

DRAFT

New Zealand Standard

**Draft Number:
DZ 4520/v2.0**

Public comment draft

**Fire-resistant
doorsets and smoke-
control doors**

Committee: P 4520

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Standards New Zealand

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New Zealand Standard

**Fire-resistant doorsets and
smoke-control doors**

Committee Representation

This draft Standard was prepared under the supervision of the P 4520 Committee the Standards Council established under the Standards Act 1988.

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Acknowledgement

Standards New Zealand gratefully acknowledges the contribution of time and expertise from all those involved in developing this Standard.

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Contents

1	SCOPE AND GENERAL	12
1.1	Scope.....	12
1.2	Application	12
1.3	Objective.....	12
1.4	Definitions.....	12
1.5	Abbreviations.....	16
2	DESIGN REQUIREMENTS	19
2.1	General.....	19
2.2	Side-hung doors, including double-acting doorsets	19
2.3	Sliding doorsets	20
2.4	Leakage performance for smoke-control doors.....	21
3	TESTING THE FIRE-RESISTANCE OF FIRE-RESISTANT DOORSETS	23
3.1	General.....	23
3.2	Vision panel.....	23
3.3	Latch set.....	23
4	TESTING THE PERFORMANCE OF SMOKE-CONTROL DOORS.....	24
4.1	General.....	24
4.2	Test specimens for smoke-control doors	24
5	VARIATIONS FROM THE TESTED SPECIMEN	25
5.1	General.....	25
5.2	Variations permitted without a formal assessment for fire-resistant doorsets.....	25
5.3	Variations permitted without a formal assessment for smoke-control doors.....	25
5.4	Variations permitted subject to a formal assessment.....	26
5.5	Minimum fire testing required for the preparation of formal assessments on fire doors	27
5.6	Formal assessments not requiring additional supporting test data for fire-resistant doorsets	29
5.7	Formal assessments not requiring additional supporting test data for smoke-control doors.....	29
5.8	Minimum air leakage testing required for the preparation of formal assessments on smoke-control doors	30
6	INSTALLATION OF FIRE-RESISTANT DOORSETS	31
6.1	General.....	31
6.2	Fixing of door frames.....	31
6.3	Clearances.....	31
6.4	Hardware	31
6.5	Final check.....	32
7	INSTALLATION OF SMOKE-CONTROL DOORS	33
7.1	General.....	33
7.2	Final check.....	33
8	MARKING AND OTHER DOCUMENTATION.....	34
8.1	Marking of fire-resistant doorsets and smoke-control doors	34
8.2	Identification and labelling	34
8.3	Information requirements.....	35
8.4	Evidence of compliance.....	35
8.5	Doorset signs.....	36
9	INSPECTION, MAINTENANCE, AND REPORTING	37
9.1	General.....	37
9.2	Weekly.....	37
9.3	Monthly	37
9.4	Six monthly	Error! Bookmark not defined.
9.5	Annually.....	37
9.6	Records	37

Appendix

Appendix A – Physical testing of fire-resistant doorsets (Informative)	38
Appendix B – Annual inspection of fire-resistant doorsets and smoke-control doors for independent qualified person (Informative).....	41

Appendix C – Sensing devices (Informative)..... 45

Table

Table C1 – Sensing device requirements 45

Figure

Figure 1 – Terms relating to side-hung fire-resistant doorsets 17
Figure 2 – Terms related to Latch set in side-hung fire-resistant doorsets 18
Figure 3 – General arrangements 21
Figure 4 – Examples of door frame installations 32
Figure 5 – Example of tag information 35
Figure B1 – Clearances to floor 42

REFERENCED DOCUMENTS

Reference is made in this document to the following:

NEW ZEALAND STANDARDS

NZS 3101: - - - -	Concrete structures Standard
Part 1:2006	The design of concrete structures
Part 1: 2006	Commentary to the design of concrete structures
NZS 4230:2004	Design of reinforced concrete masonry structures
NZS 4512:2003	Fire detection and alarm systems in buildings
NZS/BS 476: - - - -	Fire tests on building materials and structures
Part 22:1987	Methods for determination of the fire resistance of non-loadbearing elements of construction
NZS ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories

AUSTRALIAN STANDARDS

AS 1428.1:2001	Design for access and mobility – General requirements for access – New building work
AS 1530: - - - -	Methods for fire tests on building materials, components and structures
Part 1:1994	Combustibility test for materials
Part 4:2005	Fire-resistance test of elements of construction
Part 7:2007	Smoke control assemblies - Ambient and medium temperature leakage test procedure
AS 1851:2005	Maintenance of fire protection systems and equipment
AS 1890:1999	Thermally released links
AS 5007:2007	Powered doors for pedestrian access and egress
AS 6905:2007	Smoke doors

OTHER PUBLICATIONS

Department of Building and Housing. Compliance documents to the New Zealand Building Code.

Rakic, J. *So called 'tight fitting' solid core doors: Are they an appropriate design solution for fire safety engineered high rise residential apartments?* Fire Australia, 2002

Edwards, A.P.R., and Wade, C.A. Study report No, 151, *Leakage of smoke control door assemblies*. BRANZ, 2006

Edwards, A.P.R., and Wade, C.A. Study report No, 148, *Maintaining tenability of exitways in buildings in the event of fire – Literature review*. BRANZ, 2006

Warrington Fire Research Australia. FSE 04.1, *Technical specification for air leakage testing in accordance with AS 1530.7:1998*. Warrington Fire Research Australia, 2003

Method of Assessment and Test (MOAT) Number 7 for Internal and External Doorsets issued by the British Board of Agreement – Assessment of Products for Construction.

Australian Building Code Board. Building Code of Australia

NEW ZEALAND LEGISLATION

Building Act 2004
Building (Forms) Regulations 2004

WEBSITES

<http://www.legislation.govt.nz>

LATEST REVISIONS

The users of this Standard should ensure that their copies of the above-mentioned New Zealand Standards are the latest revisions. Amendments to referenced New Zealand Standards can be found on <http://www.standards.co.nz>.

REVIEW OF STANDARDS

Suggestions for improvement of this Standard will be welcomed. They should be sent to the Chief Executive, Standards New Zealand, Private Bag 2439, Wellington 6140.

FOREWORD

This Standard was prepared by New Zealand Standards committee P 4520.

The objective of this Standard is to provide manufacturers, suppliers, and installers with minimum requirements for the testing, construction, and installation of fire-resistant doorsets and smoke-control doors designed to protect the openings in walls and elements of construction that are required to resist the passage of fire or smoke.

Requirements for standard configurations and permissible variations are given in this Standard and also referred to in AS 1530.4 and AS 1530.7.

Smoke is a major contributor toward fatalities and serious injury in structural fires; therefore adequate smoke-control systems are necessary in buildings, where deemed appropriate for life safety and property protection, as applicable.

This Standard has been prepared to specify parameters for door performance based on allowable smoke-leakage rates at given temperatures and pressures. It introduces a smoke-control rating for doors, akin to a fire-resistance rating (FRR), by which the results of testing to the test method Standard, AS 1530.7, can be applied.

With the introduction of a performance-based New Zealand Building Code (NZBC), the use of smoke-control doors in buildings has increased, leading to a need to adequately specify and install doors with a quantified level of performance.

The specification of 30-minute exposure at a temperature of 200°C has been derived from the Building Code of Australia's deemed-to-satisfy requirements for smoke-control doors. Smoke door criteria have been chosen so that they represent a valid value for a smoke-control door, based on AS 1530.7.

At the time of writing there were no Standards for testing high-temperature smoke-control doors, although a project to consider a high-temperature air-leakage test is being investigated.

OUTCOME STATEMENT

NZS 4520 will continue to help prevent loss of life and provide protection to property in the event of fire by specifying requirements for the design, certification, installation, and maintenance of fire-resistant doorsets and smoke-control doors used to form part of the passive fire-protection solution in buildings.

1 SCOPE AND GENERAL

1.1 Scope

This Standard specifies requirements for the testing, construction and installation of fire-resistant doorsets and smoke-control doors used to protect openings in walls and partitions, which are required to resist the passage of fire and smoke. It also applies to transom panels over doors, where the panels are contained within the door frame and form part of the doorset.

This Standard does not apply to lift-landing doors.

NOTE –

- (1) Where it is intended to install the fire-resistant doorset in high traffic areas, it is recommended that it be tested in accordance with Appendix A prior to fire testing and that it complies with the requirements set out therein.
- (2) Guidance on information that should be supplied with an enquiry or order is given in section 9.
- (3) A panel above a doorset, which is not contained within the door frame, is considered to be part of the wall and is therefore subject to the structural adequacy, integrity, and insulation requirements set out in the Compliance Documents to the NZBC.
- (4) A smoke-control system (or other external environmental conditions) can impose forces which may override the strike plate. In such circumstances a substantially greater resistance force may be required of the strike plate to ensure the door remains in the latched position during a fire emergency.
- (5) This Standard includes the evaluation of smoke-leakage under ambient and medium temperature exposures and gives requirements for smoke-control doors.

1.2 Application

This Standard is intended to complement the fire-protection requirements of the NZBC and to be used with the appropriate clauses of AS 1530.4 and AS 1530.7. This standard also applies to doors tested to earlier versions of these Standards provided the tests were carried out prior to the publication of the latest Standard.

1.3 Objective

The objective of this Standard is to provide specifiers, manufacturers, suppliers, installers, and maintenance persons with a set of requirements for the testing, construction, installation, maintenance, and inspection of fire-resistant doorsets and smoke-control doors designed to protect the openings in walls and elements of construction which are required to resist the passage of fire and smoke as applicable.

1.4 Definitions

For the purpose of this Standard the definitions below apply. See also Figure 1 and Figure 2.

Air-leakage test	A method to determine the ability of a smoke-control door to fulfil, for a stated period of time, the required air-leakage rate criteria specified in 2.4 of this Standard when subjected to the test method specified in AS 1530.7
Applicant	An organisation or individual who sponsors a test in accordance with this Standard
Astragals	A member of combination or members applied to one or both doors of a pair at their meeting edges to close the clearance gap for the purpose of either providing a weather seal, minimising the passage of light or sound between doors or retarding the passage of smoke or flame during a fire
Automatic	Where applied to a fire-resistant doorset or smoke-control door, designed to close when activated by a sensing device in accordance with 2.1.2
Building consent authority (BCA)	Has the meaning assigned to it by the Building Act
Combustible	The classification of a material based on its reaction to defined elevated temperature conditions and which has

been subjected to the test conditions in AS 1530.1 and has exceeded flaming or temperature rise limits specified in that Standard, that is, classified as 'deemed combustible' by that test

Doorset

A complete assembly comprising:

- (a) The door leaf or leaves including any glazing and other inbuilt features;
- (b) The door frame, if any, with its fixings to the wall and, for a sliding doorset, with all guides and their respective fixings to the lintel, wall, or sill;
- (c) Any fixed panel and its associated transom or mullion (including the methods of fixing) which is contained within the door frame; and
- (d) All door hardware

Door stop

That part of a door frame against which the door leaf stops

Double-acting doorset

A doorset whose leaf is equally capable of opening in either direction, usually having no stop in its frame. It may be single-leafed or multi-leafed

Essential latching components

The components which are critical for keeping the door closed

NOTE – Electromagnetic clamp mechanisms are not considered essential latching components under this Standard since they do not necessarily keep the door closed during power failure.

Facings and edgings

The surface covering and all perimeter strips of the door leaf, including their methods of fixing

Fire-resistance rating (FRR)

The nominal grading period, in minutes, that is determined by subjecting a specimen to the standard time temperature curve regime as set out in AS 1530.4 and NZS/BS 476.22, to specify:

- (a) Structural adequacy, does not apply to doorsets;
- (b) Integrity; and
- (c) Insulation, which are expressed in that order.

The rating may include smoke-control rating as applicable that is determined by subjecting a specimen to the conditions in AS 1530.7 and meets 2.4 of this Standard.

The rating may include a requirement for a sill seal additional to all other seals around the frame or leaf as applicable to achieve the smoke-control capability

NOTE – For example, a door with an FRR of -/60/30 Sm (s) will maintain, when tested in accordance with:

- (a) AS 1530.4:
 - (i) Structural adequacy, does not apply to doorsets
 - (ii) Integrity for a period of 60 min
 - (iii) Insulation for a period of 30 min.
- (b) AS 1530.7:
 - (i) Smoke-control capability as tested to AS 1530.7 and meets 2.4 of this Standard

- (ii) If '(s)' is present in the FRR, then a sill seal is required to achieve the smoke-control capability.

Fire-resistance test	A method to determine the ability of an element of construction, component, or structure to fulfil, for a stated period of time, the required structural adequacy, integrity thermal insulation, or other expected attribute during exposure to the standard fire-resistance test regime as specified in AS 1530.4
Fire-resistant doorset	A doorset which, except when varied as permitted by this Standard, is identical in assembly, construction, and installation with a specimen doorset that has been submitted to the fire-resistance test, and has fulfilled all the relevant test requirements
	NOTE – Fire-resistant doorsets are commonly referred to as 'fire doors'.
Formal assessment	A document prepared by a competent person, experienced in both testing and writing laboratory reports, on fire-resistant or smoke-control doors of similar construction to that proposed. Also known as an 'opinion'
Full-scale test	The standard fire-resistance test carried out on a full-sized doorset (used to distinguish from a pilot test)
Furniture (door)	Visible items or parts of door hardware which may not be essential for the correct operation of the doorset
Hardware (door)	A broad term used to group all items that are fitted or related to doors and includes hinges, pivots, sliding door track assemblies, locks, latches, snibs, panic-exit devices, closers, pull handles, sequence selectors, bolts, reed switches, buffers, power transfers, hold-open devices, any part of an automatic closing device which is attached to the doorset, and all (door) furniture
Latch handle	The operating device (for example a knob or lever) that effects the retraction of the latch bolt
Mullion	A vertical bar dividing sections of a panel over a doorset within the door frame other than the door leaf (see 'transom panel')
Pilot test	A fire test of a representative section of a doorset, in a furnace complying with AS 1530.4 but having the furnace opening not less than 900 mm × 900 mm. Pilot tests are used to provide information towards the determinations of hardware and other variations
Self-closing	Equipped with a device designed to bring the door leaf to the fully closed position immediately after each opening or on release of the hold-open device or the delayed closing action, and to latch it if applicable
Similar construction	A door leaf, having the same core materials and form of construction, that is capable of achieving a fire-resistance level at least the equivalent of the tested assembly
Similar	In relation to door leaves, this shall be restricted to leaves that react to fire in a comparable manner, for example:

- (a) Non-combustible cores with steel reinforcing for the fixing of hardware items, edged and clad to construct a leaf; and
- (b) Solid timber leaves, of composite or laminated construction, that use intumescent seals to protect the edge gap from fire.

In relation to frame-to-wall sealing systems, where specified in the installation instructions, for:

- (c) Steel frames to masonry walls, any joint sealing mastic-tested to AS1530.4; and
- (d) Timber frames to masonry or plasterboard walls, any intumescent mastic tested to AS 1530.4.

Sealants shall be tested to an equivalent FRR and to be applied as per the suppliers recommendations, unless otherwise specified by the doorset manufacturer.

In relation to walls:

- (e) Any masonry or concrete construction having the same FRR; and
- (f) Any plasterboard-lined partition system, having component thicknesses equal or greater than that tested in a full scale fire doorset test and having an equivalent FRR

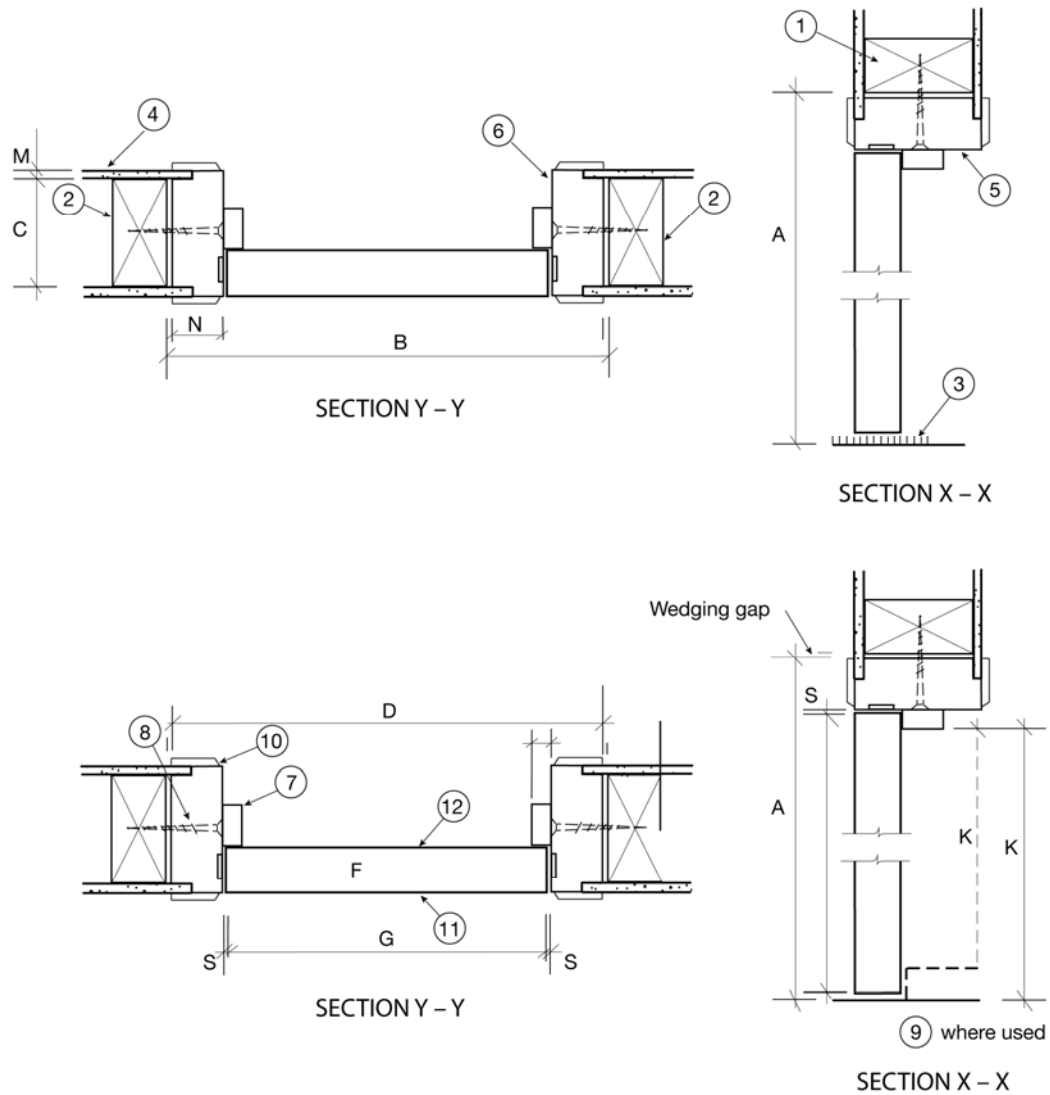
Smoke	Totality of gases and aerosols, including suspended particles, created by combustion or pyrolysis in a fire
Smoke-control door	Any combination of a door, frame, wall fixings, hardware, smoke seals, and any other accessories that together restrict smoke movement through door openings, as demonstrated by testing at medium temperature conditions in accordance with AS 1530.7
Smoke-control rating	See FRR
Smoke seals	A smoke seal is a component of a door assembly that enhances the ability of the door assembly to resist the passage of smoke
Specimen doorset	A doorset that has been subjected to the standard fire-resistance test or air-leakage test in order to establish its FRR or smoke-control rating
Strike plate	The metal plate in the frame that retains the latch bolt
Tested specimen	A specimen doorset that has been subjected to the standard fire-resistance test or air-leakage test in order to establish its FRR or smoke-control rating
Through components	Door hardware that penetrates (through) the door leaf
Transom panel	A panel mounted within the door frame above the door leaf or leaves; such a panel may be fitted above a transom member which forms part of the door frame or the panel may be fitted directly above the door leaf

Walls of concrete construction	Reinforced concrete walls constructed in accordance with NZS 3101
Walls of masonry construction	Brick or concrete block walls constructed in accordance with NZS 4230

1.5 Abbreviations

The following abbreviations are used in this Standard:

BCA	Building Consent Authority
FRR	Fire-resistance rating
IQP	Independently qualified person
Min.	Minute
N	Newtons
NZBC	New Zealand Building Code
O/A	Overall
MOAT	Method of assessment and test
S	A suffix given to a door FRR indicating the smoke-control capability requires a door sill
S _m	A suffix given to a door FRR indicating smoke-control capability



where

Trim opening

- 1 Head trimmer stud
- 2 Jamb trimmer stud
- 3 Still
- 4 Lining

Door frame

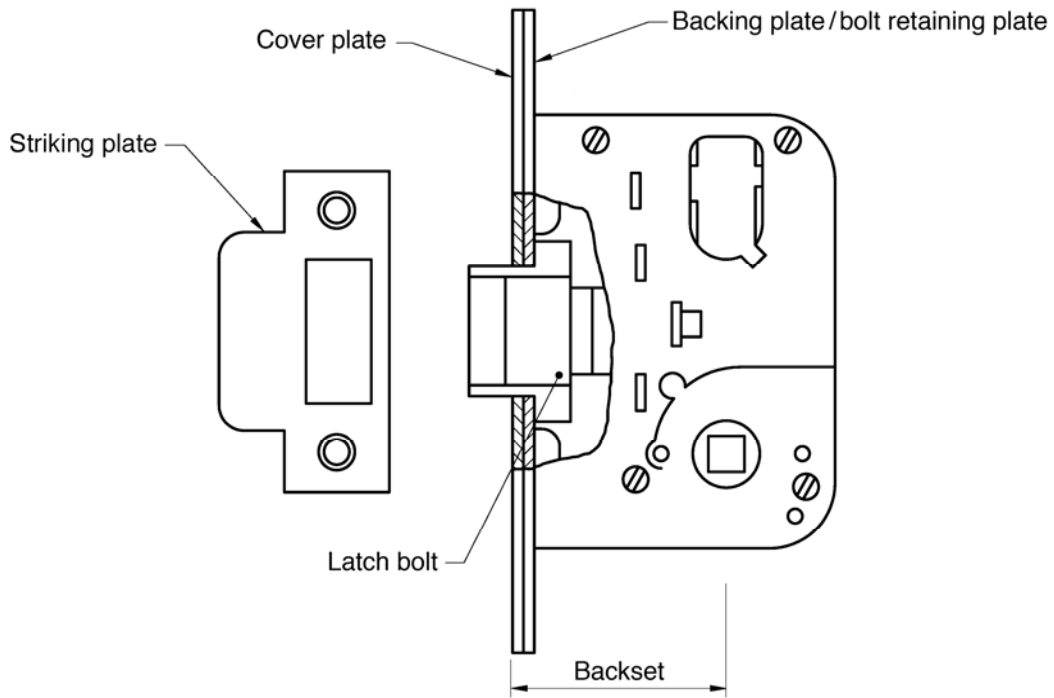
- 5 Head
- 6 Jamb
- 7 Doorstop
- 8 Fixing
- 9 Stepped sill
- 10 Architrave

Door leaf

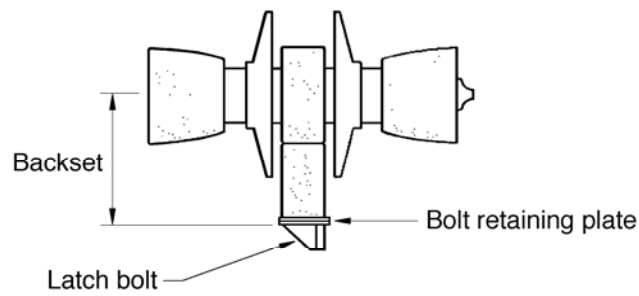
- 11 Opening face
- 12 Closing face

- A Trim height
- B Trim width
- C Stud width
- D Overall (O/A) frame width
- E Stop depth
- F Leaf thickness
- G Leaf width
- H O/A frame height
- J Leaf height
- K Clear opening height
- L Floor gap
- M Lining thickness
- N Jamb thickness

Figure 1 – Terms relating to side-hung fire-resistant doorsets



(a) Mortice latch



(b) Key in knob latch

Figure 2 – Terms related to latch set in side-hung fire-resistant doorsets

2 DESIGN REQUIREMENTS

2.1 General

2.1.1 *Materials*

Unless otherwise specified in this section, no restriction shall be imposed on the materials of construction of the doorset, provided that the tested specimen satisfies the requirements of this Standard.

2.1.2 *Self-closure*

The fire-resistant doorset or smoke-control door shall be self-closing or automatic. Automatic doorsets shall revert to self-closing on operation of a sensing device installed in accordance with the requirements of Appendix C, or on the loss of power to the electromagnetic hold-open device.

2.1.3 *Selection of hardware*

2.1.3.1 *Self latching*

A bolt or function which could in normal usage render a door leaf non-self latching shall not be incorporated.

NOTE – A non-self-latching bolt (for example a dead bolt), will prevent the door from closing if left protruding while the door is open.

2.1.3.2 *Lock sets*

Lock sets shall be suitable for their purpose with particular attention being given to durability and ease of operation.

2.1.3.3 *Electric bolts*

Electrically operated bolts shall be self-latching in the event of power failure.

2.1.3.4 *Sequencers*

Doorsets in pairs which have rebated meeting strike plates, astragals, or single-level latches shall include selective sequence-closing devices to ensure the self-closure and latching of both leaves.

NOTE – Requirements for the installation of hardware are given in 6.4.

2.1.4 *Clearances*

Clearances between the leaf and frame, finished floor, and wall shall comply with 6.3.

A means shall be provided for restricting smoke spread while the door is in the closed position.

NOTE – This is typically achieved by the use of smoke seals.

2.1.5 *Wall openings*

Wall openings shall be designed so that no structural loads are imposed on the door frame unless the frame has demonstrated its ability to sustain the loads under the conditions of the fire-resistance test.

2.2 Side-hung doors, including double-acting doorsets

2.2.1 *Hinges and pivots*

2.2.1.1 *General*

Hinges and pivots shall be aligned so that the door leaf swings without bias in the opening direction.

2.2.1.2 *Door operational forces for fire doors*

Except for doorsets incorporating floor or head springs (for which the testing of frictional forces is not practicable), when continuously applied perpendicular to the face of the door leaf at a radius of 700 mm from the pivot centre, and before the closer arm is attached, the force required to:

- (a) Move the door leaf from the fully closed position to the fully open position and return to the strike plate shall be not more than 2 N; and
- (b) Bring the door leaf to the fully latched condition shall be not more than 20 N.

NOTE – These forces exclude the effects of differential building pressures.

2.2.1.3 *Door operational force for smoke-control doors*

Except for doorsets incorporating floor or head springs (for which the testing of frictional forces is not practicable), when continuously applied perpendicular to the face of the door leaf at a radius of 700 mm from the pivot centre, and before the closer arm is attached, the initial opening force for the smoke-control door at the handle position shall not exceed 50 N.

NOTE – This force limit excludes the effects of differential building pressures. Excessive differential building pressures can severely compromise the performance of smoke-control doors and should be avoided where practicable.

2.2.2 *Closer pressure relief for fire doors*

All closers that incorporate:

- (a) Packing gland type pressure seals;
- (b) An O-ring seal with a backup seal; or
- (c) Cup seals with a backup seal;

shall incorporate a vent, plugged with material of temperature of fusion below 100°C, and located above the level of oil in the hydraulic chamber.

2.2.3 *Opening shock protection*

The self-closure system shall provide a cushioning action to prevent shock when the door is forcibly opened. This action shall not commence until the door leaf has opened to not less than 75°, and shall be effective over not less than the last 5° of opening (see Note 1). If an adjustable valve is provided, that valve shall not be capable of preventing the cushioned back-checking action.

NOTE –

- (1) The final angle of effectiveness of the cushioned back-checking action depends on the particular location where each fire-resistant doorset is to be installed.
- (2) For the purposes of fire-resistance testing, it is recommended that the maximum opening angle of the door is assumed to be 90°, and that the tested specimen be set to permit this angle of door opening.

2.3 **Sliding doorsets**

Regulations may place restrictions on the use of sliding doors. Where sliding doors are permitted, they shall be in accordance with 2.3.1 to 2.3.4.

2.3.1 *Flush pulls and grips*

Where a finger pull or grip is recessed into the face of the door leaf, and does not provide for a retractable 'D' handle, the recess shall:

- (a) Measure not less than 25 mm wide × 70 mm high; and
- (b) Offer not less than 20 mm depth of finger purchase in a plane normal to the direction of door movement, except that where the recess is undercut by not less than 5° to the plane normal to the direction of door movement, the depth of finger purchase may be reduced to 12 mm.

Where pulls or grips are recessed into both faces of the door leaf, they shall be staggered in their location to give a clear distance of not less than 75 mm between any of their parts. They shall be located vertically so that they are not less than 900 mm nor more than 1200 mm above the finished

floor level on the side from which they are visible. Terms relating to sliding doorsets are shown in Figure 3.

2.3.2 Directional arrows

All sliding fire-resistant doorsets shall be provided with sharply-delineated arrows of the form shown in Figure 3, which shall indicate the direction of opening of the door. The surface of such arrows shall be not less than 3 mm above or below the plane of their surround, and the arrows shall be located at the midpoint of the face of each door leaf at a height not less than 900 mm, nor more than 1200 mm, above floor level.

2.3.3 Fusible links

Where the doorset is automatic the sensing device that activates the door closure or release shall be of a type suitable for that particular application.

2.3.4 Automatic closing

Where a sliding fire-resistant doorset is automatic, the operation of the door shall comply with the appropriate provisions of AS 5007, and in particular, the kinetic energy requirement.

NOTE – The total kinetic energy of the door leaf (or leaves) should not exceed 27 joules at any point in the closing cycle.

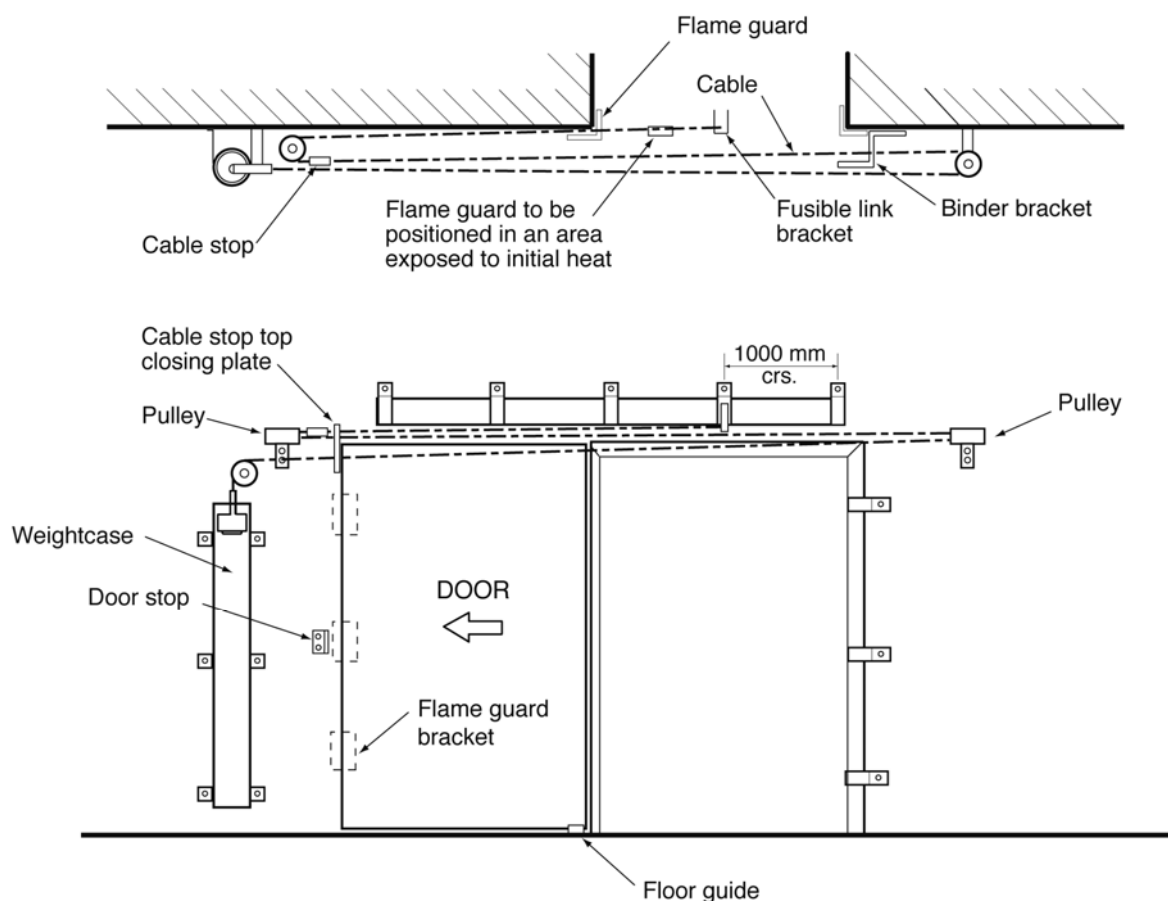


Figure 3 – General arrangements

2.4 Leakage performance for smoke-control doors

When tested in accordance with section 3, the smoke-control door leakage rates shall not exceed the following:

- (a) Single-leaf smoke-control doors – 40 m³/h at medium temperature conditions (25 m³/h corrected to standard reference conditions), at a pressure differential of 25 Pa after exposure at 200°C for at least 30 min when subjected to a test in accordance with AS 1530.7; and
- (b) Two-leaf smoke-control doors – 65 m³/h at medium temperature conditions (40 m³/h corrected to standard reference conditions), at a pressure differential of 25 Pa after exposure at 200°C for at least 30 min when subjected to a test in accordance with AS 1530.7.

C2.4

The test-leakage rate has been derived predominantly from AS 1530.7.

Prior to this time no definitive test leakage-criteria has been set out or defined within Australasia. Both New Zealand and Australia's Building Codes only set out performance criteria for compliance. The problems associated with the actual performance of smoke-control doors which meet the requirements of the Building Code of Australia have been identified by experimental test methods in Australia, for sprinkler controlled and uncontrolled fires (Rakic, 2002) and in New Zealand (BRANZ Study Report no. 151, 2006). The latter identifying that a smoke-control door, complying with the C/AS1 prescriptive criteria at the time, does not necessarily achieve the maximum leakage criteria of 20-25m³/h used for 'life safety considerations' in other countries.

BRANZ Study Report no. 148 (2006) provides a summary of smoke-door-leakage criteria set out by various international Standards. The report highlights the aforementioned maximum leakage criteria used for 'life safety consideration'. Consequently this criteria has been used to form the basis of the criteria stipulated for medium temperature air-leakage tests in AS 6905, and likewise in this Standard.

The Committee has also noted the following, when deciding to incorporate the medium temperature leakage criteria proposed:

- (a) *The maximum leakage criteria specified in AS 6905 for a single leaf smoke door at medium temperature conditions (200°C for at least 30 minutes in accordance with AS 1530.7) is 40 m³/h (25 m³/h when corrected to standard reference conditions), at a pressure differential of 25 Pa. For a two-leaf smoke door under the same conditions the specified maximum leakage criteria is 65 m³/h (40 m³/h when corrected to standard reference conditions). Testing in Australia has shown that these values are achievable;*
- (b) *Warrington Fire Research Australia (2003) recommended more conservative values of 15 m³/h and 30m³/h for single and double smoke-control doors respectively;*
- (c) *The Building Code of Australia requires air-leakage testing to 200°C, but does not define any test method or acceptance criteria. Notwithstanding this, no air-leakage test methodology or acceptance criteria is currently specified by the Building Code of Australia; and*
- (d) *Standards for air-leakage testing of smoke-control doors from other countries, including AS 1530.7, specify procedures for both ambient and medium temperature conditions. Smoke-control doors having passed the leakage criteria under medium temperature test conditions are, except in a few instances, expected to also achieve acceptable lower leakage rates when subjected to ambient temperature test conditions compared to medium temperature conditions. Consequently, to suit the New Zealand environment and to negate associated costs which it would incur if included as a mandatory component of this Standard, the Committee has decided that the additional ambient test methodology need not form part of this Standard.*

3 TESTING THE FIRE-RESISTANCE OF FIRE-RESISTANT DOORSETS

3.1 General

The fire resistance of the doorset shall be determined by submitting a specimen doorset to the fire-resistance test specified in AS 1530.4.

The tests shall be carried out by a test laboratory accredited to NZS ISO/IEC 17025.

NOTE – For pilot tests, where the purpose of the test is to validate a variation, the direction of fire exposure and the specimen mounting may differ from the provisions at full scale. In each instance the mounting and direction may be arranged to gather the data needed for the validation, subject to each feature being examined for the least favourable conditions.

3.2 Vision panel

Where a fire-resistant doorset includes non-insulated vision panel(s) up to a total 65 000 mm² clear opening area, the vision panel(s) shall not be taken into account when determining failure in respect to the insulation and radiation criteria of the doorset when subjected to the standard fire test.

3.3 Latch set

The latch bolt shall be designed to provide a positive latching action and remain engaged at the conclusion of the fire test. If the latching cannot be determined by visual examination, the ability to resist a perpendicular force of 20 N shall be an indication of a latched state.

4 TESTING THE PERFORMANCE OF SMOKE-CONTROL DOORS

4.1 General

The performance of a smoke-control door shall be determined by subjecting a representative smoke-control door to a medium temperature smoke test in accordance with AS 1530.7.

The tests shall be carried out by a test laboratory accredited to NZS ISO/IEC 17025.

4.2 Test specimens for smoke-control doors

4.2.1 *General*

Specimens of smoke-control doors shall be tested in a representative wall system in which they are intended to be installed, they shall be self-closing, and shall comply with the relevant design requirements specified in section 2.

NOTE – The key elements in this test are the interface between the wall and door frame; and door leaves, frame, and door-sealing system.

4.2.2 *Clearances*

The clearance dimensions required for smoke-control doors shall be as demonstrated on a tested specimen.

NOTE – Clearance requirements may be influenced by fire, serviceability, and security considerations.

4.2.3 *Transoms, side lights and side panels*

Doors intended for installation in frames containing transoms, sidelights, or side panels shall be tested with such frames if these elements form a critical part of the sealing system.

NOTE – For example, an openable/removable transom panel.

4.2.4 *Orientation*

Smoke-control doors shall be tested opening towards and away from the heated enclosure unless the direction of exposure can be clearly identified.

5 VARIATIONS FROM THE TESTED SPECIMEN

5.1 General

The basis of this Standard is the production and testing of a specimen fire-resistant doorset or smoke-control door and the subsequent production and installation of additional fire-resistant doorsets or smoke-control doors which have equivalent performance to the tested specimen.

Any variations from the tested specimen shall:

- (a) Satisfy the requirements of AS 1530.4 for fire-resistant doorsets;
- (b) Satisfy the requirements of 5.3 for smoke-control doors; or
- (c) Be subject to a formal assessment confirming that the variation is within the requirements of 5.4.

5.2 Variations permitted without a formal assessment for fire-resistant doorsets

Refer to AS 1530.4.

5.3 Variations permitted without a formal assessment for smoke-control doors

The following variations to the smoke-control doors are permitted without the need for a formal assessment:

- (a) Decrease in size of the opening;
- (b) Increase in door-leaf thickness and associated change in the frame rebate;
- (c) Installations in similar wall types with the same frame-fixing and sealing detail;

NOTE – ‘Similar wall types’ refers to walls that have similar deflections under the test conditions. Permissible ‘similar wall types’ without a formal assessment are those that match the permissible variations to the tested wall as specified in AS 1530.4 or for smoke-control doors tested in walls of masonry or concrete construction any wall of masonry or concrete construction is permissible.

- (d) Surface-mounted or concealed door closers provided they do not compromise the seal performance and provide similar opening and closing forces to those stated in the test report;

NOTE – Loss of fluid does not reduce the spring force in the door closer, which is the essential component of maintaining closure.

- (e) Door locks/latch sets that:
 - (i) Do not interrupt or compromise the operation of smoke seals
 - (ii) Have latch engagement equal to or greater than the tested prototype
 - (iii) Have comparable leakage paths to the tested specimen
 - (iv) Have essential latching components with melting points higher than that tested, and
 - (v) Do not increase the amount of material removed from the door leaf;
- (f) Items of non-essential hardware fitted to smoke-control doors that:
 - (i) Do not fully penetrate the door leaf nor do their fixings,
 - (ii) Do not interrupt or compromise the operation of smoke seals,
 - (iii) Do not significantly compromise the strength, stiffness or thermal resistance of the smoke-control door, and
 - (iv) Do not form a leakage path to a void within the door leaf;
- (g) Increased or decreased width of the architrave of the doorframe;

NOTE – Reduction in the architrave width of metal frames may limit the range of strike plates/boxes that may be fitted.

- (h) Variety of metals used in the construction of a previously tested hinge, provided the melting point is not decreased below 500°C; and
- (i) Increased number of hinges without additional air-leakage testing provided they do not compromise the seal performance.

5.4 Variations permitted subject to a formal assessment

5.4.1 *General*

For fire-resistant doorsets, variations shall be permitted only if supported by a formal assessment from an assessor that the fire-resistant doorset is capable of achieving the FRR despite the minor departure from the tested specimen, unless the variation is permitted by AS 1530.4.

For fire-resistant doorsets, all formal assessments shall be derived from the results of one or more full-scale fire-resistance tests which are used as the basis of demonstrating that the doorset would achieve the fire-resistance level if subjected to the fire-resistance test. Clause 5.5 sets out the minimum fire testing requirements for the preparation of the formal assessment.

For smoke-control doors, variations and substitutions to the tested specimen that are not listed in 5.4 shall be permitted only if supported by a formal assessment from an assessor that the smoke-control door is capable of achieving the leakage rate, despite the minor departure from the tested specimen.

For smoke-control doors all formal assessments shall be derived from the results of one or more AS 1530.7 tests, which shall be used as the basis of demonstrating that the smoke-control door would achieve the leakage level if subjected to the AS 1530.7 test. Clause 5.5 sets out the minimum testing requirements for the preparation of the formal assessment.

NOTE – The assessor may require more than the minimum testing requirements before issuing a formal assessment.

5.4.2 *Preparation and presentation of formal assessments*

Formal assessments shall be prepared and presented as follows:

- (a) Each formal assessment shall be based on one or more full-scale FRR tests and may be supported by one or more pilot tests as specified in AS 1530.4, or air-leakage tests as specified in AS 1530.7;
- (b) The formal assessment shall be derived directly from the test results, if appropriate, by means of a technical analysis of the effects of the proposed variations in relation to the failure criteria of the fire-resistance test. Other formal assessments may be referred to for clarification or to avoid unnecessary repetition.
- (c) The formal assessment shall include at least the following:
 - (i) Reference to the full-scale test or air-leakage test including a general description of the tested item and the specific results achieved relevant to the formal assessment
 - (ii) Reference to other supporting information
 - (iii) A detailed statement of the permissible variation(s)
 - (iv) A summary of the critical issues leading to the formal assessment, including the main points of the argument and any assumption made
 - (v) Verification that the varied fire-resistant doorset or smoke-control door complies with section 2 and 4.2
 - (vi) Details of the organisation requesting the formal assessment
 - (vii) A statement of the formal assessment, including the number and date of the Standard against which the fire resistance has been assessed
 - (viii) The name of the person and the organisation accepting responsibility for the formal assessment
 - (ix) The name of the individual(s) preparing and reviewing the formal assessment together with their signatures and the date
 - (x) The name of the assessor preparing the report; and
- (d) Formal assessments shall be prepared by competent persons experienced in both testing and writing laboratory reports on fire-resistant doorsets or smoke-control doors, as appropriate, of similar construction to that proposed.

5.5 Minimum fire testing required for the preparation of formal assessments on fire doors

5.5.1 *General*

For the purposes of this Standard, fire testing required for the preparation of formal assessments falls within one of the following three categories:

- (a) Full-scale testing;
- (b) Full-scale testing or pilot testing; or
- (c) No testing.

Variations other than those specified in this clause and AS 1530.4 shall be subjected to the fire-resistance test which shall be either full-scale or pilot as specified in 5.5.2 and 5.5.3.

5.5.2 *Full-scale testing*

The requirements for full-scale testing are as follows:

- (a) Change of wall construction – For wall constructions other than masonry or concrete, variation of the wall type or wall system shall not be made unless the doorset has been subjected to a full-scale fire-resistance test in a wall type or system which has been the subject of a full-scale fire test, and has:
 - (i) The same (or more severe) deflection characteristics as the proposed wall
 - (ii) The same frame (and sliding-door track) and wall mounting details on the proposed wall, and
 - (iii) Achieved the required fire-resistance level;

NOTE – For example, for a drywall system the results obtained for a fire doorset, fire tested in a 64 mm steel-stud partition faced with two layers of 16 mm plasterboard, may be applicable to a similar partition with greater stud depth or greater facing thickness.

- (b) Facing and edging material – Except for the variations permitted by AS 1530.4, variations shall only be made in the materials used for facings and edgings where a full-scale test has been performed on a doorset of the same or equal construction, but with the alternative facing or edging material;
- (c) Door frame packing materials and fixing – Changes shall only be made to the packing materials and the method of fixing of a door frame if the door frame has been subjected to a full-scale fire-resistance test. A full-scale or pilot test of the changes may be required at the discretion of the testing laboratory;

5.5.3 *Full-scale testing or pilot testing*

For a pilot test the clearances between the specimen and the walls, floor and ceiling of the furnace may be reduced from those specified in AS 1530.4, in order to ensure that the size of the pilot specimen is representative.

The requirements for full-scale testing or pilot testing are as follows:

- (a) Lockset – A different lockset shall only be substituted for the lockset on the tested specimen if it has been subjected to the fire-resistance test on a doorset of similar construction, or if the essential latching components from the same manufacturer are substituted by those constructed from materials of greater or equal melting point.

The requirements for a full-scale test or pilot test for locksets from the same manufacturer may be waived if:

- (i) There is no increase in the amount of material removed from the door leaf, and
- (ii) The alternative lockset from the same manufacturer on a doorset of the same or equal construction is similar to a lockset that has been subjected to a full-scale test or pilot test and all variations of essential latching components are identified and drawn to the attention of the assessor;

- (b) Panic-exit device – A different Panic-exit device shall only be substituted for the Panic-exit device on the tested specimen if it has been subjected to the fire-resistance test on a tested doorset of similar construction. Variations to the form and material of architectural hardware may not require fire testing;
- (c) Surface-mounted closers – An alternative surface-mounted closer that is not manufactured by the same manufacturer, manufactured from the same materials using the same operating mechanism designs, of the same series, of equal or smaller size, and using the same hydraulic fluids, shall not be used unless it complies with the following:
 - (i) For a Steel-framed doorset – the closer has been subjected to a full-scale fire-resistance test, or pilot test, installed on the unexposed side of a doorset of similar construction, and a full-scale fire-resistance test has been conducted with a Surface-mounted closer or simulated weights, or greater or equal melting point and turning moments, installed on the exposed face of the door leaf
 - (ii) For a timber-framed doorset – the closer has been subjected to a full-scale fire-resistance test or pilot test, installed on the unexposed side of a doorset of similar construction;
- (d) Alternative closers – Door pivots, floor and head springs, and concealed/semi-concealed closers shall only be substituted if supported by test data from a fire test on a doorset of the same construction;
- (e) Vision panel(s) – Vision panel(s) shall only be incorporated in a door leaf without full-scale testing if all of the following requirements are satisfied:
 - (i) Vision panel(s) shall not exceed 65 000 mm² in area

NOTE – For fire-resistant doorsets including a non-insulated vision panel, it has been established that, provided the vision panel does not exceed 65 000 mm², the received radiation at 365 mm from the panel will not exceed 10 kW/m². For this reason a vision panel up to 65 000 mm² is not required to be taken into account when determining failure with respect to the insulation and radiation criteria fire-resistance test in AS 1530.4.

- (ii) The location of the opening shall not encroach on any structural framework of the door leaf in which it is placed
- (iii) A pilot test of a doorset incorporating the vision panel, and similar in construction to the tested specimen, shall demonstrate that, in the formal assessment of an assessor, the inclusion of the vision panel does not prejudice the achievement of the established fire-resistance level of the tested specimen
- (iv) When considering radiation, reference shall be made to AS 1530.4

The location of an existing vision panel may be varied, provided compliance with the requirements of this clause is maintained;

- (f) Dimensions of vision panel – The proportions of the vision panel shall only be varied by increasing the height of the tested vision panel by up to 50 percent and when:
 - (i) There is no increase in either the width or the area of the vision panel
 - (ii) The requirements of (e)(iii) are satisfied; and
- (g) Furniture, seals, and other components – Where combustible materials are added or modified or there is a reduction in the melting point of through components, or of fixings and components covering or filling through gaps in the door leaf, the alternative furniture or other components shall have demonstrated, in a pilot test or full-scale test on a doorset of similar construction, that they did not induce failure during the required period.

5.6 Formal assessments not requiring additional supporting test data for fire-resistant doorsets

Additional fire testing may not be required for the preparation of formal assessments in the following instances:

- (a) Increase of overall size of the doorset – The dimensions of the doorset that has been the subject of a full-scale fire-resistance test may be increased without additional fire testing;
- (b) Architrave width of door frame – The width of the architrave of the door frame that has been the subject of a full-scale fire-resistance test may be increased or decreased without additional testing;

NOTE – Reduction in the architrave width of metal frames may limit the range of strike plates/boxes that may be fitted.

- (c) Alternative hinge materials – The materials used in the construction of a previously tested hinge may be varied providing the melting points of the new material are not decreased;
- (d) Number of hinges – The number of hinges may be increased without additional fire testing;
- (e) Where equivalent load-bearing capacity can be demonstrated, steel hinges or door-leaf restraining devices may be interchanged for the centre hinge of a three-hinged system; and
- (f) Furniture and other components – Furniture and other components such as viewing lenses and security plates may be added or deleted without additional testing, subject to the formal assessment (see also 5.5.3).

5.7 Formal assessments not requiring additional supporting test data for smoke-control doors

Additional testing may not be required for the preparation of formal assessments in the following instances:

- (a) Increase of overall size of the smoke-control door – The dimensions of the full-sized smoke-control door that has been subjected to the air-leakage test of AS 1530.7 may be increased without additional testing;
- (b) Non-essential hardware – Furniture and other components, other than those permitted in 5.4, such as viewing lenses and security plates, may be added or deleted without additional testing, subject to the formal assessment. The formal assessment shall include consideration of the performance of the components when exposed to medium temperature conditions and any interactions with the door seals;
- (c) Frame fixing, wall-to-frame sealing – Changes to frame fixing and wall-to-frame sealing; and
- (d) Door frame packing materials and fixing, and frame materials – Changes to the packing materials and method of fixing of a doorframe and frame materials, only, when in the formal assessment of the assessor, the strength, stiffness, and thermal performance of the frame are unlikely to be compromised and the deflection characteristics would be expected to be similar to the tested specimen.

For alternative wall constructions other than masonry or concrete, variation of the wall type or wall system shall not be made unless the smoke-control door has been subjected to the air-leakage test in a wall type or system that has been subjected to the air-leakage test, and has similar (or more severe) deflection characteristics as the proposed wall when exposed to medium temperatures.

5.8 Minimum air-leakage testing required for the preparation of formal assessments on smoke-control doors

The minimum testing requirements for the preparation of formal assessments shall be as follows:

- (a) Door construction – The performance of a smoke-control door shall only be assessed with an alternative seal configuration if the alternative seal combination has been subjected to an air-leakage test in accordance with AS 1530.7 on a smoke-control door with similar deflection characteristics after exposure to 200°C for a period of at least 30 min;
- (b) Facing, adhesive, and edging material – Variations shall only be made in the materials used for facings and edgings where the air-leakage test has been performed on a smoke-control door of the same or equal construction, but with the alternative facing or edging material, and the deflection characteristics, when exposed to medium temperatures for a period of at least 30 min, are similar or less than the tested specimen;
- (c) Vision panel(s) – Vision panel(s) shall only be incorporated in a door leaf without further testing if all of the following requirements are satisfied:
 - (i) The location of the opening shall not encroach on any structural framework of the door leaf in which it is placed
 - (ii) The air-leakage test of a smoke-control door incorporating the vision panel system has been performed
 - (iii) The contribution to the total leakage rate from the vision panel can be established from tests in accordance with AS 1530.7 after exposure to 200°C for at least 30 min
 - (iv) The only variation in the dimensions of the vision panel is an increase of the height of the tested vision panel by up to 50%. There shall be no increase in either the width or area of the vision panel.

NOTE –

- (1) The location of an existing vision panel may be varied, provided compliance with the requirements of this clause is maintained.
- (2) Different glass types may perform differently and so are not exempt from testing for the preparation of a formal assessment.

In addition to testing an example of the proposed variations to the door sealing system or from leaf construction, a series of tests shall have been performed in order to allow the proposed variation to be assessed for the following:

- (d) Singles to pairs and vice-versa; or
- (e) Alternate directions of swing.

The tests shall comprise single-leaf doors opening both towards and away from the heat, and pairs of doors opening both towards and away from the heat.

Louvres shall not be installed as part of the smoke-control door unless satisfactory test evidence in accordance with AS 1530.7 is available.

6 INSTALLATION OF FIRE-RESISTANT DOORSETS

6.1 General

The method of installation of any fire-resistant doorset shall be the same as that for the tested specimen, except as permitted by 3.2, 3.3, 5.4, and AS 1530.4.

6.2 Fixing of door frames

The door frame shall be fixed as in the tested specimen (see section 3) except as permitted in 5.4. Examples of door frame installations can be found in Figure 4.

NOTE – For masonry construction, walling units and lintels should be entered as deeply as practicable into the jamb cavities, and frame head and jamb cavities should be thoroughly and progressively grouted in with cement mortar. In addition, frames built into masonry walling should be provided with corrosion-resistant metal anchors designed to provide jambs with positive rotational restraint about their vertical axes. Such anchors should be of similar type to, and be not less in number or greater in spacing than, those of the tested specimen. In any case, anchors should be built into mortar joints to a depth of not less than 75 mm at spacings not exceeding 400 mm vertically. Where, as construction progresses, the frame is incorporated in the wall, it is recommended that it be thoroughly and progressively grouted with mortar.

6.3 Clearances

The clearance dimensions required for fire-resistant doorsets shall be in accordance with the tested specimen.

6.4 Hardware

6.4.1 *Travel-limiting devices*

Every side-hung or double-acting fire-resistant doorset shall be protected by means of buffers, stops or other travel-limiting devices, to prevent damage in any installation where the fire-resistant doorset or its accessories could be subjected to forceful or careless operation. The travel-limiting devices shall be located so as to minimise strain or racking of the door leaf.

NOTE – For the purpose of this clause, a door closer is not considered to be a travel-limiting device.

6.4.2 *Counter-weighting system for sliding doors*

6.4.2.1 *Protection*

Where a counter-weighting system is used to provide automatic closure of sliding fire-resistant doorsets in a fire, this system shall be protected to ensure free operation by means of adequate guards or enclosures. The counterweights shall be not less than 150 mm clear of the floor in the door-closed position.

6.4.2.2 *Adjustment*

At the time of installation the counter-weighting systems shall be adjusted as follows:

- (a) Where it is necessary to pass through the fire-resistant doorset to reach the required exit, the force required to achieve the following shall not exceed 110 N:
 - (i) To move the door leaf from its closed position
 - (ii) To move the door leaf from its stationary position after the release mechanism has operated
 - (iii) To operate the door leaf through its full travel; and
- (b) In other cases, the force required shall be as follows:
 - (i) To move the door leaf from its closed and stationary position after the release mechanism has operated not more than 180 N
 - (ii) To operate the door leaf through its full travel (that is not more than 135 N).

6.5 Final check

When the installation is complete, the fire-resistant doorset shall latch satisfactorily from the fully open position and from any intermediate position, and the closers shall demonstrate satisfactorily opening shock protection as required by 2.2.3.

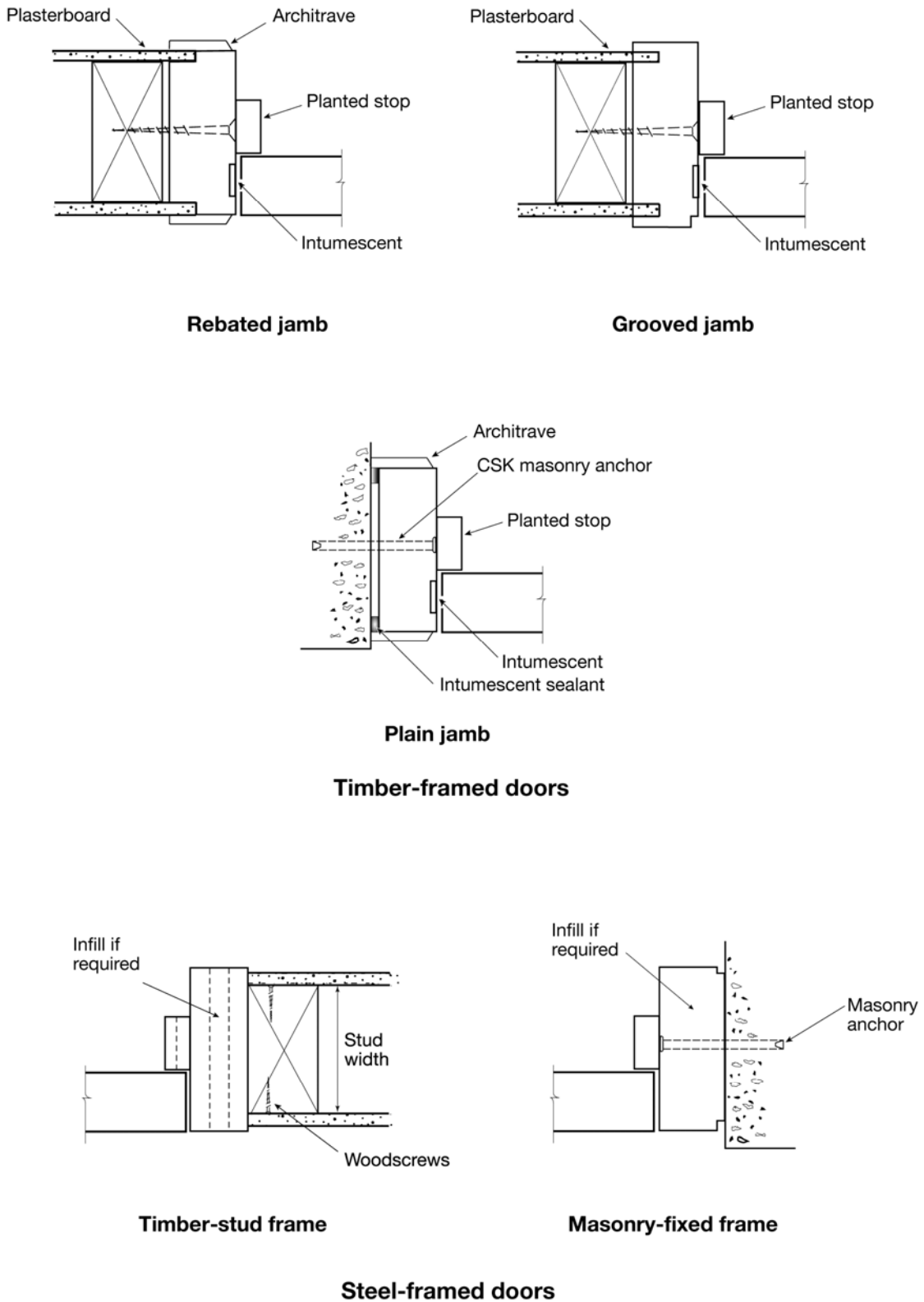


Figure 4 – Examples of door frame installations

7 INSTALLATION OF SMOKE-CONTROL DOORS

7.1 General

The method of installation of any smoke-control door shall be the same as that for the tested specimen.

7.2 Final check

When the installation is complete, the smoke-control doors shall close satisfactorily from the fully open position and from any intermediate position, and the closers shall demonstrate satisfactorily opening shock protection as required by 2.2.3.

8 MARKING AND OTHER DOCUMENTATION

8.1 Marking of fire-resistant doorsets and smoke-control doors

8.1.1 *General*

The marking of fire-resistant doorsets and smoke-control doors shall be in accordance with the requirements of this section.

8.1.2 *Completed installation*

The manufacturer shall supply an installer's declaration form with the doorset to be completed and signed by the installer and returned to the manufacturer.

This declaration shall include:

- (a) A list of hardware and accessories fitted to the doorset. If there is any doubt about the compliance of any item the doorset manufacturer should be consulted prior to the item being fitted;
- (b) The wall type, specification, and brand where applicable;
- (c) A statement that the doorset has been installed in accordance with the manufacturers instructions;
- (d) A statement that the installation clearances are compliant;
- (e) A statement that all opening and closing forces have been checked and are within the requirements of this Standard under representative conditions;
- (f) A statement that hinges or pivots are correctly aligned;
- (g) A statement that the doorset latches satisfactorily from the fully open position and from any intermediate position, and the closer, if any, demonstrates satisfactory action as specified in 2.2.2 under representative conditions;
- (h) A statement that the sill is in compliance with this Standard;
- (i) A statement that seals (if required) are correctly aligned and operating; and
- (j) A statement that a door stop has been fitted in the correct position to each leaf to minimise the risk of damage to the leaf, frame, and hinges.

When the signed installer's declaration form has been returned to the manufacturer the manufacturer shall supply the labels to the installer who shall attach them in the locations specified in this Standard.

If, for any reason, the doorset is not compliant with this Standard the reference to this Standard on the tag shall be crossed out. The installer shall provide the manufacturer with supporting documents as to the reason for noncompliance when returning the declaration.

8.2 Identification and labelling

8.2.1 *Type of label*

Labelling shall take the form of permanently affixed tags.

8.2.2 *Position of labels*

The position of the label shall be as follows:

- (a) For side-hung fire-resistant doorsets and smoke-control doors, sufficient labelling shall be fixed to the edge of the hinge stile of the door leaf and to the door frame at approximately 1.5 m above floor level;
- (b) For two-leaf fire-resistant doorsets and smoke-control doors, each leaf of the door shall be labelled;
- (c) Where the installation of a label on the edge of the fire-resistant doorsets and smoke-control door is likely to compromise the performance of the door, the label shall be relocated to the face of the door leaf at its top-hinged corner; and
- (d) The labels shall be permanently fixed to minimise the possibility of detachment during the service life of the fire-resistant doorsets and smoke-control door.

8.2.3 Tags

The following provisions shall apply to tags:

- (a) Method of marking – The required information shall be etched, embossed, or stamped on the tags so that it is recessed or projected not less than 0.25 mm below or above the surface of the tag. Alphabetic or numeric characters shall be not less than 1.5 mm high;
- (b) Location – The location of the tags shall be as follows:
 - (i) *Horizontally-sliding doorsets* – For horizontally-sliding doorsets, the tags shall be fixed to the trailing edge of the door leaf at approximately 1.5 m above floor level and to the door frame, if any, at approximately the same height
 - (ii) *Side-hung doorsets* – For side-hung doorsets the tags shall be fixed to the edge of the hinge stile of the door leaf and to the door frame at approximately 1.5 m above floor level
 - (iii) *Two-leafed doorsets* – Each leaf of a two-leafed doorset shall be tagged
 - (iv) *Tag installation* – Where the installation of a tag on the edge of the door is likely to compromise the performance of the door, the tag shall be relocated to the face of the door leaf at its top hinged corner; and
- (c) Method of fixing – The tags shall be permanently fixed to minimise the possibility of detachment during the service life of the doorset.

NOTE – Permanent fixing could be achieved by screwing, rivet, or adhesives.

8.3 Information requirements

The following information shall be shown on the tags:

- (a) Number of this Standard;
- (b) Name of the manufacturer;
- (c) Identification number of the individual doorset as recorded in the manufacturer's register;
- (d) Fire-resistance rating of the doorset in minutes or the smoke-control requirement, or both; and
- (e) Date of manufacture.

Figure 5 shows an example of the information required.

Fire-resistant doorset and smoke-control door To NZS 4520:2010 FRR –/xx/yy Sm (s) (as applicable) MANUFACTURED BY (company) LTD DOORSET NO. 12345 YEAR OF MANUFACTURE – 2010

Figure 5 – Example of tag information

8.3.1 Additional marking for fire-resistant doorsets

Fire-resistant doorsets that are approved for exposure to fire from one side only, shall be additionally marked indicating the face that was facing the furnace in the fire-resistance test of the tested specimen.

8.4 Evidence of compliance

8.4.1 Attachment

The attachment of tags to the doorset shall be evidence of compliance with this Standard except where the reference to this Standard on the tag has been crossed out (see 8.2.1).

8.4.2 Further evidence to be provided

When the installation of a fire-resistant doorset in a building has been completed, the manufacturer shall, upon request, provide to the building owner, or the building owner's representative, written confirmation that:

- (a) Each fire-resistant doorset is identical with the tested specimen, or, where there are variations from the tested specimen, the variations are in accordance with this Standard; and
- (b) The fire-resistant doorset has been installed in accordance with this Standard.

8.4.3 *Register*

The manufacturer shall maintain a register of doorsets which shall be made available for inspection to any person having reasonable cause for such inspection, listing the following information:

- (a) Building identification;
- (b) Integrity, insulation, and smoke-control rating (leakage rate), where applicable;
- (c) Installing company's name and address;
- (d) Date the door was despatched;
- (e) Date the declaration was received; and
- (f) Details of hardware fitted.

8.5 **Doorset signs**

8.5.1 *Installation*

Every doorset required to possess fire- or smoke- control capabilities shall have a sign fixed to both sides of the door leaf, stating 'FIRE DOOR, PLEASE KEEP CLOSED', or 'SMOKE-CONTROL DOOR, PLEASE KEEP CLOSED', except that door leaves fitted with hold-open devices shall have signs stating only 'FIRE DOOR, KEEP CLEAR' or 'SMOKE-CONTROL DOOR, KEEP CLEAR'.

8.5.2 *Size and colour*

The size and colour of the sign shall be in accordance with NZBC, clause F8.

9 INSPECTION, MAINTENANCE, AND REPORTING

9.1 General

The following inspection, maintenance, and reporting procedures shall be carried out and recorded in accordance with 9.6, at the intervals specified, by the nominated person. The owner may undertake procedures where noted as permitted, only if they can demonstrate competence to the Independently Qualified Person (IQP).

Opening, closing, and latching force limits for fire-resistant doorsets and smoke-control doors shall be maintained throughout the service life of the door unless a service limit is explicitly specified.

9.2 Weekly

The following procedures shall be carried out at weekly intervals by the IQP, the owner, or the owner's representative:

- (a) A visual check of the doorset for damage to the fabric of the door, self-closing device, or other furniture;
- (b) Ensure the door closes on to the stop (if not a double swing door) and the latch operates and if a double doorset the sequencer operates correctly; and
- (c) Ensure door is not held open by any mechanism or object that will prevent the door from closing or functioning in the event of fire (for example wedges, cabin hooks).

9.3 Monthly

The following procedures shall be carried out at monthly intervals by the IQP or the owner:

- (a) As for 9.2;
- (b) Any smoke seals fitted are in place and not damaged; and
- (c) Tags are in place and not damaged.

9.4 Biannually

The following procedures shall be carried out at 6-monthly intervals by the IQP:

- (a) As for 9.2 and 9.3;
- (b) Check and adjust self-closing device to ensure correct operation; and
- (c) Check the records of owner testing.

9.5 Annually

The following procedures shall be carried out annually by the IQP:

- (a) As for 9.2, 9.3, and **Error! Reference source not found.**;
- (b) Ensure a 'Certificate of Compliance', (Form 12A in the Building (Forms) Regulations 2004) is provided to the owner for fire or smoke separations; and
- (c) Ensure clearances of the fire doors are maintained in accordance with the tested specimen. These clearances are in relation to the bottom of the door leaf and floor; the gap between the door leaf and jamb;
 - (i) Typically not more than 10 mm between the bottom of the door and floor
 - (ii) Typically not more than 3 mm between the leaf and the jamb.

9.6 Records

A written copy of all tests and maintenance shall be made in a form approved by the Building Consent Authority (BCA). A copy of the record shall be retained at a suitable location on the site.

Where test results are recorded electronically a hard copy shall be provided and retained on site. If a hard copy cannot be provided at the time of testing, a copy shall be returned to the site at the time of the next routine testing visit, if not before.

A full report on each annual inspection shall be sent to the owner.

Appendix A – Physical testing of fire-resistant doorsets

(Informative)

A1 SCOPE

This Appendix sets out physical test methods which may, at the request of the applicant, be applied to the tested specimens of side-hung or pivot-swung, single or double-acting doorsets where it is intended to install them in high-traffic areas. The applicant may specify that these tests are carried out either before the fire-resistance test, or independent of it.

A2 PRINCIPLE

The test specimen is mounted in a rigid frame and subjected to a series of tests to confirm its physical capacity.

A3 APPARATUS

The apparatus consists of a suitable test rig in which the loading conditions and open/close cycles specified in this Appendix can be simulated.

A4 SPECIMEN

The specimen should be a full-size tested specimen not less than 2040 mm × 815 mm. No alterations should be made to the doorset except for the following:

- (a) For the resistance-to-slamming test, a blank strike plate should be fitted to prevent engagement of the latch bolt; and
- (b) Replacement of damaged hardware may be effected.

A5 TEST METHODS

A5.1 General

The doorset should be subjected to the tests set out in A5.2 to A5.7 in the order given. If failure is encountered in any one of the tests, the procedure should be aborted.

NOTE – The test procedure is based on the Method of Assessment and Test (MOAT) Number 7 for Internal and External Doorsets issued by the British Board of Agreement – Assessment of Products for Construction.

A5.2 Resistance to buckling (torsion)

A5.2.1 Procedure

The procedure is as follows:

- (a) Open the door to its 90° position and clamp it at the upper lock stile corner;
- (b) Progressively apply a horizontal force of up to 400 N at the handle in the direction of closing, and maintain for 2 min. Then release the force; and
- (c) After the force has been released, measure the residual horizontal deflection at the bottom lock stile corner.

A5.2.2 Results

The deflection measured in A5.2.1(c) should not exceed 1 mm up to 1 h after release of the force.

A5.3 Vertical loading test

A5.3.1 Procedure

The procedure is as follows:

- (a) With the door still in the 90° open position, apply a vertical force of 500 N to the handle through the centre-line of the spindle;
- (b) Maintain the application of the force for 2 min, and then release the force; and
- (c) After the force has been released, measure the residual vertical deflection at the bottom lock stile corner.

A5.3.2 Results

The deflection measured in A5.3.1(c)) should not exceed 1 mm up to 1 h after release of the force.

A5.4 Resistance to slamming**A5.4.1 Procedure**

The procedure is as follows:

- (a) Fit a door closer or similar device and adjust it to close the door from the 90° open position in not more than 2 s, with no damping effect;
- (b) Using a motor device, perform 10 000 non-latching slam cycles; and
- (c) Examine the door leaf and note any damage.

A5.4.2 Results

The test results should be as follows:

- (a) At the end of the test there should be no cracking or delamination of the door leaf body or edge strips exceeding 0.5 mm in width and 50 mm in length; and
- (b) Where a viewing panel is fitted there should be no detachment of the system components.

A5.5 Shock impact**A5.5.1 Procedure**

The procedure is as follows:

- (a) Vertically swing a metal or concrete sphere not exceeding 180 mm diameter and not less than 5 kg in mass to impact the bottom lock stile corner with 40 J of energy (approximately 800 mm drop) in the direction of closure against the door stop, and repeat four more times;
- (b) Repeat (a) in the direction of opening against the normal lockset restraint; and
- (c) Examine the door leaf and note any damage.

A5.5.2 Results

At the end of the test there should be no cracking or delamination of the door-leaf body or edge strips exceeding 0.5 mm in width and 50 mm in length.

A5.6 Body impact**A5.6.1 Procedure**

The procedure is as follows:

- (a) Vertically swing a soft body of mass 30 kg and approximate dimensions 250 mm diameter and 600 mm length, filled with dry sand to impact the door leaf laterally adjacent to the handle in the direction of opening against the normal lockset restraint, with 60 J of energy (200 mm drop);
- (b) Repeat two more times;
- (c) Repeat (a) with 120 J of energy (400 mm vertical drop); and
- (d) Examine the door leaf and note any damage.

A5.6.2 Results

The test results should be as follows:

- (a) At the end of the test there should be no cracking or delamination of the door leaf body or edge strips exceeding 0.5 mm in width and 50 mm in length; and
- (b) There should be no breach or failure of the door lock or leaf.

A5.7 Resistance to misuse**A5.7.1 Procedure**

The procedure is as follows:

- (a) Place a wooden block of minimum density 500 kg/m^3 and approximate dimensions $40 \text{ mm} \times 8 \text{ mm} \times 50 \text{ mm}$ at the heel of the door immediately below the bottom hinge in such a manner as to jam the door open by approximately 20° ; and
- (b) Gradually apply sufficient force at the handle to close the door against the frame.

Examine the door and note any damage sustained, particularly around the hinge area.

A5.7.2 Results

The test results should be as follows:

- (a) At the end of the test there should be no cracking or delamination of the door leaf body or edge strips exceeding 0.5 mm in width and 50 mm in length; and
- (b) The screws should remain firmly anchored in the hinge plate.

NOTE – Bending of the hinge is expected and does not constitute failure.

A6 TEST REPORT

The test report for the functional tests should include the following information:

- (a) Date and location of the test;
- (b) Result of the various tests specified in the relevant clauses of this Appendix;
- (c) Full documentation of hardware that had to be replaced;
- (d) All information that identifies the doorset and its manufacturer, as indicated in AS 1530.4; and
- (e) Reference to this Standard.

Appendix B – Annual inspection of fire-resistant doorsets and smoke-control doors for independent qualified person

(Informative)

B1 GENERAL

B1.1

Fire-resistant doorsets and smoke-control doors require regular inspections to ensure they prohibit the spread of fire and smoke and, where applicable, the occupants are not prevented from leaving the building in the event of an emergency.

B1.2

The manufacturer's installation manual and installation details of the fire-resistant doorset and smoke-control door should be made available at time of the inspection.

B1.3

The fire-resistant doorset and smoke-control door should be checked that they are the same as that for the tested specimens, except as permitted by 3.2, 3.3, 5.4, and AS 1530.4.

B2 NORMAL OPERATION REQUIREMENTS

B2.1 Fixing of door frames

The door frame should be maintained to be fixed as in the tested specimen (except as permitted in 5.4).

NOTE – This information should be in the suppliers or manufacturers instructions and installation manual.

B2.2 Clearances

B2.2.1 *General*

The clearance dimensions required for fire-resistant doorsets should be in accordance with this clause unless greater clearance dimensions have been demonstrated on a tested specimen (refer to the installation manual).

B2.2.2 *Sill and floor finish*

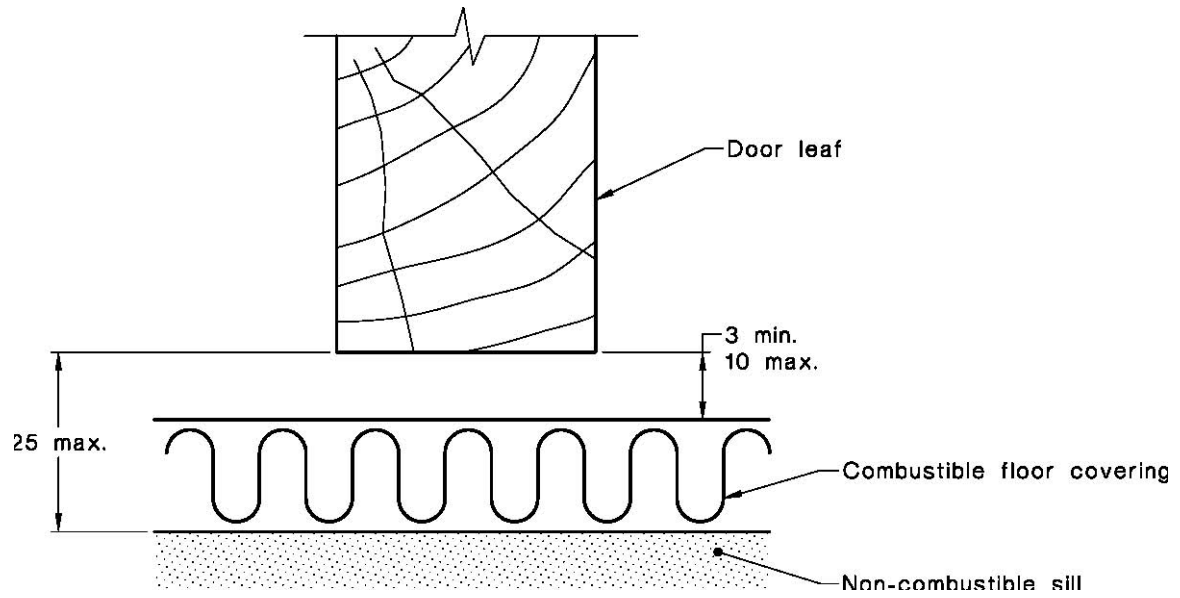
Clearances between the bottoms of all door leafs and the floor should be as follows (see Figure B1Error! Reference source not found.):

- (a) Between the leaf and the top of any floor covering – not less than 3 mm and not more than 10 mm; and
- (b) Between the leaf and the top of the floor covering:
 - (i) Not more than 10 mm where there is no combustible floor covering
 - (ii) Not more than 25 mm where there is a combustible floor covering present.

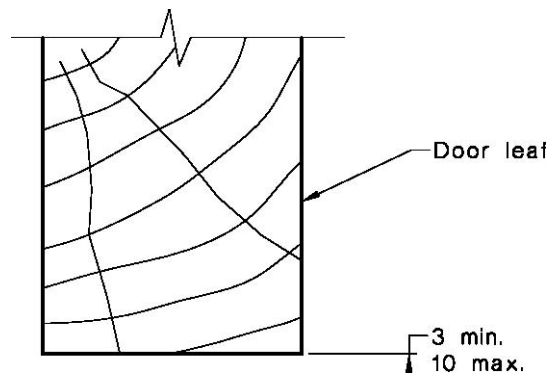
NOTE – When the installed doorset is inspected for compliance with B2.2.2(b)(ii), the clearance should not exceed 25 mm for the purpose of certification unless an appropriate note is made in the evidence of compliance.

CB2.2.2

In essence the maximum gap between the bottom of the door leaf and the adjacent floor covering is 10 mm. The 25 mm dimension is provided to limit the thickness of carpets and underlays to a maximum thickness of 15 mm in total. The intention of this Standard is to not allow a 25 mm gap under a door unless carpet is in the process of being installed. This is a temporary measure allowing for certification of the doorset, provided that a note is put in the evidence of compliance schedule and is checked at the first maintenance inspection regime.



(a) With a combustible floor covering



(b) Without a combustible floor covering

All dimensions are in mm.

Figure B1 – Clearances to floor

B2.2.3 *Side-hung door, leaf to frame*

Door leaves side-hung into rebated frames should be clear of the door frame and should have mean clearances, in the closed position, between the leaf and the head, and between the leaf and each stile, of not more than 3 mm.

B2.2.4 *Double-acting doorsets*

Clearances between the edges of the door leaf and the wall, floor, head, and frame should be not greater than that necessary for the operation of the doorset and in no case should these clearances exceed those of the satisfactorily tested specimen.

B2.2.5 *Sliding doorsets*

When closed, the door leaf of sliding doorsets should:

- (a) Overlap the clear opening by not less than 75 mm at each jamb and at the door head;
- (b) Have an average clearance between the face of the door leaf and the return of the frame or wall face within the area of required overlap at the top and sides (see (a)) of not more than 10 mm;
- (c) Have a maximum clearance at any point of 15 mm; and
- (d) Have a clearance between the bottom of the door leaf and the floor as defined in 5.5.2.

NOTE – Where interlocking-steel sections are fitted to the edges of the leaf, the clearances where these edges are fitted are limited by the fire-resistance test.

B2.2.6 *Smoke doors*

The clearances, seal contacts, and other critical design attributes for smoke-control doors should be within the range established by the test.

B2.3 **Hardware****B2.3.1** *Attachment*

All hardware that is essential for suspension, closing, and latching should be fixed to the doorset to the same requirements as per the tested specimen.

B2.3.2 *Latch handles*

Where knobs are used to operate the latch bolt, the clearance between the surface of the knob and the face of the door stop should be maintained at not less than 35 mm.

NOTE –

- (1) It is recommended that the latch handle is located between 900 mm and 1100 mm above the finished floor.
- (2) Reference should be made to AS 1428.1 for the location requirements applicable to particular types of door hardware and to the NZBC for sanctions applicable to particular types of buildings.

B2.3.3 *Travel-limiting devices*

Every side-hung or double-acting fire-resistant doorset should be protected by means of buffers, stops, or other travel-limiting devices, to prevent damage in any installation where the fire-resistant doorset or its accessories could be subjected to forceful or careless operation.

NOTE – For the purpose of B2.3.3, a door closer is not considered to be a travel-limiting device.

B2.3.4 *Counter-weighting system for sliding doors***B2.3.4.1** *Protection*

Where a counter-weighting system is used to provide automatic closure of sliding fire-resistant doorsets in a fire, this system should be protected to ensure free operation by means of adequate guards or enclosures. The counterweights should be not less than 150 mm clear of the floor in the door-closed position.

B2.3.4.2 *Adjustment*

The counter-weighting systems should be as follows:

- (a) Where it is necessary to pass through the fire-resistant doorset to reach the required exit, the force required to achieve the following should not exceed 110 N:
- (i) To move the door leaf from its closed position
 - (ii) To move the door leaf from its stationary position after the release mechanism has operated
 - (iii) To operate the door leaf through its full travel; and
- (b) In other cases, the force required should be as follows;
- (i) To move the door leaf from its closed and stationary position after the release mechanism has operated not more than 180 N
 - (ii) To operate the door leaf through its full travel (that is not more than 135 N).

B2.4 Final check

The fire-resistant doorset should latch satisfactorily from the fully open position and from any intermediate position, and the closers should demonstrate satisfactorily back-checking action as required by 2.2.3.

The smoke-control door should close satisfactorily to meet the requirements as tested from the fully open position and from any intermediate position.

The metal tag of the fire-resistant doorset and smoke-control door should be checked that it is permanently fixed and the information in the tag is legible.

B3 MAINTENANCE

Maintenance of fire-resistant doorsets and smoke-control doors should be carried out to minimise deterioration of performance over the life of the assembly.

Guidance on maintenance is provided in AS 1851 and should be found in manufacturers' instructions and installation manual.

Appendix C – Sensing devices

(Informative)

C1 GENERAL

A fire-resistant doorset or smoke-control door is required to be self closing or automatic. Automatic doorsets should revert to self closing on operation of a sensing device installed in accordance with NZS 4512, or on loss of power to an electromagnetic hold open device.

C2 SENSING DEVICE

The sensing device should be of a type suitable for that particular application and should comply with the appropriate Standards listed in Table C1.

Table C1 – Sensing device requirements

Sensing device	Compliance requirements
Thermally released	AS 1890 – air-oven test for temperature rating $\leq 80^{\circ}\text{C}$
Thermal detectors	NZS 4512, as applicable
Smoke detectors	NZS 4512, as applicable
NOTE – (1) Refer to NZS 4512, as applicable, for guidance on the selection of detectors for particular applications. (2) Refer to the NZBC for specific requirements concerning activation by a sprinkler system.	

C3 INSTALLATION OF DOORSETS AND HARDWARE

Any prescribed sensing device which operates to cause the closure of automatic doorsets should be positioned within the stream of air that passes through the door opening when the fire-resistant doorset or smoke-control door is fully open.

Where the device is to be mounted on the ceiling, it should be set back horizontally from the door opening by a distance of 1.5 m, or the distance between the ceiling and the top of the opening, whichever is the greater.

Where detection is not provided on both sides of the door, the detector should be placed within 1.5 m of the door in accordance with NZS 4512.