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NZS 4223.1:2008
GLAZING IN BUILDINGS – PART 1: GLASS SELECTION AND GLAZING

AMENDMENT NO. 1

29 February 2016

REVISED TEXT

EXPLANATORY NOTE

The amendment to NZS 4223.1 is part of an update to the NZS 4223 series, which also includes the addition of a new Part 2 on insulating glass units (IGUs).

This amendment incorporates changes that have come through from Amendments No. 1 and No. 2 of AS 1288 *Glass in buildings – Selection and installation* and corrects errors that had been identified within the current Standard.

Clauses 2.1.5, 3.9 and Appendix E have been added. The Foreword, Scope, clause 3.8, Appendix B, and Appendix D have been revised. Clause 1.4 on heritage and historic buildings has been removed.

APPROVAL

Amendment No. 1 was approved on 19 February 2016 by the Standards Council to be an amendment to NZS 4223.1.

CONTENTS (page 5)

Delete:

Delete:

And **substitute**:

Add new heading:

Add new appendix heading:

In the list of figures **delete:**

And **substitute**:

(Amendment No.1, February 2016)

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REFERENCED DOCUMENTS (page 7)

Under NEW ZEALAND STANDARDS

Delete:	NZS 4211:1985	Specification for performance of windows
And **substitute**:	NZS 4211:2008	Specification for performance of windows

Add under NZS 4223 Glazing in buildings:

	Part 2:2016	Insulating glass units
Delete:	Part 3:1999	Human impact safety requirements
And **substitute**:	Part 3:2016	Human impact safety requirements
Delete:	NZS 4232	Performance criteria for fire resisting enclosures
	Part 2:1997	Fire resisting glazing systems
And **substitute**:	NZS 4232	Performance criteria for fire resisting enclosures
	Part 2:1988	Fire resisting glazing systems

Under JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

Delete:	AS/NZS 4666:2000	Insulating glass units
And **substitute**:	AS/NZS 4666:2012	Insulating glass units

Under AMERICAN STANDARDS

Add:	ASTM C1401-14	Standard guide for structural sealant glazing

Amendment No.1, February 2016)

Under BRITISH STANDARDS (page 8)

Delete:

BS 6206:1981	Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings
BS 6262	Glazing for buildings
Part 1:2001	General methodology for the selection of glazing

Add:

BS 6262	Glazing for buildings
Part 1:2005	General methodology for the selection of glazing
BS EN 1863-1:2011	Glass in building. Heat strengthened soda lime silicate glass. Definition and description
BS EN 12150-1:2015	Glass in building. Thermally toughened soda lime silicate safety glass. Definition and description
BS EN 12600:2002	Glass in building. Pendulum test. Impact test method and classification for flat glass
BS EN 14179-1:2005	Glass in building. Heat-soaked thermally toughened soda lime silicate safety glass. Definition and description
BS EN 14449:2005	Glass in building. Laminated glass and laminated safety glass. Evaluation of conformity/product standard

Under OTHER DOCUMENTS

Add:	**BRANZ Study Report No. 17.** *The development of a procedure and rig for testing the racking resistance of curtain wall glazing.* Wright, P.D. 1989.
Add:	**BRANZ Study Report No. 39.** *The behaviour of external glazing systems under seismic racking*; King, A.B. and Lim, K.Y.S. 1991.
Delete:	**Window Association of New Zealand (WANZ).** *Glazing seals, including wedges, backing seals, and gaskets – Specification 170103*; 2007. Retrieved from www.wanz.org.nz
And **substitute**:	**Window Association of New Zealand (WANZ).** *Glazing seals, including wedges, backing seals, and gaskets – Specification 170103*; 2012. Retrieved from www.wanz.org.nz
Delete	**Window Association of New Zealand (WANZ).** *Material specifications for glazing blocks – Specification 140307*; 2007. Retrieved from www.wanz.org.nz
And **substitute**:	**Window Association of New Zealand (WANZ).** *Material specifications for glazing blocks – Specification 140307*; 2013. Retrieved from www.wanz.org.nz

(Amendment No.1, February 2016)

FOREWORD (page 9)

Delete Foreword and **substitute**:

FOREWORD

NZS 4223 applies to glazing in buildings.
The Standard comprises four parts:

- Part 1:2008 – Glass selection and glazing;
- Part 2:2016 – Insulating glass units;
- Part 3:2016 – Human impact safety requirements;
- Part 4:2008 – Wind, dead, snow, and live actions.

This Standard applies to glazing in all buildings and applications other than those excluded in the scope.
This Standard, including Amendment No. 1, provides general guidance for designers and specifiers for glass selection and glazing in buildings.
These parts have been amended and revised to update the Standard and allow for New Zealand-specific considerations.

(Amendment No.1, February 2016)

1.1 Scope (page 11)

Delete clause and **substitute**:

1.1 Scope

NZS 4223.1 provides design criteria, guidance for specific design and procedures for glass selection, and glazing in buildings.

The following are excluded from the scope of NZS 4223 Parts 1, 2, 3, and 4:

(a) Glazing in lift cars and liftwells (see Appendix A for guidance);
(b) Furniture glass, cabinet glass, vanities, glass basins, refrigeration units, internal glass fitments and glass wall linings, framed internal wall mirrors, and mirrors not specifically covered by these parts;
(c) Buildings and structures with no public access intended for non-habitable building structures for horticultural or agricultural use;
(d) Restoration or repairs to existing decorated glass;
(e) Glazing applications that might fail due to stresses other than tensile stresses, such as glass floors;
(f) Plastic glazing materials;
(g) The construction and installation of windows (refer to NZS 3504, NZS 3619, and NZS 4232.2);
(h) Glass blocks, pavers, slumped, formed, or cast glass;
(i) Point-fixed or point-supported systems, used for glazing, cladding, signage, and the like, not specifically covered by these parts.

(Amendment No.1, February 2016)

1.2 Application (page 11)

Delete (e) and **substitute**:

(e) For framed, unframed, and partly framed glass assemblies in buildings up to 10 m high, glass shall be selected in accordance with Section 5 of this part;

Delete (f) and **substitute**:

(f) Insulating glass units shall also be in accordance with NZS 4223.2.

Delete note.

(Amendment No.1, February 2016)

1.4 Heritage and historic buildings (page 12)

Delete clause.

(Amendment No.1, February 2016)

1.5 **Interpretation** (page 12)

Delete third paragraph and **substitute**:

Notes to the text contain information and guidance and are not considered to be an integral part of this Standard.

Statements expressed in mandatory terms in notes to figures and tables are deemed to be requirements of this Standard.

(Amendment No.1, February 2016)

1.6 **Definitions** (page 12)

Delete paragraph 1 and **substitute**:

For the purposes of this Standard the following definitions apply. Refer to AS/NZS 4668 for additional definitions. See also Figure 1.

Delete and **substitute** the following definitions:

MINIMUM THICKNESS — The thickness of a pane of glass at the minimum thickness tolerance.

NOMINAL THICKNESS — The commonly used dimension by which the thickness of a pane of glass is generally described.

NOTE – The actual thickness of particular panes of glass may not coincide with the nominal thickness.

PANEL — An assembly containing one or more panes.

NOTE –

1. Panels may be fully framed, partly framed or fully unframed (frameless).
2. Panels beside a door are 'side panels' and are sometimes known as sidelights or sidelites.

SPAN — The dimension between supports. For panels supported on all four edges, it corresponds to the smaller of the sight size dimensions. For panels supported on two opposite edges only, it is the sight size dimension between supports.

(Amendment No.1, February 2016)

2.1.2 **Heat-strengthened glass** (page 14)

Delete second paragraph and note and **substitute**:

When tested in accordance with ASTM C1279, heat-strengthened glass shall have a surface compression of 24 MPa – 52 MPa.

NOTE – Heat-strengthened glass with surface compressive stress between 52 MPa and 69 MPa can lead to an increased risk of spontaneous glass fracture (associated with material impurities).

Alternatively heat-strengthened glass shall comply with BS EN 1863-1.

(Amendment No.1, February 2016)

2.1.3 **Safety glazing material** (page 14)

Delete first paragraph and **substitute**:

Safety glazing materials (such as toughened and laminated glass) shall comply with AS/NZS 2208, or ANSI Z97.1, or BS EN 12150-1, or BS EN 14449.

(Amendment No.1, February 2016)

2.1.4 **Insulating glass units (IGU)** (page 14)

Delete paragraph and **substitute**:

Insulating glass units shall comply with NZS 4223.2.

(Amendment No.1, 26 February 2016)

2.1.5 **Glass material properties** (page 14)

Add new clause:

2.1.5 Glass material properties

For the purpose of this Standard, whether the glass is annealed, heat-strengthened, or toughened, the glass material properties shall be based on reliable test data.

In the absence of test data the following material properties shall be used:

(a) Density = 2500 kg/m$^{3;}$
(b) Poisson’s ratio = 0.22;
(c) Linear elastic modulus (E) = 70 GPa;
(d) Torsional elastic modulus (G) = 28.7 GPa.

(Amendment No.1, February 2016)

Table 1 – Glass type factor c_1 (page 18)

Delete '2.1.2.' in the note and **substitute**:

Section 2.

(Amendment No.1, February 2016)

Table 3 – Load duration factor c_3 (page 18)

Delete first row of table and **substitute**:

Short-term load duration[1] (wind) on all glass types	1.0

Delete notes and **substitute:**

NOTE –

1. Short-term load duration is any duration ≤ 3 seconds.
2. Medium-term load duration is any duration > 3 seconds and ≤ 10 minutes.
3. Long-term load duration is any duration > 10 minutes.
4. Where the load duration (d seconds) is accurately known then the load duration factor c_3 can be determined for annealed glass using $c_3 = (3/d)^{(1/16)}$.

(Amendment No.1, February 2016)

3.4.1 Laminated glass (page 19)

Delete 3.4.1(a) and **substitute:**

(a) For short-term and medium-term load durations, the actual total minimum glass thickness, as specified in NZS 4223.4 or Table 4, shall be used.

NOTE – Table 4 is applicable for both symmetrical and non-symmetrical laminates.

(Amendment No.1, February 2016)

3.4.2 Insulating glass units (IGU) (page 21)

Delete first paragraph and **substitute**:

For insulating glass units subjected to wind pressures, each pane shall be checked individually for strength and deflection under ultimate and serviceability limit design wind pressures respectively. The pressures acting on each pane shall be determined by multiplying the design wind pressures by k_{pane}, calculated as follows:

(Amendment No.1, February 2016)

3.8 **Racking** (page 22)

Delete header and clause and **substitute**:

3.8 Building movement

3.8.1 General

The building design movements and distortions, such as lateral building deflection, inter-storey drift, racking, vertical deflections of structural elements, shrinkage, and creep, shall be considered for the glazing and glazing system.

3.8.2 Glazing

All framed, partly framed or unframed (frameless) glazing shall comply with Section 3.

3.8.3 Design actions

3.8.3.1 *Serviceability limit state*

Under serviceability limit state (SLS) actions glass shall not be subject to in-plane forces and deformations.

3.8.3.2 *Ultimate limit state*

Where glass may be subjected to in-plane forces and deformations under ULS (ultimate limit state) racking actions (typically seismic) and, if broken, people in the vicinity may be endangered (see note 1) then one or more of the following shall be adopted:

(a) Use laminated safety glass (annealed, heat-strengthened, or toughened laminated safety glass) that is prevented from disengaging from its perimeter frame when broken (see note 2);

(b) Use monolithic toughened safety glass, provided the glass is no more than 5 m above the walking surface;

(c) Use specific design to:

  (i) Demonstrate by design or testing that the glass is separated from the frame (see note 3) or building such that the ULS building deformations are not resisted by the glass or

  (ii) Design the glass and frame systems to resist ULS actions without failure.

NOTE –

1. Examples of situations where people may be endangered by breaking glass are:

   (a) Glass in the exterior wall of a building that can fall on to occupied interior or exterior spaces;

   (b) Glass (vertical and sloped) above and within 2000 mm either side of internal or external exit routes in a building.

2. Glass can be captured mechanically in a frame system pocket with adequate edge cover, or with structural silicone sealant at the perimeter, or with other proprietary anchorage systems or fittings to ensure restraint of the fractured pane. If used, structural silicone sealant can have 6 mm minimum glueline and bite.

3. Separation from the surrounding structure may be as follows:

$\Delta_{fallout} \geq 1.25D_P$

$\Delta_{fallout}$ = relative seismic displacement (drift) causing glass fallout from the curtain wall, storefront, or partition, as determined in accordance with an approved engineering analysis method

D_P = relative seismic displacement that the component should be designed to accommodate

4. For IGUs consider both the outer and inner pane separately, the internal finished floor level may be considered as the walking surface in (b).

The 1.25 factor is applied to reflect the uncertainties associated with calculated inelastic seismic displacements in building structures. For more information refer to BRANZ Study Report No.17 and BRANZ Study Report No. 39.

(Amendment No.1, February 2016)

3.9 Selection of glass for minimising the risk due to glass spontaneous fracture (page 23)

Add new clause:

3.9 Selection of glass for minimising the risk due to glass spontaneous fracture

The use of toughened glass and some heat-treated glasses involve a relatively small risk of breakage resulting from nickel sulphide or other inclusions. There are no specific requirements for minimising spontaneous fracture in this Standard. Guidance on glass selection to minimise the risk is given in Appendix E.

(Amendment No.1, February 2016)

4.1 Scope (page 24)

Delete second sentence and **substitute**:

For insulating glass units, refer to NZS 4223.2.

Delete note 3 and **substitute**:

3. The glazing of insulating glass units is not covered in this section (refer to NZS 4223.2).

(Amendment No.1, February 2016)

APPENDIX B – STRUCTURAL SILICONE GLAZING (INFORMATIVE) (page 44)

Delete Appendix B and **substitute**:

APPENDIX B – STRUCTURAL SILICONE GLAZING (INFORMATIVE)

B1 General

Structural silicone glazing (SSG) is an application where a sealant not only can function as a barrier against the passage of air and water through a building envelope, but also primarily provides structural support and attachment of glazing or other components to a window, curtain wall, or other framing system.

For common glass types and frame surface finishes (substrates), adhesion and compatibility have normally been established. However some substrates require primers as a result of adhesion testing, and therefore special procedures should be followed, which are not defined in this appendix.

It is normal on SSG projects to have compatibility and adhesion testing done before any glazing commences.

Detailed guidance is provided in ASTM C1401 and by the major sealant manufacturer; however, this appendix is a simple guide to some key design and glazing issues.

B2 Structural bite design

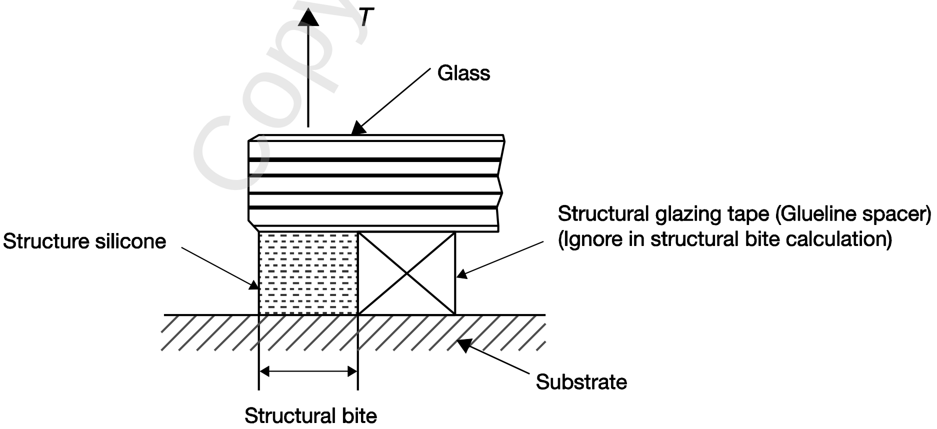
B2.1 Calculation

The minimum structural silicone bite (see Figure B1) required under wind load may be calculated using the following equation:

$$\text{Structural bite } (B) = \frac{0.5 \times \text{short span length (mm)} \times \text{ultimate limit state wind pressure (kPa)}}{\text{Silicone minimum tensile strength (kPa)}}$$

NOTE – For dead load design refer to the manufacturer.

Figure B1 – Structural bite



T = tension

B2.2 For a wind load

B2.2.1 *Example for glass supported along four edges*

For a pane of vertical glass 2000 mm × 1200 mm supported along four edges with a ULS wind load of 2 kPa applied, the minimum structural silicone bite is calculated as follows:

$$\text{Structural bite } (B) = \frac{0.5 \times 1200 \times 2}{210} = 5.71 \text{ mm minimum (6 mm nominal)}$$

NOTE – Allowing for a typical 2 mm installation tolerance, a structural silicone bite of 8 mm would be selected.

B2.2.2 *Example for glass supported along two edges*

For a pane of glass supported along the top and bottom edges with an unsupported span of 1500 mm, with a ULS wind load of 2 kPa applied, the minimum structural silicone bite is calculated as follows:

$$\text{Structural bite } (B) = \frac{0.5 \times 1500 \times 2}{210} = 7.14 \text{ mm minimum (8 mm nominal)}$$

NOTE – Allowing for a typical 2 mm installation tolerance, a structural silicone bite of 10 mm should be selected.

B3 Movement design of structural silicone

Movement design of structural silicone is complicated due to its non-linear stress/strain behaviour. Approximations and associated calculation methods have been developed to allow for design assessments. These are available from the silicone manufacturer.

In some applications the joint may be subject to tension and shear loading from dead loads and other actions, and the structural bite and joint thickness (glueline) will need to be designed to accommodate these loads. Calculation methods are available for these loading conditions from the silicone manufacturer and depend on the movement capacity of the sealant.

B4 Glazing with structural silicone (without substrate primers)

B4.1 General

Silicone will bond very well to glass and compatible substrates provided the surface of the glass and substrates are clean. Unfortunately, surfaces within a factory or building site will be contaminated by residue from other materials and activities.

In such environments, it is essential that the glass and substrate surfaces be cleaned thoroughly just before the application of structural silicone. If silicone is applied to surfaces that have not been cleaned then the adhesive bond may become contaminated (for example, with dust) and greatly increase the risk of sealant joint failure.

Because of this, it is recommended that structural silicone be applied under factory conditions where quality is easier to control.

Selecting the right silicone is critical to a successful application. Use of an unsuitable silicone can have serious consequences. For example, some silicones are not compatible with the interlayer of laminated glass, glass coatings, IGU seals, or the substrate finishing. There are numerous grades of silicone available, all with different performance characteristics. The manufacturers of these products have the best understanding of the performance capabilities of their products so their advice on which product to use should be sought for each application.

B4.2 Cleaning

Thorough and effective cleaning of the glass and substrate surfaces should be carried out before the application of silicone is commenced.

Successful cleaning of the glass and substrate surfaces depends on the use of an effective cleaning agent and the use of an appropriate cleaning method. An effective cleaning agent can only be chosen if the nature of the contaminant is known. The removal of dust, dirt, and cutting oils can be achieved using a solvent such as alcohol blends. The glazier should take suitable safety precautions when handling such solvents.

As the success of the silicone bond with the glass and substrate relies on the cleanliness of the glass edge and substrate, the procedure used for the cleaning is the responsibility of the glazier. It is recommended that clean, lint-free cloths or clean, silicone-free paper towels be used to apply the cleaner to the surface. The object is to remove the contaminants from the surface and not simply move them around and reapply them.

A typical cleaning procedure is as follows:

(a) Thoroughly clean the glass and substrate surface of any loose debris;
(b) Pour or dispense solvent onto a cloth or towel. Do not dip the cloth or towel into the solvent as this can contaminate the cleaning solvent;
(c) Wipe the glass and substrate surfaces vigorously to remove any contaminants. Check the cloth to see if it has picked up any contaminants. Rotate the cloth to a clean area and re-wipe until no additional dirt is picked up;
(d) Take a second clean, dry cloth and immediately wipe the cleaned area;
(e) Dispose of dirty cloths or towels.

B4.3 Silicone application

The silicone application will provide a silicone seal capable of carrying the loads imposed by the structural silicone joint design.

A typical application procedure is as follows:

(a) It is common to first mask the glass or frame either side of a joint to ease clean-up;
(b) Cut the silicone tube or set the gun nozzle so that it is able to just enter the gap between the edges of the glass and substrate. Apply the silicone with a silicone gun or pump into the join so that it wets both edges of the glass and substrate, oozing out on both the far and near sides of the joint. It is essential that no air pockets be formed while the silicone is being gunned into the joint;
(c) For tooling the joint, select a tool that will minimise the concave shape of the finished surface of the silicone, this will ensure the maximum strength of the joint;
(d) Tool the silicone so that it is forced into the joint. This will further ensure that the edges of the glass and substrate are properly wetted. Each side will require to be tooled several times, as tooling will force some silicone out the other side of the join. Tooling should be completed before the silicone has formed a skin;
(e) Remove the tape and excess silicone, taking care not to spread the silicone or scratch the glass. Use a rag dampened with recommended solvent to wipe up the remainder. It is much easier to remove excess silicone before it has cured as trying to do so after curing greatly increases the risk of glass damage. If excess silicone has cured then it can be cut away using a blade and the remainder then has to be abraded away.

B4.4 Silicone curing

The glass should be properly supported until the silicone has cured. Any movement of a structural silicone seal prior to a full cure being achieved may reduce the section area of the silicone and reduce the strength of the seal. Support should therefore be maintained until the silicone has adequately cured.

There are two basic cure mechanisms for structural silicone:

(a) Two-part silicones include all the reactants within the silicone mix and can cure in a matter of hours; and

(b) One-part silicones are air-cured and may take some time to cure (a rule of thumb is 1 mm of cure per day).

Whichever type of silicone is used, the required curing time should be obtained from the silicone manufacturer.

B4.5 Structural silicone monitoring

It is recommended that quality assurance (QA) records and ongoing monitoring of structural silicone applications are maintained. Some project approving authorities require this as evidence and the sealant manufacturer may require it for a warranty.

The silicone manufacturer will provide guidance on typical QA procedures.

B5 Glazing with structural silicone (with substrate primers)

Where primers are required to ensure adhesion with the glass surface or frame substrate then the manufacturer should be consulted concerning the selection and application of the correct primer.

(Amendment No.1, February 2016)

APPENDIX C – GUIDANCE ON THE SPECIFIC DESIGN OF GLASS FINS TO PREVENT BUCKLING (INFORMATIVE) (page 47)

C1 Introduction

Delete fifth paragraph and **substitute**:

The ultimate limit state design moment for a particular structural situation should not exceed the critical buckling moment (M_{CR}) divided by a safety factor of 1.14.

(Amendment No.1, February 2016)

APPENDIX D
RECOMMENDATIONS FOR FRAMELESS SHOWER INSTALLATION
(INFORMATIVE) (page 53)

Delete appendix and **substitute**:

APPENDIX D – RECOMMENDATIONS FOR FRAMELESS SHOWER INSTALLATION (INFORMATIVE)

D1

The following recommendations are provided for the benefit of fabricators, installers and users of partly framed and unframed (frameless) shower enclosures:

(a) NZBC E3/AS1 is a means of compliance for waterproofing wet areas and shower screen installation;

(b) Glass gussets, braces and supports at the head of the shower enclosure may be necessary to ensure the stability and safe performance of frameless shower screens;

(c) The fixed glass panels in a shower enclosure may be attached to the wall and floor with a securely fixed channel. The glass should be bonded firmly to the channel with silicone to prevent the glass falling out and water ingress into the channel;

(d) To prevent excessive deflection, fixed toughened safety-glass screens, partly framed continuously along two or three edges by channels, should not exceed the following spans between two opposite supported edges:

5 mm glass:	1300 mm
6 mm glass:	1600 mm
8 mm glass:	2000 mm
10 mm glass:	2400 mm
12 mm glass:	2800 mm;

(e) The hardware design should be such that the ‘cut-outs’ or fixing holes in toughened safety glass anchor the glass to the hardware thus reducing the potential for a frameless door to sag, which can result in glass-to-glass and glass-to-floor contact. The hardware design should also include gaskets to prevent glass to metal contact;

(f) Partly framed and unframed (frameless) doors should be installed in such a manner as to avoid the edge of the glass, which is the part of glass most vulnerable to breakage, from coming into contact with the stile or floor or other hardware, such as a vanity. The weight of unframed doors should not exceed the capacity of the hardware;

(g) A partly framed or unframed side panel or return panel up to 2100 mm high should have a minimum of two mechanical fixing brackets to the wall at 1700 mm maximum spacing. Panels exceeding 2100 mm high require additional fixings at 1700 mm maximum spacing. This is in addition to silicone, which provides some stability to the glass as well as sealing the glass to wall tiles, and so on. Screens can be attached to the floor allowing for a minimum 3 mm clearance with either structural silicone or a minimum of two mechanical fixing brackets at a maximum spacing of 1700 mm;

(h) NZS 4223.3 requires Grade A safety glass.

D2

It is recommended that homeowners regularly inspect the following aspects of the operation of a frameless shower screen:

(a) Ensure a minimum of 3 mm clearance is maintained between all edges of a frameless glass door and the partly framed panel and or wall and the floor;

(b) Check the tightness of the screws in the hardware;

(c) Check the operation of the hinges to ensure that they hinge freely and are not bound;

(d) Replace scratched or damaged glass;

(e) Ensure that, when making alterations to a shower area, unframed shower door edges do not make contact with objects that may cause the glass door to fracture.

(Amendment No.1, February 2016)

APPENDIX E

GUIDANCE ON SELECTING GLASS TO MINIMISE THE RISK OF SPONTANEOUS GLASS FRACTURE

(INFORMATIVE) (page 54)

Add new appendix:

APPENDIX E – GUIDANCE ON SELECTING GLASS TO MINIMISE THE RISK OF SPONTANEOUS GLASS FRACTURE

(INFORMATIVE)

The use of toughened glass and some heat-treated glasses involves a relatively small risk of breakage resulting from nickel sulphide or other inclusions. The following provides guidance on the selection of glass to minimise this risk.

E1 Heat soaking

All monolithic-toughened glass and heat-strengthened glass, with a surface compression greater than 52 MPa, should be heat soaked in accordance with clauses 3, 5, 6, 12 and Annex A of BS EN 14179-1.

The heat-soaked glass should be marked in compliance with BS EN 14179-1. Alternatively, a certificate supplied by the manufacturer verifying that the toughened glass has been heat soaked in accordance with this Standard would be a suitable alternative to marking in compliance with BS EN 14179-1.

NOTE – Heat soaking will significantly reduce but not totally eliminate the small risk of fracture due to nickel sulphide.

E2 Other ways to minimise risk

Heat soaking in accordance with E1 should not be required in glazing that conforms to any one of the following:

(a) No part of the glass is glazed more than 5 m from the finished floor or ground level;
(b) Suitable protection by a balcony, awning or the like is provided such that, in the event of glass fracturing, the risk of injury or property damage is minimised;
(c) Laminated glass (including toughened laminated and heat-strengthened laminated) is used.

NOTE –

(1) For insulating glass units glazed vertically, greater than 5 m from the ground level, a laminated, monolithic annealed or monolithic heat-strengthened outer or inner pane as appropriate may be considered to provide suitable protection.
(2) For insulating glass units glazed in sloped overhead glazing greater than 5 m from the finished floor or ground level a laminated inner (lower) pane may be considered to provide suitable protection.
(3) A balcony that extends from the building a minimum two-thirds of the height of the adjacent panel may be considered to be suitable to minimise the risk. For example, for a 2.7 m high panel, the balcony or protection should extend a minimum of 1.8 m from the building.
(4) Refer to NZS 4223.3 for glass barriers.

(Amendment No.1, February 2016)

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