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Public consultation draft

DRAFT

Technical specification

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Committee:

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Standards New Zealand

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Public comment information

Status

This document is a proposed New Zealand technical specification under the Standards and Accreditation Act 2015. Issued as a draft in this form, it provides the required statutory opportunity for consideration and comment by the bodies and persons having an interest in the standard.

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Closing date for comments **13 January 2022.**

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Please read before commenting

To help you send in your comments, please read the following.

(a) Comments are invited, preferably in electronic format, on the technical content, wording, and general arrangement of this draft.
(b) Editorial matters (that is spelling, punctuation, grammar, numbering, references, and so on) will be corrected before final publication.
(c) Please do not return marked-up drafts as comments.
(d) When completing the public comment form, ensure that the number of this draft, your name, and your organisation (if applicable) are recorded. Please place relevant clause numbers beside each comment.
(e) Please provide supporting reasons and suggested wording for each comment. Where you consider that specific content is too simplistic, too complex, or too detailed, provide an alternative.
(f) If the draft is acceptable without change, an acknowledgement to this effect would be appreciated.
(g) Normally, no acknowledgement of comment is sent. All comments received by the due date will be put before the relevant development committee. Where appropriate, changes will be incorporated before the technical specification is formally approved.

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Committee representation

This technical specification was prepared by the P4211 Committee. The membership of the committee was approved by the New Zealand Standards Approval Board and appointed by the New Zealand Standards Executive under the Standards and Accreditation Act 2015.

The committee consisted of representatives of the following nominating organisations:

BRANZ Ltd

Building Officials Institute of NZ

Building System Performance, Ministry of Business Innovation & Employment

Engineering New Zealand

International Accreditation NZ

Mott MacDonald NZ Ltd

New Zealand Institute of Building Surveyors

New Zealand Joinery Manufacturers' Federation Inc.

Window & Glass Association New Zealand Incorporated

Acknowledgement

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DZ TS 4211:2022

Technical specification

Specification for the classification of windows

Superseding NZS 4211:2008

Contents

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Referenced documents

Reference is made in this document to the following:

New Zealand standards

NZS 3604:2011	Timber-framed buildings
NZS 4223:----	Glazing in buildings
Part 3:2016	Human impact safety requirements
Part 4:2008	Wind, dead, snow, and live actions
NZS ISO/IEC 17025:2018	General requirements for the competence of testing and calibration laboratories

Joint Australian/New Zealand standards

AS/NZS 1170:----	Structural design actions
Part 2:2021	Wind actions
AS/NZS 4284:2008	Testing of building facades
AS/NZS 4420:----	Windows, external glazed, timber and composite doors – Methods of test
Part 1:	Test sequence, sampling and test methods
AS/NZS 4505:2012	Garage doors and other large access doors
AS/NZS 4666:2012	Insulating glass units

Australian standards

AS 2047-2014	Windows and external glazed doors in buildings
AS 4285:2019	Rooflights

British standards

BS EN 12207:2016	Windows and doors. Air permeability. Classification

Other publications

BRANZ. EM7 Performance of mid-rise cladding systems. Version 3. BRANZ, 2020. Available at https://www.branz.co.nz/pubs/evaluation-methods/em7/ (retrieved 30 November 2021)

Ministry of Business, Innovation & Employment (MBIE). Verification Methods E2/Verification Methods E2/VM1 and Acceptable Solutions E2/AS1, E2/AS2 and E2/AS3: For New Zealand Building Code clause E2 external moisture. 3rd ed. MBIE, 2020. Available at https://www.building.govt.nz/assets/Uploads/building-code-compliance/e-moisture/e2-external-moisture/asvm/e2-external-moisture-3rd-edition-amendment-10.pdf (retrieved 2 December 2021)

National Association of Steel-Framed Housing (NASH). NASH standard part two: 2019: Light steel framed buildings. NASH, 2019. Available from https://nashnz.org.nz (retrieved 30 November 2021)

Window & Glass Association NZ (WGANZ). Trans-Tasman Industry Code of Practice TT-ICP-002 NZ Window and door hardware in housing and residential buildings product performance – durability and corrosion resistance. WGANZ, 2019. Available at https://www.wganz.org.nz/wp-content/uploads/2019/07/TT-ICP-002-Hardware-2019-NZ.pdf (retrieved 30 November 2021)

Window & Glass Association NZ (WGANZ). New Zealand Industry Code of Practice NZ-ICP-003a Window and door hardware in housing and residential buildings product performance – structural strength. WGANZ, 2019. Available at https://www.wganz.org.nz/wp-content/uploads/2019/07/NZ-ICP-003a-WGANZ-May-2019.pdf (retrieved 30 November 2021)

New Zealand legislation

Building Act 2004

Websites

www.branz.co.nz
www.building.govt.nz
www.legislation.govt.nz
www.nash.org.nz
www.wganz.org.nz

Latest revisions

The users of this technical specification should ensure that their copies of the above-mentioned New Zealand standards are the latest revisions. Amendments to referenced New Zealand and joint Australian/New Zealand standards can be found on www.standards.govt.nz.

Review

Suggestions for improvement of this technical specification will be welcomed. They should be sent to the National Manager, Standards New Zealand, PO Box 1473, Wellington 6140.

Foreword

SNZ TS 4211 *Specification for the classification of windows* provides a methodology for classifying windows and exterior doors in accordance with their suitability for various design and building situations. It is intended for use by window suppliers, manufacturers, designers, and regulators in ensuring that New Zealand windows are fit for purpose and meet the minimum requirements of the New Zealand Building Code.

SNZ TS 4211 is for use with discrete window and door units to be installed into the walls of buildings. It excludes the installation details at the window perimeter and excludes building facades and curtain walls. Requirements for glazing in buildings are excluded from SNZ TS 4211 but are given in the NZS 4223 series of standards. SNZ TS 4211 also does not cover durability, thermal, acoustic, or fire rating performance requirements for windows.

SNZ TS 4211 supersedes NZS 4211:2008 *Specification for performance of windows*. Changes to the title, layout, and emphasis of the document reflect its role in providing a classification system for windows used in New Zealand buildings. This classification system ensures that appropriate windows can be manufactured and selected for the situations in which they will be used.

Windows for typical domestic New Zealand buildings remain classified by the building's wind zone. However, the technical specification's scope has been expanded to include windows for larger buildings. Classifications are available for windows used in buildings with facades verified using BRANZ EM7 *Performance of mid-rise cladding systems* [version 3, June 2020], and for windows that achieve building-specific performance levels determined by the facade designer.

Classification of a window using SNZ TS 4211 still requires the performance testing of a representative specimen in a controlled test facility. The methods, parameters, and performance criteria for each test are prescribed within the technical specification either directly or by reference to other standards such as AS/NZS 4420.1:2016 *Windows, external glazed, timber and composite doors – Methods of test – Part 1: Test sequence, sampling and test methods*, and AS/NZS 4284:2008 *Testing of building facades*. Additional tests and performance criteria have been added for use where the technical specification has introduced additional classifications.

Other revisions include updating and rationalising the requirements for operating forces, and a more graduated system for classifying air infiltration performance (adapted for New Zealand from BS EN 12207:2016 *Windows and doors. Air permeability. Classification*).

SNZ TS 4211 is expected to enable window suppliers and manufacturers to provide specifiers and consumers with robust and effective window systems that meet the requirements of the New Zealand Building Code.

1 General

1.1 Scope

1.1.1 Inclusions

This technical specification specifies requirements for the classification and associated testing of windows installed in the exterior walls of New Zealand buildings.

The classification of as-manufactured windows relative to exposure categories is intended to facilitate the selection and specification of windows used in:

(a) Buildings for which the building wind zone is determined in accordance with NZS 3604 or NASH Standard Part 2, and for which the weathertightness of the window installation in the cladding system is demonstrated using an Acceptable Solution or Verification Method for New Zealand Building Code (NZBC) clause E2 External moisture.
(b) Other buildings within the scope of NZS 3604 or NASH Standard Part 2 and for which the building wind zone is determined in accordance with those documents, for which the weathertightness of the window installation in the cladding system is demonstrated using an alternative solution for NZBC clause E2 External moisture.
(c) Buildings for which cladding wind pressures on the windows have been determined using AS/NZS 1170.2. For these buildings, the weathertightness of the window installation in the cladding system may be demonstrated using an Acceptable Solution, Verification Method or alternative solution for NZBC clause E2 External moisture.

This technical specification covers performance in terms of exposure categories related to test pressures for air infiltration, watertightness, and wind resistance. Additional tests for operating force, torsional strength of opening panels, and lateral displacement are also required for some configurations and circumstances.

1.1.2 Exclusions

This technical specification specifically excludes:

(a) Skylights, rooflights, and roof windows;
(b) Interior windows and doors;
(c) Fixed louvres;
(d) Thermal and acoustic performance (see Appendices H and I for further information);
(e) The weathertightness of the window perimeter junction with the external wall or facade (see Appendix D for further information);
(f) Building facades (including curtain walls);
(g) Durability;
(h) Large access doors such as roller shutter doors and grilles;
(i) Automatic entrance doors;
(j) Security performance.

C1.1

The performance of skylights, rooflights, and roof windows may be tested using AS 4285.

The performance of garage doors and large access doors may be tested using AS/NZS 4505.

Performance outcomes addressed by this technical specification are intended to be applied to fire windows. However, this technical specification does not address fire performance per se.

1.2 Objectives

The objective of this technical specification is to provide a means of compliance for window and door designers, systems' suppliers, manufacturers, and specifiers with the requirements of NZBC clauses B1 Structure and E2 External moisture for the performance of windows and doors to be installed in exterior walls.

This technical specification provides a basis for testing, certifying, and classifying the strength, rigidity, air infiltration, operation of opening panels, water penetration, and an optional in-plane lateral displacement of window and door systems. It does not cover durability, thermal, acoustic, or fire rating performance (see the appendices for more information on these).

1.3 Interpretation

For the purposes of this technical specification, the word 'shall' refers to requirements that are essential for compliance with the technical specification, while the word 'should' refers to practices that are advised or recommended.

The term ‘normative’ has been used in this technical specification to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of the technical specification and contains requirements.

1.3.1 Commentary clauses

Clauses prefixed by ‘C' and printed in italic type are intended as comments on the corresponding mandatory clauses. They are not to be taken as the only or complete interpretation of the corresponding clause, nor should they be used for determining in any way the mandatory requirements of compliance within this technical specification.

1.4 Definitions

For the purposes of this technical specification the following definitions shall apply:

Collapse	When one or any combination of the following occurs during strength testing: (a) Dislodgement or breaking of any glazing; (b) Dislodgement of a frame or any part of a frame; (c) Dislodgement of an opening panel from its frame; (d) Loss of support of a frame, such as when it is unstable in its opening in the building structure; (e) Failure of any locking device, fastener, or supporting stay that allows an opening panel to open
Deflection	The amount of relative displacement of the structural components in a window. Deflection is typically not measured in the perimeter frame or the opening panel elements that are restrained by the perimeter frame. Deflection is usually measured in each of the unique full-height mullions, stiles, and/or interlockers, (normally the smallest or weakest one), and can be measured in transoms as well
Door	An opening panel of a size suitable for use as access through an external wall
External wall	The enclosing part of the building that has one surface exposed to the outside
Fixed glass	Glass fixed into a light that does not move within the window or door
Frame	The outer surrounding members of the window commonly called head and sill and jambs. The frame may or may not incorporate integral linings and facings
Friction restraint	A rotating or sliding frictional device holding a hinged, pivoted, or projected opening panel in a selected open position and which is overcome by force during opening and closing. The term does not include any device such as a stay nipped by a thumbscrew in which the friction is manually released during window movement
Glass	Infill and glazing material fixed into an opening panel or frame. Glass shall be in accordance with NZS 4223
Glazing	The installation of glass in prepared openings in windows, opening panels, and the like.

	Glass or plastics glazing sheet material for installation into a building
Hardware	A component that allows an opening panel to operate as designed
Louvre, fixed	A window unit comprising a series of fixed blades of glass or any other material
Louvre, operable	A window unit comprising a series of operable blades of glass or any other material
Mullion	An intermediate vertical member subdividing a window
Non-specific design	Design that does not require project-specific engineering calculation and design of structural actions and behaviour with project structural design work based on pre-calculated design options provided by standards such as NZS 3604 and NASH Standard Part 2
Panel	An assembly of parts, being glazing potentially contained by stile and rail members that may be opening or fixed. In the industry, the term 'sash' is sometimes used to describe what the technical specification refers to as a 'panel'
Purpose-built collection or drainage area	A system that allows water to collect and/or be drained to the outside (at the end of testing) from sills or other framing members, or in cavities
Rail	A horizontal member of an opening panel other than an interlocker
Serviceability limit state (SLS)	State that corresponds to conditions beyond which specified service criteria for a structure or structural element are no longer met. The criteria are based on the intended use and may include limits on deformation, vibratory response, degradation, weathertightness, or other physical aspects
Specific engineering design (SED)	Project-specific engineering calculations of structural parameters, such as a facade's wind pressures, deflections, and/or strength under structural loads
Stile	A vertical side member of an opening panel other than an interlocker
Structural member	An element, for example a mullion, transom, interlocker, and/or stile, that performs the function of transferring a load to the perimeter frame or other structural member
Transom	An intermediate horizontal member subdividing a window
Ultimate limit state (ULS)	State associated with collapse or other similar forms of structural failure. This generally corresponds to the maximum load-carrying resistance of a structure or

	structural element, but in some cases it may correspond to the maximum applicable strain or deformation. Typically, the point of structural collapse (ULS) is not actually reached in testing, and the system is assigned a ULS with a lower value
Uncontrolled water	Water that penetrates through a test sample during the water testing is determined as 'uncontrolled water' if: (a) It moves beyond the joint where it entered; or (b) It is not contained in a purpose-built collection or drainage area. Examples that would not be considered 'uncontrolled water' leakage are: (c) Minor splashing due to air infiltration within one minute after a change of applied air pressure; (d) Water which accumulates on gaskets, in sill tracks, and on thresholds, and which drains to the exterior during or at the end of testing
Weathertightness	Performance in respect to air infiltration, watertightness, and wind resistance. The condition where external water has been prevented from entering and accumulating on the interior side of the cladding in amounts that can cause undue dampness or damage to the building elements. The correlation of real performance to test methods and parameters is empirical
Window	Throughout this technical specification, the term 'window(s)' refers to the test specimen, being a window or door of any type not excluded in 1.1.2
Wind zone	Classification of the level of wind actions on a non-specific design building into one of five zones (L, M, H, VH and EH), using the methodology provided in NZS 3604 or NASH Standard Part 2

1.5 Abbreviations

Abbreviations have the following meanings:

EH	Extra high (wind zone)
H	High (wind zone)
Hr	Hour
IGU	Insulating glass unit
L	Low (wind zone)
M	Medium (wind zone)
NA	Not applicable
NZBC	New Zealand Building Code
SED	Specific engineering design
SLS	Serviceability limit state
ULS	Ultimate limit state
VH	Very high (wind zone)

WGANZ	Window & Glass Association New Zealand

1.6 Notations

This technical specification uses the following notations:

Q	**air infiltration of the specimen**
Q_A	area averaged air infiltration
Q_L	opening joint averaged air infiltration
q_{tp} (ULS)	test pressures for ultimate limit state (strength testing)
q_{tp} (SLS)	test pressure for serviceability limit state (serviceability testing)
R	minimum return period for calculations.

2 Classification

2.1 Determination of exposure

Many of the minimum test performance requirements required for classification are determined relative to the anticipated wind pressure exposure of a window. This technical specification allows for the classification of windows that use a variety of pathways to establish wind exposure. Wind exposure shall be determined using any of the following methods:

(a) Derived from NZS 3604 or NASH Standard Part 2 wind zones;
(b) Derived from the test pressures used in BRANZ's evaluation method EM7 (BRANZ EM7);
(c) Derived using the methods in AS/NZS 1170.2.

C2.1

In 2.1(a), the simplified approaches for determining wind zones relate to methods in documents cited as Acceptable Solutions for claddings of domestic houses which have scope and geometric constraints for exposure calculation.

It should be noted that pressures determined to AS/NZS 1170 do not necessarily correlate with the wind zones from other methods, in particular in the corner zones. For situations with unusual exposure conditions, it is recommended that designers use the AS/NZS 1170 methods.

2.2 Classification

The classification of windows in accordance with this technical specification establishes:

(a) Exposure rating;
(b) Air infiltration performance.

For a window to be classified, the mandatory tests applicable to the type of classification shall have been completed. There are two forms of classification covered by this technical specification:

(c) SNZ TS 4211 – classification includes the range of mandatory and applicable tests listed in Table 2;
(d) SNZ TS 4211 (A) – classification as (c) above, but includes the additional tests for BRANZ EM7.

2.2.1 *Exposure rating classification*

The exposure label represents the window's structural and serviceability test performance. Establish the exposure label using Table 1, which lists specific parameters to exposure calculation pathways. These parameters, q_{tp} (ULS) and q_{tp} (SLS), are used in this technical specification to derive minimum test parameters.

It is understood that users will not always be working from exposure to parameters to testing. The alternative is to work in the other direction (to calculate exposure limitations from test results). For a window to obtain an exposure label, all the test parameters applicable to that exposure shall be attained or exceeded.

Table 1 – Exposure rating classification

Approach to exposure determination	**Exposure label**	**q_{tp} (SLS)** (Pa)[a]	**q_{tp} (ULS)** (Pa)[a]
NZS 3604:2011	L:2011	± 510	± 720
NASH Part 2:2019	M:2011	± 680	± 960
	H:2011	± 970	± 1360
	VH:2011	± 1250	± 1760
	EH:2011	± 1515	± 2130
EM7	EM7	+ 2250/− 2750	+ 3200/− 3950
NZS 1170.2	SED (test report #)	Serviceability limit state net cladding pressures[b] q_{net} (SLS) (R > 25)[c]	Ultimate limit state net cladding pressures[b] q_{net} (ULS)

[a] q_{tp} (ULS) = test pressures for ultimate limit state (strength testing).
q_{tp} (SLS) = test pressure for serviceability limit state (serviceability testing).

[b] SED parameters are net positive and negative limit state cladding pressures acting on the window, including local pressure coefficients.

[c] R = minimum return period for calculations.

2.2.2 *Air infiltration performance classification*

Air infiltration classification is based on a comparison of the air permeability of the test specimen related to overall area, and the air permeability related to the length of the opening joint where opening panels are included. A range of classes is defined from 1 to 4. Following the assessment, the infiltration (or exfiltration) rate with the highest number for airflow related to area or joint length (in positive or negative directions) is used to establish the test specimen's air infiltration classification. See Figure 1.

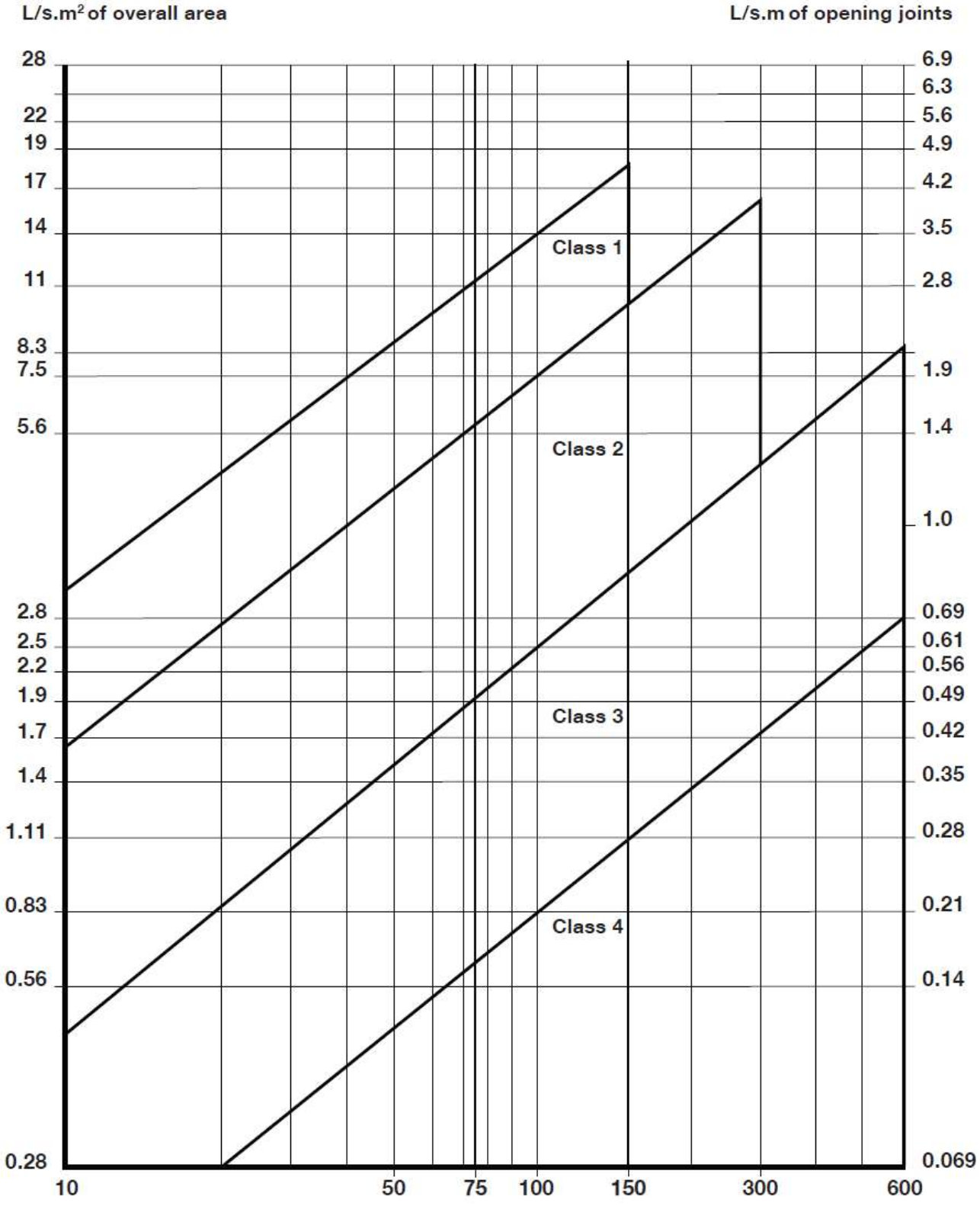


Figure 1 – Classification (adapted from BS EN 12207)

2.3 Implementation

2.3.1 Use and rating of smaller- or larger-size products

Where the product is not of the same size as those classified by testing, either 2.3.1.1 or 2.3.1.2 shall apply.

2.3.1.1

Smaller-size window assemblies (either shorter or narrower or both) that have the same construction as a tested product shall assume the same classification, except that they may be classified higher than the tested product for deflection only when both:

(a) Calculations of deflection and stress for all structural members show that these will remain within the requirements of 5.1.2 and 5.1.9 should the specimen be subjected to the wind pressures in Table 1 for the higher classification, using the actual test data for the structural members, and the calculations are performed and certified by a suitably qualified person who can provide substantiating documentation; and

(b) Where a higher classification is determined by calculation for a smaller-size window assembly, the maximum water penetration classification that can be used is that which the tested product has achieved.

2.3.1.2

Larger-size window assemblies (either taller or wider or both) that have the same construction as a tested product shall assume the same or lower classification as the tested product if all of the following requirements are met:

(a) The area of the window assembly is no greater than 10% in either the horizontal or vertical direction, or no greater than 15% of total area of the tested product. This applies to any element within the assembly. See Figure 2;

(b) Calculations of deflection and stress for all structural members show that these will remain within the requirements of 5.1.2 and 5.1.9 should the specimen be subjected to the wind pressures in Table 1 for the rating, using the actual test data for the structural members, and the calculations are performed and certified by a suitably qualified person who can provide substantiating documentation;

(c) Where the window assembly contains one or more moveable opening panels that move out of plane, then those panels shall comply with 5.1.10;

(d) Where the window assembly contains one or more moveable opening panels, then those panels shall comply with 5.1.3. Additionally, if a sliding opening panel is increased in size, the operating force determined during the test shall be multiplied by the ratio of the increased area to the original test specimen area to determine if the sliding opening panel still complies with the requirements at the increased size when the rating of the rolling hardware meets or exceeds the weight rating of the hardware used in the original test specimen.

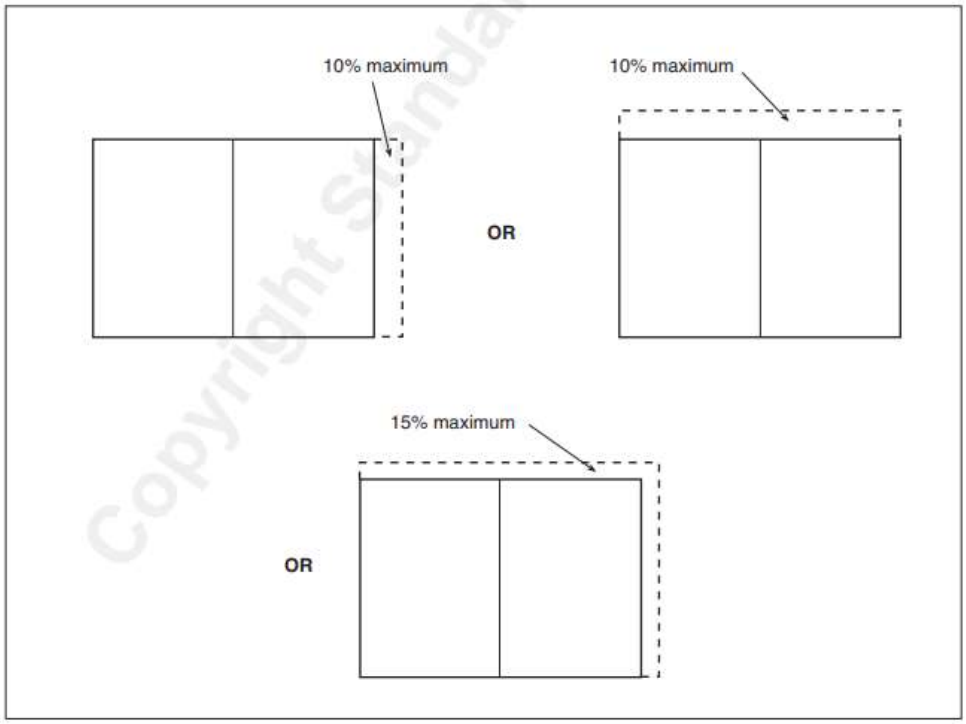


Figure 2 – Allowable dimensional increase

To ensure that it is adequate structurally and in all other aspects for the classification chosen, care should be taken when classifying a window assembly larger than the tested unit.

C2.3.1.2
Provided internal or external stiffeners do not interfere with the movement of air or water through the system, airtightness and weathertightness ratings from unstiffened systems may be used for a stiffened system in wind zones, within the limit of the system deflection.

Internal stiffeners may:

(a) allow the rotation or partial buckling of hollow sections surrounding them;

(b) increase the loads on structural connections;

(c) affect the air leakage and water leakage of the system given the fixing of the stiffeners, altered deflection of the members, and changed connection with seals.

2.3.2 Use and rating of coupling systems

Coupling is the joining of two or more assemblies together horizontally or vertically.

Where a window is made of repeated identical adjoining panels, at least two panels, including coupling mechanisms where used, shall be tested.

A successful test result shall be sufficient to indicate that larger windows created by the addition of identical adjoining panels will comply.

Likewise, an opening panel need only be tested once, provided the sealing and closing systems are identical.

Where window structural couplings have been tested to this technical specification, further testing of these same couplings in other configurations is not deemed necessary, provided the calculations for deflection and stress show that these will remain within the requirements of 5.1.2 and 5.1.9 for the new configuration, based on actual test data for these couplings, and provided the calculations are performed and certified by a suitably qualified person who can provide substantiating documentation.

To ensure that it is adequate structurally and in all other aspects for the rating chosen, care should be taken when certifying the classification of a window assembly larger than the tested unit.

2.4 Labelling and classification

Each window shall be classified by the manufacturer using this technical specification, with a label on the frame in letters not less than 2 mm high stating:
(a) The manufacturer's name or brand name;
(b) The number of this technical specification, SNZ TS 4211, and type of classification, 2021 or 2021 (A);
(c) The exposure limit;
(d) The air infiltration classification (1 to 4).

The labelling shall be attached to a framework member using a durable affixed label or other method, and be readable after the installation of the window.

Example 1 – Type of classification TS 4211:2021, exposure limit VH:2011, air infiltration class 2

Example 2 – Type of classification TS 4211:2021 (A), exposure limit EM7, air infiltration class 2

Example 3 – Type of classification TS 4211:2021, exposure limit SED – test report number to be added by manufacturer, air infiltration class 2

Figure 3 – Examples of complying labels for marking a window

2.5 Reporting

Each test report supporting a claim of compliance with this technical specification shall contain the following information:

(a) Test report number;
(b) Date of test;
(c) Laboratory details, including accreditation endorsement;
(d) Details of author and/or test technician;
(e) Manufacturer's details;
(f) Customer's details (if different from the manufacturer's);
(g) Summary of test results and test specimen classifications, where applicable;
(h) Detailed description with photos and drawings of the manufactured test specimen, including extrusion, hardware and component numbers, structural members and perimeter details, and a list of any modifications to the test specimen made after testing started;
(i) Test details, including which tests were performed, the sequence in which they were performed, test settings, the record of observations including photos, and the test results.

C2.5
The installation and perimeter details should be clearly defined in the test report drawings.

3 Specimen preparation

3.1 Test facilities

All testing shall be performed by an NZS ISO/IEC 17025 accredited testing laboratory registered for such tests, under the authority of a currently accredited test technician.

3.2 Test specimen

Prepare the test specimen in accordance with AS/NZS 4420.

3.2.1 *Requirements for test specimen*

The test specimen, with components, shall be representative both in size and configuration of either:
(a) The largest standard assembly of the product type;
(b) The largest assembly of the product type to be used on the specific building project.

Product type is a designation used to distinguish between the method of operation of the window, as well as associated materials and components, for example, awning, casement, sliding.

The materials and components of the test specimen assembly shall be of the same type and size, and shall have identical methods of construction as those to be used in production.

NOTE – It is recommended that in the case of a timber specimen the manufacturer may present the specimen in a finished state, that is, painted or stained, subject to the notation on the test report.

3.2.2 *Documentation of test specimen*

Technical drawings and any other relevant information shall be made available to the test laboratory prior to the installation of the test specimen. These documentations shall include the following:
(a) Expected classifications(s) or wind pressure capacity of test specimen assembly in accordance with this technical specification;
(b) Assembly drawing showing elevations and sections of test specimen;
(c) Details uniquely identifying all parts comprising the window system, including all weather-seals, gaskets, joint sealants and hardware;
(d) Details of support fixing of test specimen;
(e) Details of drainage including drainage hole dimensions, spacing, and location;
(f) Glazing materials, including glass type and thickness;
(g) A statement certifying that these documents accurately represent the test specimen in all respects;
(h) Date the document was generated.

3.3 Installation of test specimen

The installation of the test specimen shall be as follows:
(a) The test specimen shall be closed and locked and supported around the outside, except that in the case of the operating force test, it is not applicable to lock the window;
(b) The perimeter of the test specimen shall be sealed against air and water penetration;
(c) Operable test specimens shall be tested for operation with five cycles of opening, closing, and locking prior to the testing;
(d) Details of the mounting and fixing of the test specimen shall be noted on the respective drawing.

C3.3
For the purposes of this technical specification, the perimeter referred to in 3.3(b), is considered as the exterior interface between the test specimen and the external wall of the test booth.

The perimeter of the test specimen may be tested for air and water penetration using AS/NZS 4284 or E2/VM1.

The test specimen should comprise components most likely to be used in normal manufacture – in other words, double glazing, seals, and hardware. The hardware used for the test specimen should be sufficiently robust to meet the minimum requirements of the NZBC. See Appendix E.

4 Sequence of tests

4.1 Sequence of measurements and tests

The sequence for testing a single specimen shall be determined using the following table:

Table 2 – Sequence of tests

Sequence of measurements and tests		
	Type of classification	
	SNZ TS 4211	**SNZ TS 4211 (A)**
Deflection of structural members	**M-1**	**M-1**
Operating force	IR1-2	IR1-2
Air infiltration	**M-3**	**M-3**
In-plane lateral displacement	NA	**M-4**
Air infiltration – 2	NA	**M-5**
Water penetration – static	**M-4**	**M-6**
Water penetration – cyclic	NA	**M-7**
Ultimate strength test	**M-5**	**M-8**
Torsional strength test	IR2-6	IR2-9

NOTE –

(1) M-# = Mandatory. # indicates test sequence.
(2) IR1-# = If required by 5.1.3. # indicates test sequence.
(3) IR2-# = If required by 5.1.10. # indicates test sequence.
(4) NA = Not applicable.

To determine the test sequence for each specimen, the type of classification being sought – 2021 or 2021(A) – can be established as per clause 2.2.

For each classification type, there are mandatory tests as well as some additional tests that may be applicable depending on the configuration of the test specimen. Tests are to be performed in numerical sequence as nominated in Table 2.

NOTE – The term ‘if required’ refers to the test specimen’s configuration and not the client’s instruction or test operator’s discretion.

5 Performance requirements

5.1 Test parameters and performance requirements

5.1.1 Test parameters

Minimum test parameters are derived as per 2.2.1 and Table 1.

C5.1.1
The relationships between water penetration test pressures and wind exposure classification have been chosen as generally satisfactory for most window installations. These choices are not intended to preclude designers from specifying different properties or values if they consider the performance will achieve compliance with the building code. Windows for which lower performance is specified are outside the scope of this technical specification.

5.1.2 Deflection of structural members

The maximum deflection due to bending of any structural member, measured relative to the ends of the member, shall not exceed the span divided by 200 unless a smaller value of allowable deflection is specified.

The maximum deflection of any structural member shall not exceed 20 mm, unless a smaller value of allowable deflection is specified.

Undertake separate tests to 100% of both the positive and negative q_{tp} (SLS) pressures.

5.1.3 Opening force test

The test force shall be no greater than the values for opening panels given in Table 3.

Table 3 – Maximum operating force for panels

Function	Horizontal sliding panel[a]	Vertical sliding panel	All other opening panels[b]
To initiate movement	135 N	180 N	100 N
To sustain movement	100 N	150 N	100 N

[a] For multiple sliding panel configurations, for example stacking sliding doors, each panel shall be measured independently and the highest figures adopted for the total product.

[b] For multiple hinged panel configurations, for example bifolding panels, the force to initiate movement is measured perpendicular to the opening direction.

An open vertically sliding opening panel shall not move when an upward or downward vertical force of less than 10 N is applied.

Where friction restraints alone are relied on to control an open, pivoted, or projected opening panel, they shall provide sufficient restraint to prevent the window from moving when a force in newtons equal to 35 times the opening panel area in square metres is applied to the edge furthermost from the hinges or pivots. This force shall be applied perpendicularly to the plane of the opening panel at angles of opening from 33% up to 67% of the maximum opening distance.

Hinged panels, panels with a restricted opening device, and uncontrolled bifolding panels do not require an operating force test, except when they include a closing control mechanism.

A new operating force test is required to determine compliance of any opening panel that differs from the original tested specimen owing to one or more of the following:

(a) A change in glazing configuration (heavier glazing);
(b) A change to a seal type;
(c) A change in the hardware used, unless a separate confirmation is provided indicating that the replacement hardware is appropriate for the size and configuration of the opening panel.

C5.1.3

The operating forces required by this technical specification are not intended to apply to situations where people with disabilities will operate the panels. NZS 4121 contains provisions for operating forces of door panels for use by people with disabilities, for example door panels that are part of an accessible route.

5.1.4 *Air infiltration test 1*

This classification is determined by establishing a performance class (from 1 to 4) based on the air permeability of the test specimen related to overall area of the test specimen and, where applicable, to the length of opening joints in the test specimen.

First determine the air infiltration of the specimen (Q) in m^3/hr at pressure differentials of + 75 Pa, − 75 Pa, + 150 Pa, and − 150 Pa.

Then for each test pressure, determine the area averaged infiltration (Q_A) by dividing the air infiltration (Q) by the total area of the test specimen. This calculation will result in four data points.

If the sample contains opening joints, determine the opening joint averaged infiltration (Q_L) by dividing the air infiltration (Q) by the total length of opening joints in the test specimen. This calculation will result in four data points.

Plot the first four data points on the graph (XXXX) using the left-hand y axis for the area averaged results. For test specimens containing opening joints, plot the next four data points for the opening joint averaged results using the right-hand y axis.

The air infiltration class is the lowest-numbered (least-favourable) class indicated by any of the plotted data points.

The (A) classification requires air infiltration test 1 results to be displayed on the label.

C5.1.4
This method is similar to that used in BS EN 12207, thus allowing international comparison of performance. The 'non air-conditioned' rating from NZS 4211:2008, falls within Class 2, and the 'air-conditioned' rating falls within Class 3.

5.1.5 In-plane lateral displacement

The specimen shall be displaced laterally in accordance with BRANZ EM7 section 4. Requirements for EM7 lateral displacement are not less than inter-storey height divided by 200 in each direction parallel to the window plane.

If the inter-storey height has not been determined, it shall be considered as 3.0 m for test purposes.

5.1.6 Air infiltration test 2

Repeat the air infiltration test 1 process and determine the air infiltration class using all of the steps in 5.1.4.

The specimen shall not be classified with an (A) classification if the performance reduces by more than one class, or reduces below Class 2.

A specimen that is to be labelled with "EM7" for the exposure label shall achieve at least a Class 3 performance in this test, and shall achieve Class 4 in air infiltration test 1.

The (A) classification requires air infiltration test 2 results to be displayed on the label.

5.1.7 Water penetration – static

Undertake tests at minimum positive pressures shown in Table 4.

Table 4 – Water penetration test pressures – Static

Exposure label	**Water test pressure** (Pa)
L:2011	155
M:2011	205
H:2011	290

VH:2011	375
EH:2011	455
EM7:2020	675
SED	q_{tp} (SLS) × 0.3

Water penetration shall be assessed by visual observation. The specimen shall not permit uncontrolled water penetration during the testing.

Observations of the internal surface of the specimen shall be carried out throughout the water spray operation and for 5 minutes after the water spray has stopped and there is zero air pressure differential on the specimen.

C5.1.7
The pressures used for the water penetration tests are not intended to represent actual pressures during rainstorms. They are an empirically derived set of test pressures which have been found to correlate well with observed performance during in-service wind and rain events.

5.1.8 Water penetration – cyclic

Undertake tests to BRANZ EM7 section 4 parameters, as shown in Table 5.

Table 5 – Water penetration test pressures – Cyclic

Test stages	**Water test pressure** (Pa)
Stage 1	337 – 675
Stage 2	450 – 900
Stage 3	675 – 1350

5.1.9 Ultimate strength test

Undertake separate tests to 100% of both the positive and negative q_{tp} (ULS) pressures.

When tested to the test pressures the specimen shall not collapse.

5.1.10 Torsional strength test

All projecting opening panels used in a specimen shall be tested to the requirements of this section.

The maximum deflection of a glazed opening panel shall not exceed 0.025 times the length of the shortest of two members joined at the point of load, or 30 mm (whichever is the lesser), when loaded with a force of 40N.

6 Test methods

6.1 Test methods

6.1.1 Deflection of structural members test

Structural members of the specimen shall be tested in accordance with AS/NZS 4420.1 section 3.

6.1.2 Operating force test

The opening panels in a specimen shall be tested in accordance with AS/NZS 4420.1 section 4.

The operating forces shall be applied under still air conditions and, except for the 'to initiate movement', in both opening and closing directions. The force shall be applied to the fastener or handle in the direction of motion. If there is no fastener or handle, the force shall be applied midway between the slides or pivots and to the member most likely to be gripped by a user.

For multiple sliding panel door configurations, the leading or first opening panel shall be tested.

6.1.3 Air infiltration test

The specimen shall be tested for air infiltration in accordance with AS/NZS 4420.1 section 5 at air pressure differentials of + 75 Pa, − 75 Pa, + 150 Pa, and − 150 Pa.

6.1.4 Water penetration resistance test – static pressure

The specimen shall be tested in accordance with AS/NZS 4420.1 section 6, as shown in Table 4.

Where testing is continued beyond the initial 15-minute period, additional pressure increments will be for 10-minute intervals.

Spray nozzle layout shall comply with Appendix A.

6.1.5 Water penetration resistance test – cyclic pressure

The specimen shall be tested to the cyclic water test methods of 8.6 of AS/NZS 4284, as shown in Table 4.

6.1.6 Ultimate strength test

The specimen shall be tested in accordance with AS/NZS 4420.1 section 7, as shown in Table 1.

C6.1.6
There may be occasions during the ULS test when the desired test pressure cannot be readily achieved. In this case, it is acceptable for any openings to be covered with flexible air-tight material to restore the airtightness for the duration of that part of the test, provided this does not contribute any structural support to the window.

6.1.7 Torsional strength

A specimen unit shall be supported in its normal attitude, then subjected to a force perpendicular to the plane of the opening panel. The test shall be conducted as follows:

(a) Use the test apparatus described in Appendix B;
(b) The opening panel to be tested, complete with the thinnest glazing allowable for the opening panel as determined by NZS 4223, shall be mounted vertically and clamped at three corners so that these corners cannot move out of plane;
(c) The two corner clamps closest to the free corner shall each use a pair of rigid metal strips 5 mm wide, secured approximately parallel to each other, one on each side of the opening panel. The centre line of each strip shall be aligned along the corner joint of the frame of the opening panel. The third clamp shall securely hold the corner most remote from the free corner;
(d) The fourth corner shall be subjected to a force at right angles to the opening panel, applied and progressively increased in increments of 10 ± 0.1 N at 1-minute intervals up to the maximum specified in 5.1.10;
(e) The opening panel shall be tested in both inward and outward directions.

6.1.8 In-plane lateral displacement

The specimen shall be displaced laterally to the method set out in 8.9 of AS/NZS4284.

APPENDIX A – SPRAY NOZZLE LAYOUT

(Normative)

A1

As the majority of the specimen is subjected to surface water run-off rather than water spray droplet impact, the crucial factor is the surface water coverage, not the droplet size. The following layout provides a means of achieving this.

A2

To test the water penetration of windows, spray the face of the windows completely and continuously. A typical spray nozzle layout for water application is shown in Figure A1.

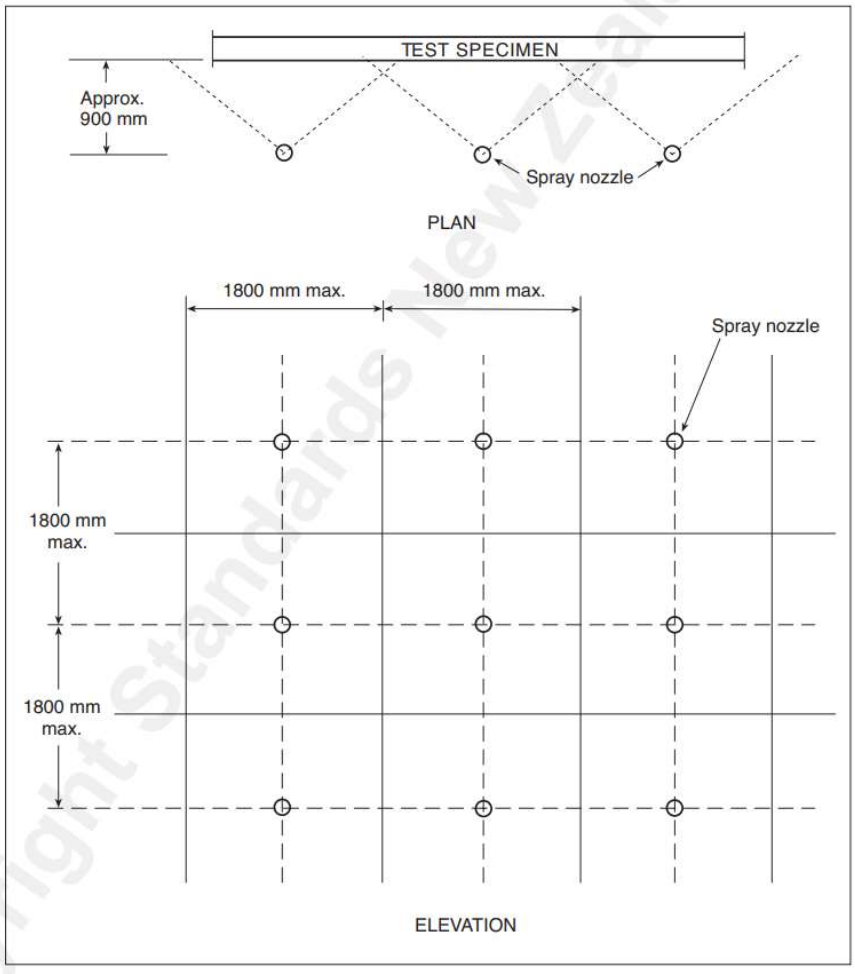


Figure A1 – Spray nozzle layout for water application

A3

Spray nozzles shall provide complete coverage of the top of the specimen. They may be a solid-cone type giving approximately 90° – 100° spray angle with predominantly large droplet size (50% greater than 2 mm diameter). The top horizontal row of nozzles should be positioned at a level within ± 100 mm of the top of the test specimen.

NOTE –

A Spraying Systems Co. (USA) 1/4HH-14WSQ nozzle is an example of an acceptable square-pattern solid-cone type that provides a suitable droplet size and coverage of 1.5 m^2 – 2.0 m^2.

APPENDIX B – TORSIONAL TEST RIG

(Informative)

The following apparatus is required:

(a) A mounting frame, as shown in Figure B1, of a size to fit the test specimen;
(b) A displacement measuring device capable of measuring displacements to an accuracy of better than ± 0.5 mm;
(c) A set of weights or a digital force scale with a maximum reading capability calibrated to a traceable standard in increments of 10 N to an accuracy of better than ± 0.1 N;
(d) A stand and pulley system for applying force to a corner of the opening panel.

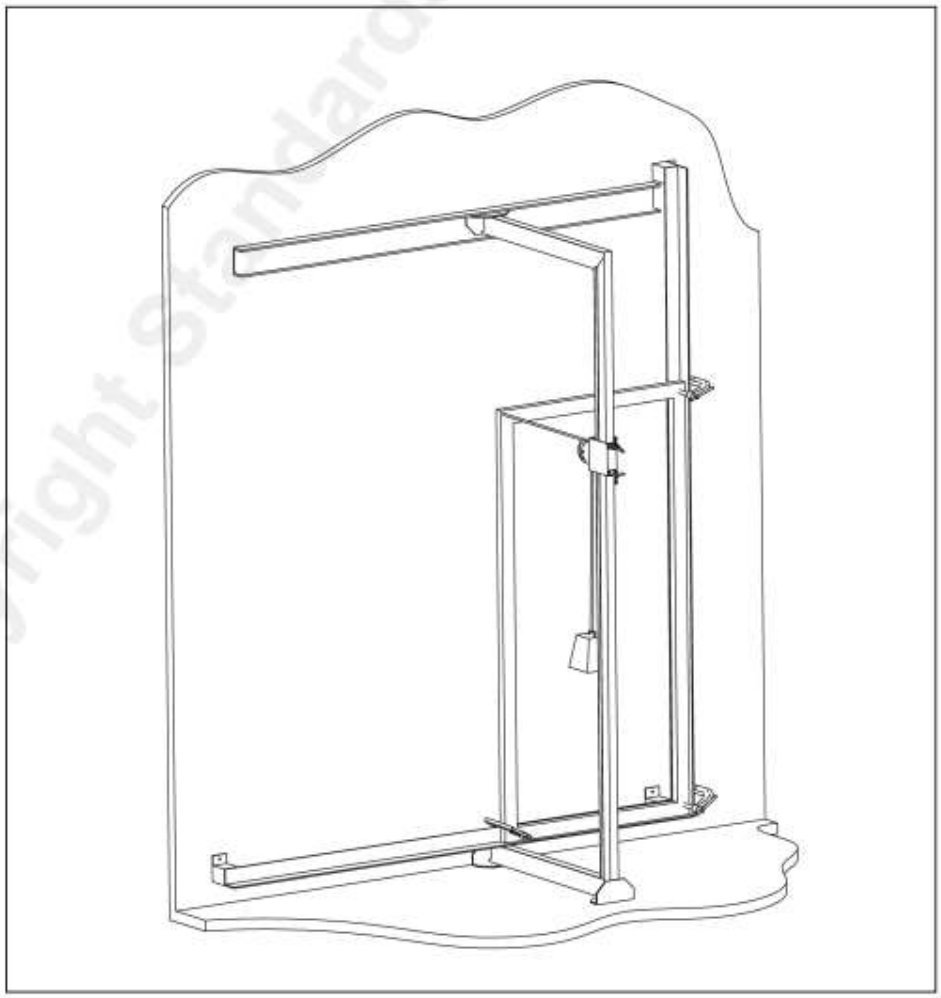


Figure B1 – Torsional test rig assembly

APPENDIX C – TYPICAL CONFIGURATIONS AND STRUCTURAL MEMBERS

(Informative)

The following figures provide examples of window and door configurations typically tested for compliance with historic versions of NZS 4211. The intent of this technical specification, as described in 4.1, is that when testing a prototype, the test sample should replicate the largest size of any particular configuration and/or system type. Not all possible configurations can be included in this appendix, nor indeed conceived, so the following figures simply provide a level of direction when deciding what should, could or might be tested.

Sizes have been specifically excluded from the following figures. The manufacturer should decide what size a particular test sample should be, based on its design and intended market. Clause 2.3.1 allows the test data to be extrapolated within the limits prescribed.

Arrows and lines indicating opening direction are examples only.

The figures indicate which elements of the configuration shall be tested.

Indicative of a structural member as defined in 1.4, which would be tested in accordance with 6.1.1.

If identical to another structural member in the same test sample, then testing as per 6.1.1 is not required.

Similar to a structural member and testing in accordance with 6.1.1 is often omitted unless the member length exceeds 1.0 m.

A sash or panel, for which deflection testing as per 6.1.1 is not required. Instead, the assembly would be removed at the completion of testing. It will then comply with 5.1.10.

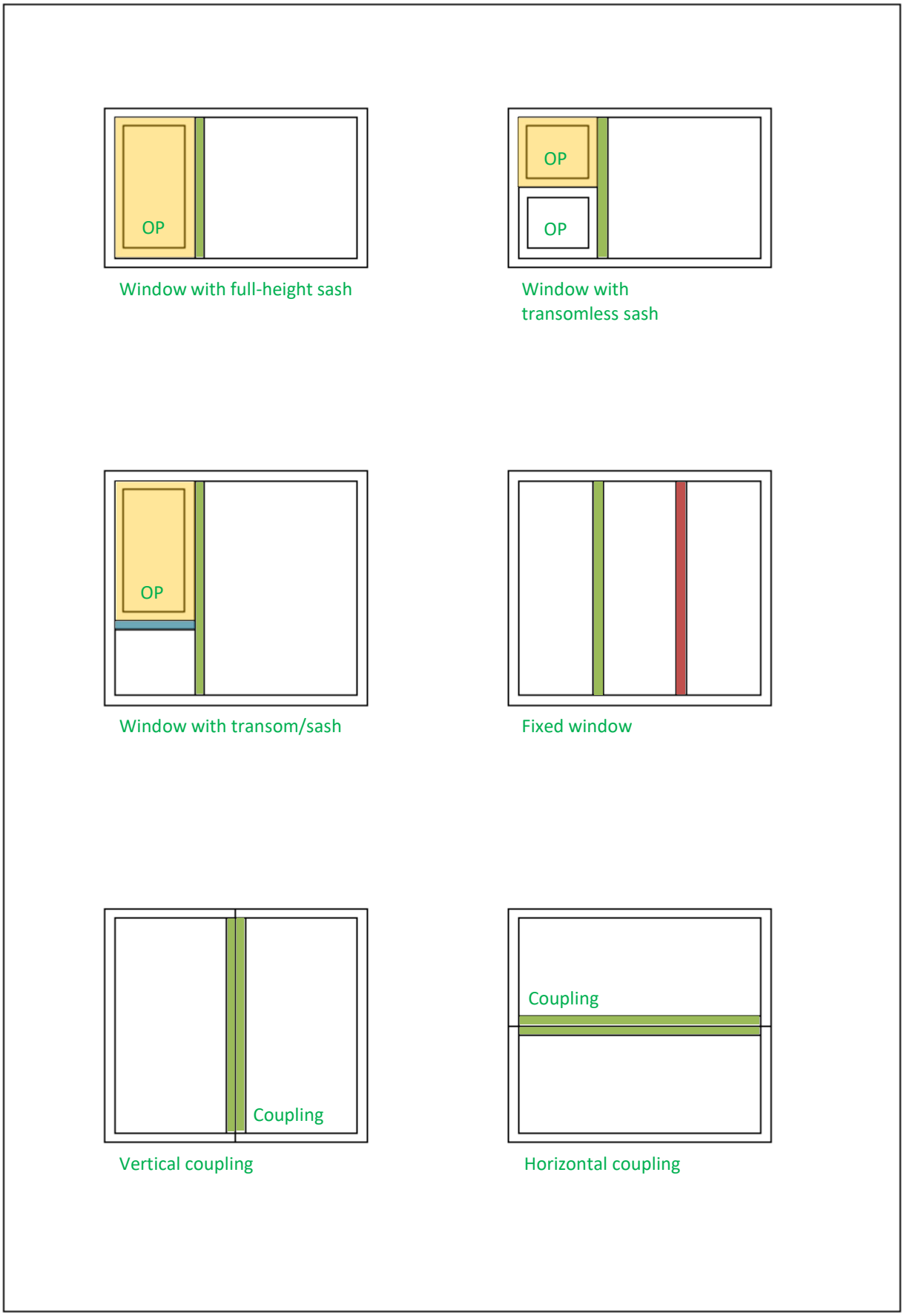


Figure C1 – Configuration examples – Windows

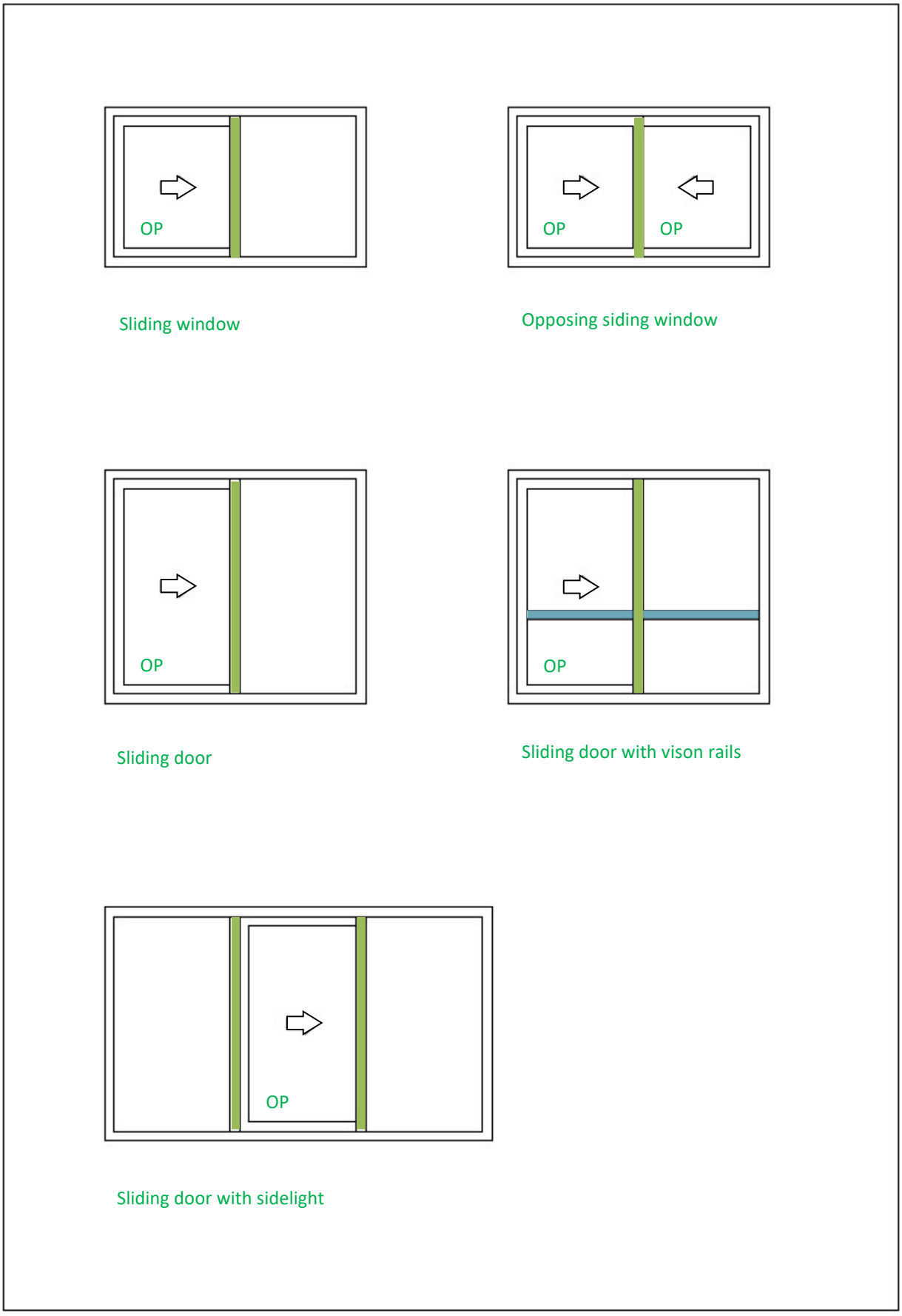
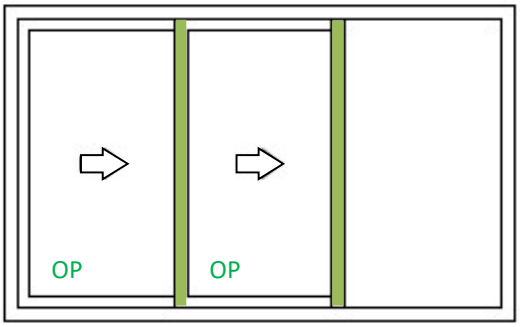
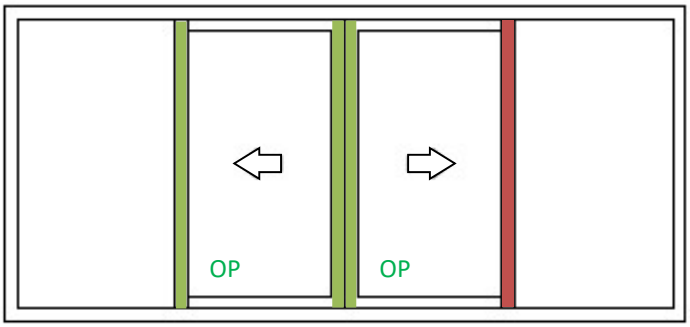


Figure C2 – Configuration examples – Sliding



Stacking sliding door



Bi-parting sliding door

Figure C3 – Configuration examples – Sliding continued

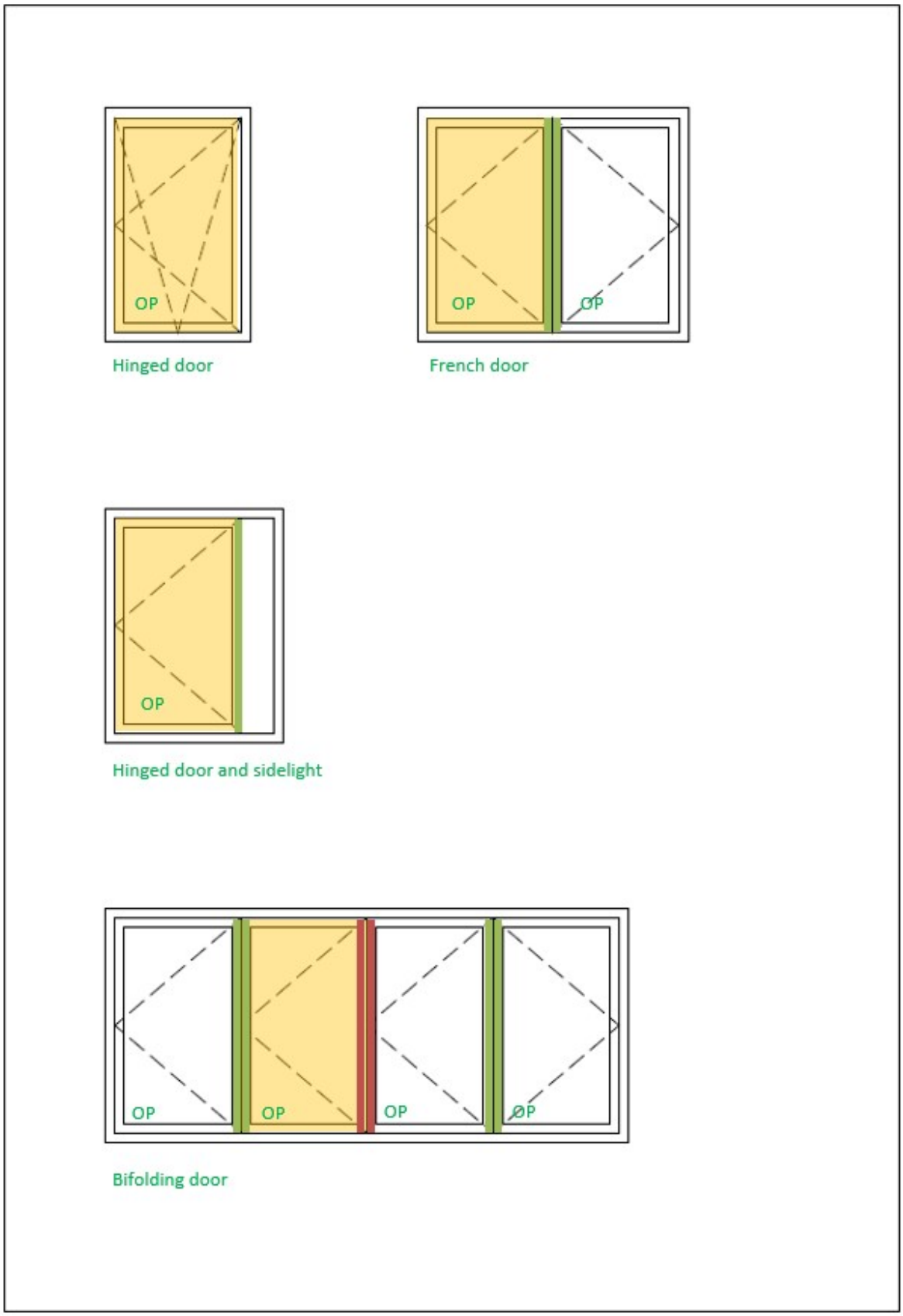


Figure C4 – Configuration examples – Hinged and bifolding

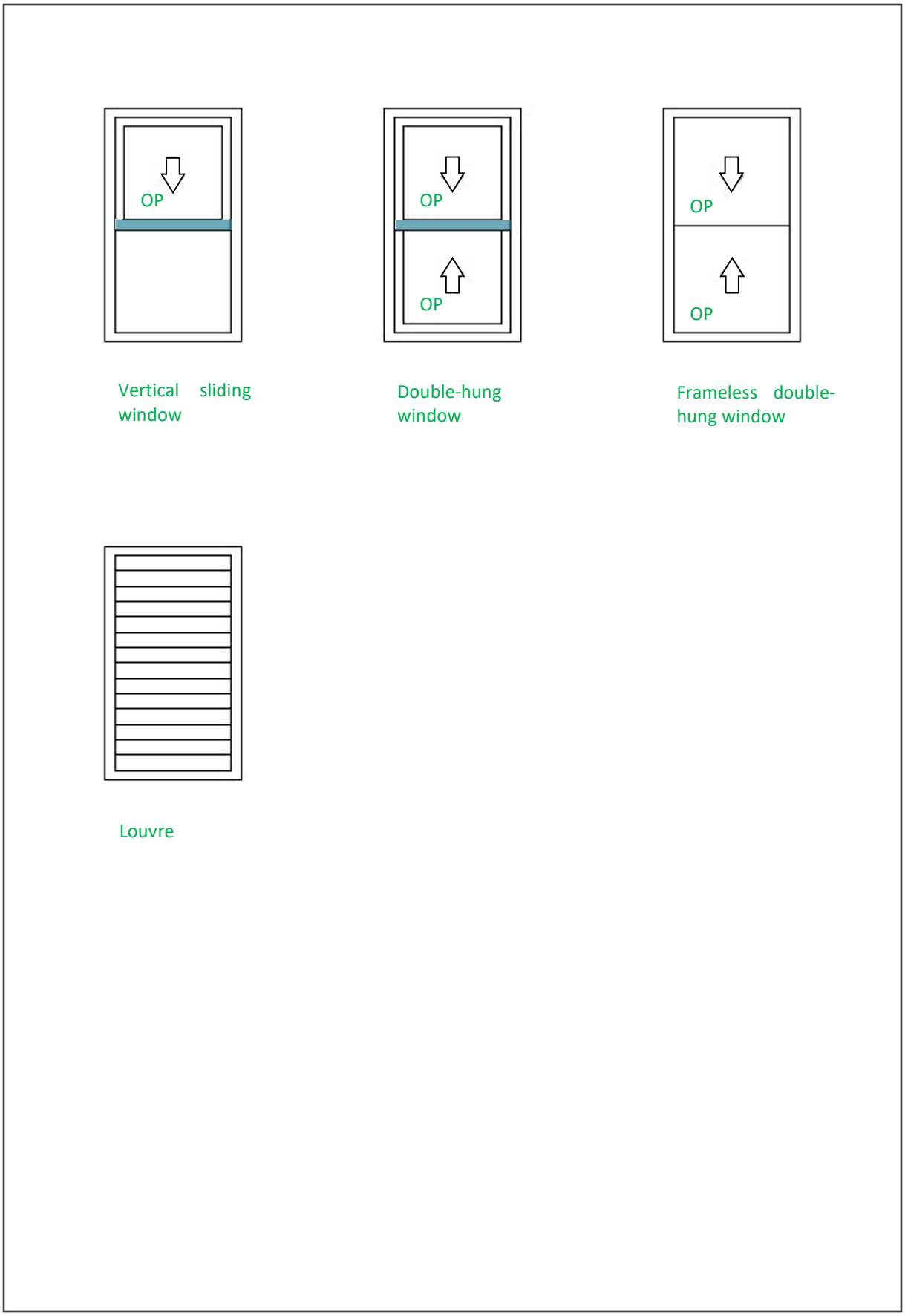


Figure C5 – Configuration examples – Miscellaneous

APPENDIX D – IMPACTS ON TORSIONAL RIGIDITY TESTS

(Informative)

Glazing (including glazing gaskets, tapes or sealants used to fix, retain, and support the glazing) provides some torsional rigidity to opening panels, so it does matter what glazing is used in the test. The option of testing the torsional rigidity of a window opening panel without any glazing at all was considered, but until work has been done to set performance levels, it has been deemed inappropriate. While it is expected that the specimen is tested with the thinnest (weakest) glazing system possible, as noted in 6.1.7(b)(ii), it is anticipated that some building consent authorities may require tests of a specific glazing thickness, typical glazing system, or IGU configuration if this is relevant to a particular project.

If it is permitted (by NZS 4223 or AS/NZS 4666) that the window system will be used with single glazing, then this should be used in the test. Where a window system will not be used with single glazing, the thinnest (weakest) IGU allowed by NZS 4223.3 would typically be used in the test.

While it is expected that glazing installed in window assemblies for testing should comply with NZS 4223, there may be situations where plastic panes, or panes of other materials are appropriate for testing. This should be clearly noted in the test report. Also, the panes should comply with any applicable material standards as well as any applicable human impact requirements.

Leadlight glazing, glass blocks, or other glazing systems may be installed in place of a tested glazing system, provided the replaced glazing meets any human impact requirements of NZS 4223.4.

APPENDIX E – HARDWARE

(Informative)

The term ‘hardware’ refers to the components necessary to operate, close, and/or lock an opening panel as designed. These might include, but are not limited to, hinges, pivots, stays, handles, locking mechanisms, and furniture.

The hardware used in the construction of operable windows and doors comes in a variety of types, styles, and levels of quality. Each item of hardware used in any test specimen shall be clearly and accurately identified in the test report and noted on the test drawings, with type, brand, model, part number, and any modifications made prior to or during testing noted in paragraph 2.5(h).

Hardware shall be installed so that the operating opening panel remains attached to the window frame. Sharp edges shall not protrude.

The hardware should have a tested level of performance for the most severe exposure and wind zones in which the product is to be used, as defined in NZS 3604 or NASH Standard Part 2.

The following codes of practice from Windows & Glass Association NZ (WGANZ) are examples of appropriate test standards for hardware:
(a) WGANZ TT-ICP-002 NZ;
(b) WGANZ NZ-ICP-003a.