



## TS 4211:2022 - Extrapolation of Sizes for Production Windows

Version 1.1 – 15 March 2023

### Introduction

SNZ TS (Standards NZ Technical Specification) 4211:2022 was introduced late last year and although no transition period has yet been set, it will eventually supersede NZS 4211:2008.

TS 4211 determines the performance, and performance classification of production windows and doors, based on weathertightness, airtightness, structural, and operational testing of a representative specimen within the scope set out in section 1.1 of the TS

Section 2.3 of the TS sets out how the test results and subsequent classification, are applied to production windows and doors.

The intent of this bulletin is to aide in the understanding and application of the performance classification when the production window is not of the same size or configuration as the tested specimen.

### Labelling

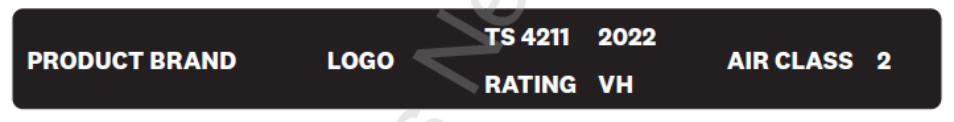


Figure 1 – Typical label

In accordance with section 2.4 of the TS each production window or door shall be affixed with a label by the manufacturer or supplier, stating,

- a) the window manufacturer or suppliers name or brand name,
- b) the standard to which the specimen was tested - (in this case TS 4211 2022),
- c) the exposure rating - (in this case a Very High wind zone),
- d) the air permeability class - (in this case Class 2).

The label is to be attached to a framework member using a durable affixed label, using lettering not less than 2mm high, located so that it will be readable after the installation of the window or door (refer to the WGANZ website for typical locations - <https://www.wganz.org.nz/guides/quality-and-performance/> ).



## Application to production windows and doors

When testing a specimen, system designers are encouraged to test the largest unit likely to be produced for use in a building and/or to the designed exposure rating. However, in some cases the constraints of the test facility will impact of the size and/or configuration of the test specimen.

The TS allows the suitability of production windows and doors, to be interpreted from the test results, within prescribed limits. The following provides a summary of how the interpretation applies.

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### Smaller sizes

*Production windows and doors that are smaller (either shorter, narrower, or both) than the tested specimen and are of the same construction, will be recognised as performing in a similar manner to the tested specimen, within the following limits. Refer Example 1.*

The production window or door shall,

- a) have the same air permeability class as the tested specimen,
- b) have the same exposure rating as the tested specimen, or
- c) have a higher exposure rating than the tested specimen, provided all of the following criteria are met,
  - i) the tested specimen achieved the requirements of the standard at the higher exposure rating in the water penetration test, and
  - ii) calculation is provided to demonstrate that all structural members will satisfy the allowable deflection requirements of the standard, at SLS pressures, for the higher exposure rating. Member strength will be established using actual test data and calculations are to be signed off by a suitably qualified person,
  - iii) the tested specimen met the performance requirements of the higher exposure rating in the ultimate strength test.
- d) If the production window or door contains an opening sash, hinged door panel, or other panel that moves away from the plane of the unit, then those panels shall be tested for torsional rigidity at the larger size.

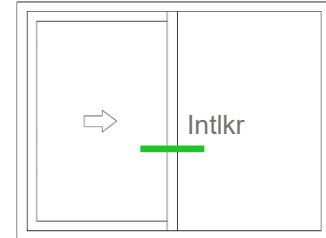
Refer to paragraph 2.3.1.1 of the standard for further information.



## Example 1.

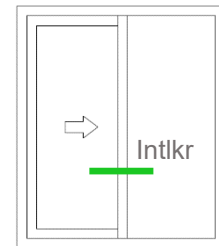
### Tested specimen

Exemplar sliding door	
Test report E-056	
Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Max deflection / span =	6.1mm / 2000mm
Calculated Interlocker 'I' value =	$6.4 \times 10^5 \text{mm}^4$
Air permeability =	Class 2
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS



### Production unit

Exemplar sliding door	
Test report E-056	
Size =	2140h x <b>2040w</b>
Exposure rating =	EH wind zone
Deflection structural members =	+/- 1515 Pa SLS
Allowable deflection / span =	10.7mm / 2140mm
Interlocker 'I' value required =	$4.4 \times 10^5 \text{mm}^4$ ✓
Air permeability =	Class 2 ✓
Water Penetration required =	455 Pa ✓
Ultimate strength test required =	+/- 2130 Pa ULS ✓





## Larger sizes

*Production windows and doors that are larger (either taller, wider, or both) than the tested specimen and are of the same construction, will be recognised as performing in a similar manner to the tested specimen, within the following limits. Refer Example 2.*

The production window or door shall,

- a) have dimensions not more than 10% larger than those of the tested specimen in either the horizontal or vertical directions and/or have a total area of not more than 15% larger than the tested specimen, per Figure 2. This applies to any element within the production window or door,
- b) have the same air permeability class as the tested specimen,
- c) have the same or lower exposure rating as the tested specimen,
- d) calculation is provided to demonstrate that all structural members will satisfy the allowable deflection requirements of the standard, at the increased dimension for the SLS pressures, applicable to the site exposure rating. Member strength will be established using actual test data and calculations are to be signed off by a suitably qualified person,
- e) if the production window or door contains an opening sash, hinged door panel, or other panel that moves away from the plane of the unit, then those panels shall be tested for torsional rigidity at the larger size,
- f) where the window or door assembly contains one or more sliding panels that are larger than the tested specimen, then,
  - i) the production unit will use the same rolling hardware that was used in the tested specimen, and the weight of the production panel shall not exceed the weight rating of that rolling hardware, and
  - ii) the operating force determined during testing shall be multiplied by the ratio of the production window panel area to the test specimen panel area. The result will be taken as the panel operating force for the purposes of assessing compliance of the production panel with the TS.

Refer to paragraph 2.3.1.2 of the standard for further information.

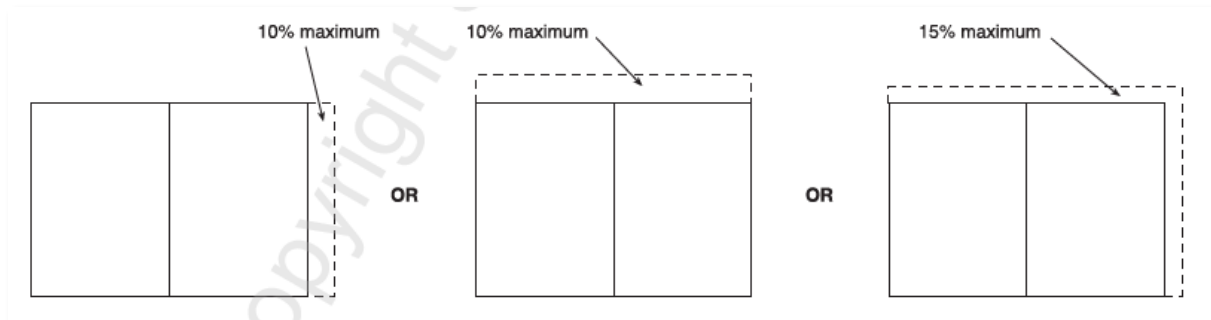


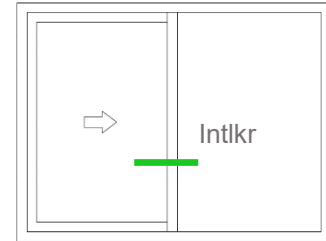
Figure 2 – Allowable dimensional increase



## Example 2.

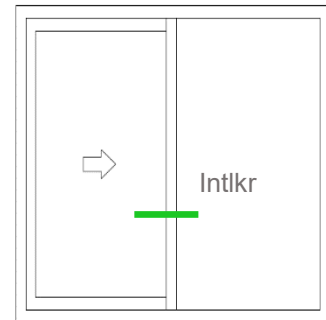
### Tested specimen

Exemplar sliding door	
Test report E-056	
Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Max deflection / span =	6.1mm / 2000mm
Calculated Interlocker 'I' value =	$6.4 \times 10^5 \text{mm}^4$
Air permeability =	Class 2
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS
Panel Weight with 5A/12/5A IGU =	61kg
Rolling hardware =	AA 0335 - Rated @55kg each
Force to initiate movement =	$75\text{N} / 2.4\text{m}^2 = 31.25\text{N/m}^2$
Force to sustain movement =	$40\text{N} / 2.4\text{m}^2 = 16.67\text{N/m}^2$



### Production unit

Exemplar sliding door	
Test report E-056	
Size =	<b>2320h</b> x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Allowable deflection / span =	11.6mm / 2320mm
Interlocker 'I' value required =	$6.3 \times 10^5 \text{mm}^4$ ✓
Air permeability =	Class 2 ✓✓
Water Penetration required =	375 Pa ✓
Ultimate strength test required =	+/- 2130 Pa ULS ✓
Panel Weight with 5T/12/5T IGU =	68kg
Rolling hardware =	AA 0335 - Rated @55kg each ✓✓
Force to initiate movement =	$31.25\text{N/m}^2 \times 2.6\text{m}^2 = 81.3\text{N}$ ✓✓
Force to sustain movement =	$16.67\text{N/m}^2 \times 2.6\text{m}^2 = 43.3\text{N}$ ✓✓



**Table 4 – Maximum operating force for panels**

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



## Wider sizes

In some cases, the testing of a sliding and bifolding door specimen is restricted by the size of the test booth, often only 4m wide. In order to test units designed to be manufactured beyond the limits of the test facility, the TS allows for the testing of smaller specimens and the results to be extrapolated to wider production doors.

*Production doors that are wider (but not taller) than the tested specimen, that consist solely of multiple panels repeating horizontally, with either couplings or mullions and are of the same construction, will be recognised as performing in a similar manner to the tested specimen, within the following limits. Refer Example 3.*

The production door shall,

- a) have the same air permeability class as the tested specimen, and
- b) have the same exposure rating as the tested specimen,
- c) the test specimen shall include all of the panel and frame details that are likely to be used in the production door, and
- d) the test specimen shall include three or more full width panels to be used in the production door, and  
*(this limitation is designed to prevent the increase in size allowed by paragraph 2.3.1.2 being used in conjunction with this clause)*
- e) the test specimen shall include the same number of tracks as used in the production door. Where the test specimen includes more tracks than panels the unused tracks will face the weathering side of the specimen, and  
*(this limitation is designed to prevent the testing of a specimen with some tracks protected by panels where those tracks may be exposed to the weather on a production door)*
- f) the test specimen shall include all joining details required in the assembly of the outer frame, and  
*(this limitation is designed to include any horizontal frame joints that may be required when the overall length of the production door exceeds the available length of the outer frame material. Joints in the outer frame are exposed to thermal movement and potential issues with drainage of the sill tracks)*
- g) the production door is not part of a coupled assembly.

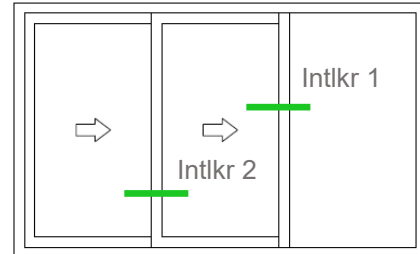
Refer to paragraph 2.3.1.3 of the standard for further information.



### Example 3.

#### Tested specimen

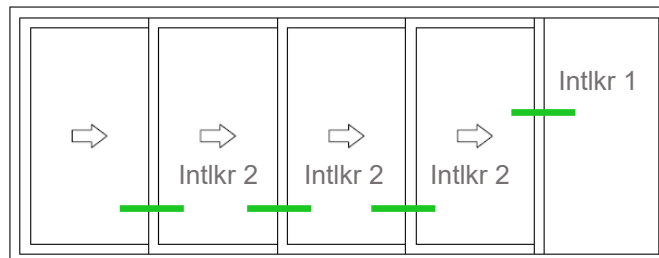
Exemplar stacking door  
Test report E-057



Size =	2140h x 3640w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Interlocker 1	
Max deflection / span =	6.1mm / 2000mm
Calculated 'I' value =	$6.4 \times 10^5 \text{mm}^4$
Interlocker 2	
Max deflection / span =	7.7mm / 2000mm
Calculated 'I' value =	$5.1 \times 10^5 \text{mm}^4$
Air permeability =	Class 2
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS

#### Production unit

Exemplar stacking door  
Test report E-057



Size =	2140h x 6040w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS ✓
Interlocker 1	
Allowable deflection / span =	10.7mm / 2140mm
Interlocker 'I' value required =	$3.9 \times 10^5 \text{mm}^4$ ✓
Interlocker 2 (repeated 3 times)	
Allowable deflection / span =	10.7mm / 2140mm
Interlocker 'I' value required =	$3.9 \times 10^5 \text{mm}^4$ ✓
Air permeability =	Class 2 ✓
Water Penetration =	455 Pa ✓
Ultimate strength test =	+/- 2500 Pa ULS ✓



## Coupled systems

*Coupling is the joining of two or more separate assemblies, either horizontally or vertically, through the use of a separate coupling member. Where an assembly is made of repeated adjoining modules, at least two modules, including the coupling member, shall have been tested. Refer Example 4.*

The individual modules comprising the assembly need only have been tested once, provided the sealing and closing systems are identical.

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

Where an assembly consists of both horizontal and vertical coupling members, these shall both have been included in the same test specimen.

Where structural couplings have been tested in accordance with the TS, further testing of the same couplings in other configurations shall not be required, provided the calculations for deflection and stress show they will remain within the requirements of the TS.

Refer to paragraph 2.3.2 of the standard for further information.

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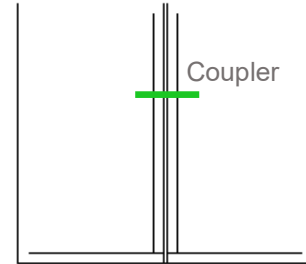




## Example 4.

### Tested specimen

Exemplar coupled window	
Test report E-055	
Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Max deflection / span =	5.8mm / 2000mm
Calculated Interlocker 'I' value =	$6.7 \times 10^5 \text{mm}^4$
Air permeability =	Class 3
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS



### Production unit

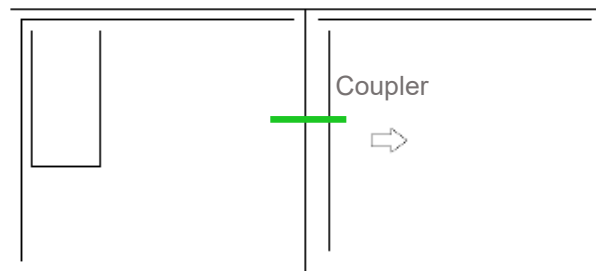
Exemplar coupled window / slider combination

#### Window

Exemplar window	
Test report E-054	
Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Air permeability =	Class 3
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS

#### Slider

Exemplar sliding door	
Test report E-056	
Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Air permeability =	Class 2
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS



*continued over...*

**Coupler**

Exemplar coupled window

Test report E-055

Size =	2140h x 2440w
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Max deflection / span =	5.8mm / 2000mm
Calculated Interlocker 'I' value =	$6.7 \times 10^5 \text{mm}^4$
Air permeability =	Class 2
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS

**Production Coupler**

Size =	2140h
Exposure rating =	VH wind zone
Deflection structural members =	+/- 1250 Pa SLS
Allowable deflection / span =	10.7mm / 2140mm
Interlocker 'I' value required =	$5.3 \times 10^5 \text{mm}^4$ ✓
Water Penetration =	455 Pa
Ultimate strength test =	+/- 2500 Pa ULS