

Please find enclosed Amendment 17, effective 30 November 2018, to the Acceptable Solutions and Verification Methods for Clause B1 Structure of the New Zealand Building Code. The previous amendment to the B1 Acceptable Solutions and Verification Methods was Amendment 16, in April 2018.

Section	Previous Amendment	November 2018 Amendment 17
Title pages	Remove document history and status page 3/4	Replace with new document history and status page 3/4
References	Remove pages 11-14	Replace with new pages 11-14
B1/VM1	Remove pages 17/18, 21–22B	Replace with new pages 17/18, 21–22B
index	Remove page 83/84	Replace with new page 83/84

Document Status

The most recent version of this document (Amendment 17), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 30 November 2018 and supersedes all previous versions of this document.

The previous version of this document (Amendment 16) will cease to have effect on 31 March 2019.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any Verification Method or Acceptable Solution at any time. Up-to-date versions of Verification Methods and Acceptable Solutions are available from www.building.govt.nz

B1: Document History			
	Date	Alterations	
First published	July 1992		
Amendment 1	September 1993	p. ix–xii, References p. 1, 1.3, 1.4.1–1.4.3, 2.1, 2.2, 3.1–3.3, 4.1, 5.1 p. 2, 6.1, 6.2, 8.1, 9.1 p. 4, 11.1, 12.1 p. 5, 1.2, 2.1, 2.2, 3.1, 3.2,s 4.1, 4.2, 6.1, 6.2, 7.1	p. 9, 1.0.1, 1.0.5 b) c) p. 10, 2.3.5 p. 13, Figure 4 p. 14, 2.3.6 p. 16, 2.3.8, 2.3.9 p. 34, Table 1 p. 47, 1.0.1 pp. 49–54, Index
Amendment 2	19 August 1994	pp. i and ii, Document History pp. vii and viii, Contents pp. x and xi, References p. xiv, Definitions p. 1, 1.4.2, 5.1 p. 2, 6.1 p. 5, 1.3, 3.1, 4.1 p. 6, 7.1 p. 10, 2.3.5 p. 12, Figure 3 p. 13, Figure 4 p. 14, 2.3.6, 2.3.7	p. 15, Tables 4 and 5 p.16, 2.4.1 p. 21, Figure 2 p. 22, Figure 3 p. 32, 2.2.4 p. 33, 1.0.2 p. 34, 3.2.1, Table 1 p. 35, 4.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, 4.3, 4.3.1, 5.0.1, Table 2 p. 36, 6.1.2, 7.1, 7.1.1 p. 37, 7.3.4 pp. 49, 50, 51, 54, Index
Reprinted incorporating Amendments 1 and 2	October 1994		
Amendment 3	1 December 1995	p. ii, Document History p. ix, References p. 1, 3.1	p. 5, 6.2 p. 50, Index
Reprinted incorporating Amendments 1, 2 and 3	July 1996		
Amendment 4	1 December 2000	p. ii, Document History pp. vii and viii, Contents pp. ix – xii, Revised References pp. xiii and xiv, Definitions	pp. 1–4A, Revised B1/VM1 pp. 5 and 6, Revised B1/AS1 pp. 33–63, Revised B1/VM4 p. 65, Revised B1/AS4 pp. 67–72, Revised Index
Erratum	9 February 2001	p. 46, 4.3.2 a) i)	
Amendment 5 incorporating Erratum	1 July 2001	p. 2, Document Status p. 3, Document History p. 7, References	p. 41, 1.7.2 Comment p. 49, 2.2.4 p. 48, 1.9.1 b) i)
Amendment 6	1 March 2005	p. 11, References	
Amendment 7	1 April 2007	pp. 11–12, 14, References pp. 15–16, Definitions	p. 18, 6.1

B1: Document History

Amendment 8	1 December 2008	p. 2, Document Status p. 3, Document History p. 9, Contents pp. 11–14, References pp. 15–16, Definitions	pp. 17–22B, B1/VM1 p. 51, B1/VM4 1.0.5, 2.0.1 p. 56, B1/VM4 Figure 2 p. 70, B1/VM4 B1.0.2 pp. 83–84, 86 Index
Amendment 9	30 September 2010	pp. 2–3, Document History, Status, pp. 11–14, References p. 20, B1/VM1 2.2.13 p. 21, B1/VM1 3.0, 5.1 pp. 22–22B, B1/VM1 11.0 pp. 23–24, B1/AS1 6.0, 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 7.3, 7.4	p. 27, B1/AS2 1.0.5 p. 44, B1/AS3 1.7.9 p. 47, B1/AS3 1.8.5, 1.8.6 p. 49, B1/AS3 2.1.1, 2.2.4 p. 63, B1/VM4 4.3.2 p. 67, B1/VM4 5.3.1
Reprinted incorporating Amendments 4–9	30 September 2010		
Erratum 1	30 September 2010	p. 21, B1/VM1 3.1	
Amendment 10 (Canterbury)	Effective from 19 May 2011 until 31 January 2012	p. 9, Contents p. 12–14, References p. 15, Definitions p. 17, B1/VM1	p. 20, B1/VM1 2.2.14A to 2.2.14D pp. 23–23C B1/AS1 1.4, 2.0, 3.0, 4.0 p. 48, B1/AS3 1.9.3 p. 84, Index
Amendment 11	Effective from 1 August 2011 until 14 August 2014	p. 9, Contents p. 11–14, References p. 17–22B, B1/VM1 1.0, 2.0, 2.2.9, 2.2.14c, 5.2, 6.1, 7.1, 8.1, 12.1, 13.0	pp. 23–24, B1/AS1 1.2, 2.0, 3.0, 4.0, 7.0, 8.0, 9.0 pp. 27–34, B1/AS2 pp. 83–87, Index
Amendment 12	Effective from 14 February 2014 until 31 May 2016	p. 9, Contents pp. 11–13, References pp. 15, 16, Definitions pp. 17, 18, 20, 22, 22A, 22B, B1/VM1 2.1, 2.2.6, 2.2.11, 5.2, 9.0, 12.1	pp. 23–23C, 24 B1/AS1 1.1, 1.2, 2.1.1–2.1.10, 3.1.9, 4.1.5, 8.0, 9.0 p. 79, B1/VM4 C11.0
Amendment 13	Effective from 1 June 2016 until 30 May 2017	p. 13, References	p. 24, B1/AS1 7.3.3, 7.3.4
Amendment 14	Effective from 4 November 2016 until 30 May 2017 Effective from 1 January 2017 until 30 May 2017	p. 9 Contents p.p. 14 References p. 22 B1/VM1 3.1 d) p. 22C VM1 14.1.1	pp. 22C–22F B1/VM1 14.1, 14.1.2 - 14.1.22 pp. 23, 23B B1/AS1 2.1.3, 3.1.8 pp. 84, 87 Index
Amendment 15	Effective from 1 January 2017 until 30 June 2018	p. 13 References p. 20 B1/VM1 2.2.14A, 2.2.14B p. 21 B1/VM1 3.1 p. 22B 13.1 p. 23A B1/AS1 3.1.2A, 3.1.2B, 3.1.2C	p. 24 B1/AS1 7.0 p. 37 B1/AS3 Scope p. 41 B1/AS3 1.7.2 p. 49 B1/AS3 2.2.4 p. 54 B1/VM4 3.3.2
Amendment 16	Effective 3 April 2018 until 31 March 2019	p. 9 Contents pp. 11–14A References p. 18 B1/VM1 2.2.5	pp. 21–22 B1/VM1 3.1, 5.1 p. 57 B1/VM4 3.3.2 p. 65 B1/VM4 4.3.4
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Amend 11
Aug 2011

References

For the purposes of New Zealand Building Code compliance, the acceptable New Zealand and other Standards, and other documents referred to in these Verification Methods and Acceptable Solutions (primary reference documents) shall be the editions, along with their specific amendments, listed below. Where the primary reference documents refer to other Standards or other documents (secondary reference documents), which in turn may also refer to other Standards or other documents, and so on (lower order reference documents), then the applicable version of these secondary and lower order reference documents shall be the version in effect at the date these Verification Methods and Acceptable Solutions were published.

Amend 12
Feb 2014

Amend 7
Apr 2007

Amend 12
Feb 2014

Standards New Zealand

Where quoted

Amend 16 Apr 2018	AS/NZS 1163: 2016 Cold-formed structural steel hollow sections	VM1 5.1.1
Amend 11 Aug 2011	AS/NZS 1170: Structural design actions –	VM1 1.0, 2.1, 2.2, 5.2, 6.1, 7.1, 8.1
Amend 12 Feb 2014	Part 0: 2002 General principles <i>Amends: 1, 2, 3, 4, 5</i>	AS1 7.2, 7.3
Amend 12 Feb 2014	Part 1: 2002 Permanent imposed and other actions <i>Amends: 1, 2</i>	VM4 2.0, B1.0
Amends 12 and 17	Part 2: 2011 Wind actions <i>Amends: 1, 2, 3, 4, 5</i>	
Amends 10 and 11	Part 3: 2003 Snow and ice actions <i>Amend: 1</i>	
Amends 10 and 11	NZS 1170: Structural design actions –	VM1 2.1, 2.2
	Part 5: 2004 Earthquake actions – New Zealand	
Amend 11 Aug 2011	COMMENT The above suite of Structural Design Action Standards, together with their amendments, are referred to collectively as “AS/NZS 1170”.	
Amend 8 Dec 2008	AS/NZS 1554: Structural steel welding	
	Part 1: 2014 Welding of steel structures <i>Amends: 1, 2</i>	VM1 5.1.13
Amend 16 Apr 2018	AS/NZS 1594: 2002 Hot-rolled steel flat products	VM1 5.1.1
	AS/NZS 1664: Aluminium structures –	VM1 7.1
	Part 1: 1997 Limit state design <i>Amend: 1</i>	
Amends 8 and 9		
Amend 7 Apr 2007	AS/NZS 1748:- Timber – Stress graded for structural purposes	VM1 6.1
	Part 1: 2011 General requirements <i>Amend: 1</i>	VM1 6.1
Amend 12 Feb 2014	Part 2: 2011 Qualification of grading method <i>Amend: 1</i>	VM1 6.1
Amend 9 Sep 2010	AS/NZS 2032: 2006 Installation of PVC pipe systems <i>Amend: 1</i>	AS1 6.3

		Where quoted
Amend 9 Sep 2010	AS/NZS 2033: 2008 Installation of polyethylene pipe systems <i>Amends 1, 2</i>	AS1 6.4
Amend 17 Nov 2018	AS/NZS 2327: 2017 Composite structures – Composite steel-concrete construction in buildings	VM1 5.1.4A
Amend 9 Sep 2010	AS/NZS 2566: 2002 Buried Flexible pipelines. Part 1: 1998 Structural Design Part 2: 2002 Installation	AS1 6.1 AS1 6.2
	AS/NZS 2918: 2001 Domestic solid fuel heating appliances installation	AS3 3.2.1, 2.2.4
Amend 16 Apr 2018	NZS 3101:- Concrete structures standard Part 1: 2006 The design of concrete structures <i>Amends: 1, 2, 3</i>	VM1 3.1, 3.1.2, 11.1
Amend 6 Mar 2005		
Amend 8 Dec 2008	NZS 3106: 2009 Design of concrete structures for the storage of liquids.	VM1 3.2
Amend 9 Sep 2010		
Amend 7 Apr 2007	NZS 3109: 1997 Concrete construction <i>Amend: 1, 2</i>	AS3 1.8.2, 1.8.5 b), 2.2.1 c), 2.2.3
Amend 9 Sep 2010	NZS 3112:- Methods of test for concrete Part 2: 1986 Tests relating to the determination of strength of concrete <i>Amend: 1, 2</i>	AS3 1.8.3 c)
Amend 9 Sep 2010		
Amend 9 Sep 2010	NZS 3404:- Steel structures standard Part 1: 1997 Steel structures standard <i>Amend: 1, 2</i>	VM1 5.1
Amend 17 Nov 2018	SNZ TS 3404: 2018 Durability requirements for steel structures and components	VM1 5.1.9A
Amend 9 Sep 2010		
Amend 11 Aug 2011	NZS 3603: 1993 Timber structures standard <i>Amend: 1, 2</i> (Applies to building work consented prior to 1 April 2007) <i>Amend: 1, 2, 4</i> (Applies to building work consented on or after 1 April 2007)	VM1 6.1, VM4 5.3.1
Amend 7 Apr 2007		
Amend 10 May 2011	NZS 3604: 2011 Timber framed buildings	AS1 1.4, 3.1, 4.1 AS3 1.1.1, 1.9.1 b), 1.9.2, 1.9.5, 2.2.1 b),
Amend 11 Aug 2011		
Amend 9 Sep 2010	NZS 3605: 2001 Timber piles and poles for use in building	VM4 5.3.1
Amend 7 Apr 2007	NZS 3622: 2004 Verification of timber properties <i>Amend: 1</i>	VM1 6.1

		Where quoted	
Amend 11 Aug 2011	NZS 3640: 2003	Chemical preservation of round and sawn timber <i>Amends: 1, 2, 3, 4, 5</i>	VM4 5.3.1
Amends 9 and 12	AS/NZS 3678: 2016	Structural steel – Hot-rolled plates, floorplates and slabs	VM1 5.1.9
Amend 16 Apr 2018	AS/NZS 3679	Structural steel Part 1: 2016 Hot-rolled bars and sections Part 2: 2016 Welded I sections	VM1 5.1.9 VM1 5.1.9
	AS/NZS 3725: 2007	Design for installation of buried concrete pipes	VM1 11.1
Amend 8 Dec 2008			
Amend 9 Sep 2010	AS/NZS 3869: 1999	Domestic solid fuel burning appliances – Design and construction	AS3 2.1
	AS/NZS 4058: 2007	Pre cast concrete pipes (pressure and non-pressure)	VM1 11.1
Amends 10 and 11	NZS 4210: 2001	Code of practice for masonry construction: materials and workmanship <i>Amend: 1</i>	AS3 1.8.1, 1.8.3 (f and g)
Amend 9 Sep 2010			
Amend 11 Aug 2011	NZS 4211: 2008	Specification for performance of windows <i>Amend: 1</i>	VM1 12.1
Amend 17 Nov 2018			
Amend 8 Dec 2008			
Amend 11 Aug 2011	NZS 4219 : 2009	Seismic Performance of Engineering Systems in Buildings	VM1 1.3.1
Amend 9 Sep 2010	NZS 4223:- Part 1: 2008	Glazing in buildings Glass selection and glazing <i>Amend 1</i>	AS1 7.1, 7.2.1, 7.3.7
Amend 9 Sep 2010	Part 2: 2016	Insulating glass units	AS1 7.2
Amend 15 Jan 2017	Part 3: 2016	Human impact safety requirements <i>Amend: 1</i>	AS1 7.3
Amends 13 & 15 Amend 15 Jan 2017	Part 4: 2008	Wind, dead, snow, and live actions <i>Amend 1</i>	AS1 7.4
Amend 9 Sep 2010			
Amend 15 Jan 2017			
Amends 10 and 11	NZS 4229: 2013	Concrete masonry buildings not requiring specific engineering design	AS1 1.4, 2.1 AS3 1.1.1, 1.8.4, 1.9.2, 1.9.5, 2.2.1 b)
Amend 12 Feb 2014			
Amend 8 Dec 2008	NZS 4230: 2004	Design of reinforced concrete masonry structures <i>Amend: 1</i>	VM1 4.0
Amend 11 Aug 2011	NZS 4251:- Part 1: 2007	Solid plastering Cement plasters for walls, ceilings and soffits	AS1 5.1
	NZS 4297: 1998	Engineering design of earth buildings	VM1 8.1

			Where quoted
Amends 10 and 11	NZS 4299: 1998	Earth buildings not requiring specific design <i>Amend: 1</i>	AS1 1.4, 4.1
	NZS 4402:-	Methods of testing soils for civil engineering purposes.	VM1 11.1
	Test 2.2: 1986	Soil classification tests – Determination of liquid limit	Definitions
	Test 2.4: 1986	Soil classification tests – Determination of plasticity index	VM1 11.1
	Test 2.6: 1986	Soil classification tests – Determination of the linear shrinkage	Definitions
	Test 2.8.1: 1986	Soil classification tests – Standard method by wet sieving	VM1 11.1
	Test 2.8.2: 1986	Soil classification tests – Standard method by dry sieving	VM1 11.1
	Test 2.8.3: 1986	Soil classification tests – Standard method for fine soils (pipette method)	VM1 11.1
	Test 2.8.4: 1986	Soil classification tests – Subsidiary method for fine soils (hydrometer method)	VM1 11.1
	Test 4.1.1: 1986	Soil compaction tests – Determination of the dry density/water content relationship – New Zealand standard compaction test	VM1 11.1
	Test 4.2.1: 1988	Soil compaction tests – Determination of the minimum and maximum dry densities and relative density of a cohesionless soil – Minimum dry density	VM1 11.1
	Test 4.2.2: 1988	Soil compaction tests – Determination of the minimum and maximum dry densities and relative density of a cohesionless soil – Maximum dry density	VM1 11.1
	Test 4.2.3: 1988	Soil compaction tests – Determination of the minimum and maximum dry densities and relative density of a cohesionless soil – Relative density	VM1 11.1, VM4 4.1.1
	Test 5.1.1: 1986	Soil density tests – Determination of the density of soil – Sand replacement test for the determination of in situ density	VM1 11.1
Amend 16 Apr 2018	NZS 4431: 1989	Code of practice for earth fill for residential development <i>Amend: 1</i>	VM1 10.1
	AS/NZS 4600: 2005	Cold-formed steel structures	VM1 5.2
Amends 10 and 11	AS/NZS 4671: 2001	Steel Reinforcing Materials <i>Amend: 1</i>	AS1 2.1.5, 3.1.8 AS3 1.8.5, VM1 14.0
	AS/NZS 4680: 2006	Hot-Dip Galvanised (zinc) Coating	AS3 1.8.6
Amend 9 Sep 2010			
Amend 16 Apr 2018	AS/NZS 5131: 2016	Structural steelwork – Fabrication and erection	VM1 5.1.3, 5.1.5-5.1.8, 5.1.10-5.1.12

Amend 14
Nov 2016

Verification Method B1/VM1

General

Amend 10
May 2011Amend 8
Dec 2008

1.0 General

1.0.1 The Standards cited in this *Verification Method* provide a means for the design of structures to meet the performance requirements of New Zealand Building Code Clause B1 Structure. For any particular *building* or *building* design, the *Verification Method* shall consist of AS/NZS 1170 used in conjunction with the relevant cited material standards as modified by this *Verification Method*.

1.0.2 Modifications to the Standards, necessary for compliance with the New Zealand *Building Code*, are given against the relevant clause number of each Standard.

1.0.3 Citation of Standards in this *Verification Method* is subject to the following conditions.

- a) The citation covers only the scope stated or implicit in each Standard. Aspects outside the scope, when applied to a particular *building*, are not part of the *Verification Method*.
- b) Further limitations, modifications and/or constraints apply to each Standard as noted below.
- c) Provisions in the cited Standards that are in non-specific or unquantified terms do not form part of the *Verification Method*. Non-specific or unquantified terms include, but are not limited to, special studies, manufacturer's advice and references to methods that are appropriate, adequate, suitable, relevant, satisfactory, acceptable, applicable, or the like.
- d) Where AS/NZS 1170 is used in combination with other Standards cited in this *Verification Method* and there are incompatibilities with these other Standards, then the underlying philosophy, general approach, currency of information and methods of AS/NZS 1170 are to take precedence.

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Aug 2011Amend 11
Aug 2011Amend 11
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- e) An engineer with relevant experience and skills in structural engineering shall be responsible for interpretation of the requirements of the Standards cited when used for *building* structure design. A structural engineer who is chartered under the Chartered Professional Engineers of New Zealand Act 2002 would satisfy this requirement.

COMMENT

The Standards referenced in this *Verification Method* relating to *building* design require the application of specialist engineering knowledge, experience and judgement in their use.

2.0 Structural Design Actions Standards

2.1 The requirements of the AS/NZS 1170 suite of Standards are to be complied with. These comprise:

AS/NZS 1170.0: 2002 including Amendments 1, 2, 3, 4 and 5

AS/NZS 1170.1: 2002 including Amendments 1 and 2

AS/NZS 1170.2: 2011 including Amendments 1, 2, 3, 4 and 5

AS/NZS 1170.3: 2003 including Amendment 1, and NZS 1170.5: 2004.

COMMENT

This suite of Standards, together with their amendments, are referred to collectively in this *Verification Method* as "AS/NZS 1170".

2.2 The requirements of AS/NZS 1170 are subject to the following modifications.

2.2.1 Material Standards Where AS/NZS 1170 calls for the use of appropriate material Standards, only those material Standards referenced in this *Verification Method* B1/VM1 are included. Use of other Standards with AS/NZS 1170 must be treated as an alternative means of verification.

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Aug 2011Amend 11
Aug 2011Amend 11
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2.2.2 Notes in AS/NZS 1170 “Notes” that relate to clauses, tables or figures of AS/NZS 1170 are part of the *Verification Method*.

COMMENT

AS/NZS 1170 makes a general statement that notes are not an integral part of the Standard. However, in many cases the content of the notes makes them an integral part of the interpretation of the Standard. In these cases, the notes have been specifically cited as being part of this *Verification Method*.

2.2.3 AS/NZS 1170 Part 0, Clause 4.1

General Add the following to the end of the Clause:

“The combination factors for permanent actions (dead loads) are based on the assumption that they have a coefficient of variation of approximately 10%. Situations where this assumption is not valid are outside the scope of this *Verification Method*.”

2.2.4 AS/NZS 1170 Part 0, Clause 4.2.4

Replace the Clause with the following:

“The combination of actions for checking strength and stability for the ultimate limit state for *fire* shall be as follows:

(a) During the *fire*:

(i) [G , thermal actions arising from *fire*, $\Psi_f Q$]

together with:

(ii) a lateral force of 2.5% of $(G + \Psi_c Q)$ applied as per Clause 6.2.2.

(b) After the *fire* until the *building* is either repaired or demolished:

(i) [G , thermal actions arising from *fire*, $\Psi_f Q$]

together with the more critical of either:

(ii) a lateral force of 2.5% of $(G + \Psi_c Q)$ applied as per Clause 6.2.2.

or

(iii) a uniformly distributed horizontal face load of 0.5 kPa in any direction.

Account shall be taken of the effects of the *fire* on material properties and the geometry of the structure.”

2.2.6 AS/NZS 1170 Part 1, Table 3.2

Replace the entry for “R2, Other roofs (i) Structural elements” with:

“R2 Other roofs (i) Structural elements 0.25 1.1”

Delete Note 2

Delete Note 3

2.2.7 AS/NZS 1170 Part 1, Clause 3.6 Barriers

In the first paragraph, second sentence, delete “... top edge or handrail...” and substitute “... top edge **and rail**...”

Delete the second paragraph and substitute:

“Apply as detailed below the uniformly distributed line loads (kN/m), uniformly distributed loads (kPa) and concentrated loads (kN) given in Table 3.3.

For the purposes of applying loads, a rail shall be any *handrail* or any top rail having a width in plan of greater than 30 mm.

The following are separate load cases, and one load at a time, either vertical or horizontal, is to be applied.

(a) Line loads (kN/m). Regardless of barrier height, line loads need not be applied more than 1200 mm above the floor (or stair pitch line):

(i) For domestic and residential activities, other residential (Row 2 of Table 3.3)

- For barriers with a rail or rails:

- apply the horizontal load to the top rail

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Aug 2011

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Dec 2008

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2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: “0.3 is the earthquake imposed action (live load) combination factor for all other applications” add the following:

“except roofs.

$\Psi_E = 0.0$ is the earthquake imposed action (live load) combination factor for roofs.”

2.2.16 NZS 1170 Part 5, Sections 5 and 6 Time history analysis Time history analysis is not part of this *Verification Method*.

COMMENT:

Time history analysis is a highly specialised method of assessing structural response to earthquakes. It requires many detailed and interdependent assumptions to be made in relation to the nature of earthquake shaking and its propagation from the source, the properties of the *building* site and the detailed characteristics of the *building* and its structural elements.

AS/NZS 1170 outlines the steps for time history analysis in some detail, but the applicability of each step needs to be evaluated on a *building-by-building* basis. More importantly, the output of the analysis needs to be examined carefully in each particular context.

Time history analysis can be an acceptable aid to verifying compliance with structural requirements provided that:

- It is carried out by specialists with in-depth experience in applying the technique.
- The output of the analysis and the viability of the resulting structural design are reviewed by an independent team experienced in both analysis and design.

2.2.17 NZS 1170 Part 5, Clause 5.2.2.3, equation 5.2(4) Delete equation 5.2(4) and replace with:

$$C_d(T) = \frac{C(T) S_p}{k_\mu} \quad \dots \text{5.2(4)}$$

2.2.18 NZS 1170 Part 5, Clause 6.1.4.1 Requirement for modelling Delete the last sentence of the first paragraph and replace with:

“The model shall include representation of the diaphragm’s flexibility.”

Delete the third (last) paragraph.

3.0 Concrete

3.1 NZS 3101: Part 1 subject to the following modifications:

3.1.1 Clause 18.7.4.4 Detailing requirements for support of hollow core floors

At the end of Clause 18.7.4.4 (b) add an additional sentence:

“The details given by C18.6.7(e) may be applied to hollow-core units where the depth of the precast unit is equal to or less than 300 mm.”

Amends 9, 14, 15, 16, Err 1

3.1.2 Cast iron anchors and couplers may be used for designs that otherwise comply with NZS 3101 until 1 November 2018.

COMMENT:

The continued use of cast iron couplers and anchors until 1 November 2018 is subject to the anchor or coupler complying with relevant performance requirements set out in NZS 3101.

COMMENT:

Welded wire fabric that is used in designs to NZS 3101 is subject to the requirements of Paragraph 14.0 Ductile Steel Mesh of this *Verification Method*.

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3.2 NZS 3106

Amend 9
Sep 2010

4.0 Concrete Masonry

4.1 NZS 4230

Amend 8
Dec 2008

5.0 Steel

5.1 NZS 3404: Part 1 subject to the following modifications:

Amends
8 and 9

5.1.1 Clause 2.2.1 Specification

In Clause 2.2.1 a) replace:

“AS 1163 Structural steel hollow sections AS 1594 Hot-rolled steel flat products”,

with

“AS/NZS 1163 Cold-formed structural steel hollow sections

AS/NZS 1594 Hot-rolled steel flat products”

5.1.2 Clause 2.3.1 Steel bolts, nuts and washers

In Clause 2.3.1 add the following to the end of the Clause:

“BS EN 14399-3 High-strength structural bolting assemblies for preloading, System HR. Hexagon bolt and nut assemblies

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BS EN 14399-5: High-strength structural bolting assemblies for preloading, Plain washers”

5.1.3 new Clause 3.10 Documentation

Insert the following after clause 3.9:

“Clause 3.10 Documentation

The requirements in AS/NZS 5131 Section 4.1.1 General shall be applied.”

5.1.4 Clause 9.3.1 Bolts and bolting category

In Clause 9.3.1.2 replace:

“and AS 1559”

with

“, AS 1559, BS EN 14399.1, BS EN 14399.2, BS EN 14399.3 and BS EN 14399.5”.

Amend 16
Apr 2018

5.1.4A Section 13 Design of composite members and structures

Replace Section 13 Design of composite members and structures with the following:

“13 Design of composite members and structures shall be in accordance with AS/NZS 2327.”

Amend 17
Nov 2018

5.1.5 Section 14 Fabrication

Replace Section 14 Fabrication with the following:

“14 Fabrication

The fabrication of steel structures shall be in accordance with AS/NZS 5131.

Construction categories for the purposes of this Standard shall be determined in accordance with Appendix C of AS/NZS 5131.”

5.1.6 Section 15 Erection

Replace Section 15 Erection with the following:

“15 Erection

The erection of steel structures shall be in accordance with AS/NZS 5131.

Construction categories for the purposes of this standard shall be determined in accordance with Appendix C of AS/NZS 5131.”

5.1.7 Section 16 Modification of Existing Structures

Replace Section 16 Modification of existing structures with the following:

“16 Site modifications during erection and modification and repair of existing structures

Site modifications during erection and modification and repair of existing structures shall be in accordance with AS/NZS 5131 Section 14 Site modifications during erection and modification and repair of existing structures.”

5.1.8 new Section 18 Architecturally Exposed Structural Steelwork

Insert the following after Section 17:

“18 Architecturally exposed structural steelwork

The requirements in AS/NZS 5131 Section 10 Architecturally exposed structural steelwork shall be applied.”

5.1.9 Appendix A

Replace references to AS/NZS 3678, AS/NZS 3769.1 and AS/NZS 3679.2 in NZS 3404 with the 2016 versions that are referenced in this Verification Method

Amend 16
Apr 2018

5.1.9A Appendix C

Replace Appendix C Corrosion Protection with the following:

“Appendix C Corrosion Protection

Corrosion protection shall be in accordance with SNZ TS 3404.”

Amend 17
Nov 2018

5.1.10 Appendix D

Replace Appendix D Inspection of Welding to AS/NZS 1554.1 with the following:

“Appendix D Inspection of Welding

The recommendations in AS/NZS 5131 Appendix I Inspection of Welding and Bolting. (Informative) should be used.”

5.1.11 Appendix K

Replace Appendix K Standard test for evaluation of slip factor (normative) with the following:

“Appendix K Standard test for evaluation of slip factor (normative)

The requirements in AS/NZS 5131 Appendix G Standard test for evaluation of slip factor shall be used.”

5.1.12 Appendix L

Replace Appendix L Inspection of bolt tension using a torque wrench (informative) with the following”

Amend 16
Apr 2018

Amend 16
Apr 2018

“Appendix L Inspection of bolt tension using a torque wrench (informative)

The recommendations in AS/NZS 5131 Appendix H Inspection of bolt tension using a torque wrench should be used.”

5.1.13 new Appendix R

Insert the following after Appendix Q:

“Appendix R Selection of materials for the avoidance of lamellar tearing (informative)

The guidance in AS/NZS 1554.1 Appendix H Selection of materials for the avoidance of lamellar tearing should be used.”

5.2 AS/NZS 4600 subject to the following modifications:

- a) Actions must be determined in accordance with AS/NZS 1170. All references to NZS 4203 are replaced by equivalent references to AS/NZS 1170.
- b) The term “normative” identifies a mandatory requirement for compliance with this Standard.
- c) The term “informative” identifies information provided for guidance or background which may be of interest to the Standard’s users. Informative provisions do not form part of the mandatory requirements of the Standard.
- d) Where this Standard has provisions that are in non-specific or unquantified terms then these do not form part of the *Verification Method* and the proposed details must be submitted to the *territorial authority* for approval as part of the *building consent* application. This includes, but is not limited to, special studies and manufacturer’s advice.
- e) All stages of *construction* of a structure or part of a structure to which this Standard is applied shall be adequately reviewed by a person who, on the basis of experience or qualifications, is competent to undertake the review.
- f) The extent of the review to be undertaken shall be nominated by the design engineer, taking into account those materials and workmanship factors which are likely to influence the ability of the finished construction to perform in the predicted manner.

- g) At the end of the first paragraph of Appendix A add the words “Unless noted otherwise a document referred to below shall be the version of that document current at the date of issue of this Standard or if amendments are cited to this Standard in the “References” pages of this document at the latest date of those amendments.”

- h) Appendix B shall be read as normative with “shoulds” changed to “shalls”.

5.3 NASH Standard – Residential and Low-rise Steel Framing Part 1: Design Criteria.

6.0 Timber

6.1 NZS 3603 subject to the following modifications:

- a) Actions must be determined in accordance with AS/NZS 1170. All references to NZS 4203 are replaced by equivalent references to AS/NZS 1170.
- b) Delete Clause 2.2.1.2 and replace with:
“Machine stress-grading shall be in accordance with AS/NZS 1748 as modified by NZS 3622. Machine stress-graded timber shall have its properties verified, and be identified, in accordance with the requirements of NZS 3622.”

7.0 Aluminium

7.1 AS/NZS 1664.1 subject to the following modifications:

- a) Actions must be determined in accordance with AS/NZS 1170. All references to NZS 4203 are replaced by equivalent references to AS/NZS 1170.
- b) The terms “capacity factor” and “strength limit state” are to be read as “*strength reduction factor*” and “ultimate limit state” respectively.
- c) Where this Standard has provisions that are in non-specific or unquantified terms then these do not form part of the *Verification Method* and the proposed details must be submitted to the *territorial authority* for approval as part of the *building consent* application. This includes, but is not limited to, special studies and manufacturer’s advice.

Amend 16
Apr 2018

Amends
8 and 11

Amend 12
Feb 2014

Amend 11
Aug 2011

Amend 11
Aug 2011

Amend 11
Aug 2011

Amend 7
Apr 2007

Amend 8
Dec 2008

Amend 11
Aug 2011

Amend 8
Dec 2008

d) All stages of *construction* of a structure or part of a structure to which this Standard is applied shall be adequately reviewed by a person who, on the basis of experience or qualifications, is competent to undertake the review.

Amend 8
Dec 2008

e) The extent of the review to be undertaken shall be nominated by the design engineer, taking into account those materials and workmanship factors which are likely to influence the ability of the finished *construction* to perform in the predicted manner.

Amend 8
Dec 2008

f) Clause 1.2 to read "**MATERIALS** This Standard applies to aluminium alloys listed in Table 3.3(A) that comply with AS 1734, AS 1865, AS 1866, AS 1867 and AS 2748.1."

Amend 8
Dec 2008

g) At the end of the first paragraph of Clause 1.4 add the words "Unless noted otherwise a document referred to below shall be the version of that document current at the date of issue of this Standard or if amendments are cited to this Standard in the "References" pages of the Acceptable Solutions and Verification Methods at the latest date of those amendments."

Amend 12
Feb 2014

8.0 Earth Buildings

8.1 NZS 4297 subject to the following modifications:

Actions must be determined in accordance with AS/NZS 1170. All references to NZS 4203 are replaced by equivalent references to AS/NZS 1170.

Amend 11
Aug 2011

9.0 Foundations

See B1/VM4.

Amend 12
Feb 2014

10.0 Siteworks

10.1 NZS 4431

11.0 Drains

11.1 AS/NZS 3725 subject to the following modifications:

Clause 3 Add to the list of reference documents:

"NZS 3101 The design of concrete structures.

NZS 4402 Methods of testing soils for civil engineering purposes: Tests 2.4, 2.8, 4.1.1, 4.2.1, 4.2.2, 4.2.3 and 5.1.1.

New Zealand Geomechanics Society, Guidelines for the field description of soils and rocks in engineering use."

Clause 4 In the paragraph headed "(c) Select fill", after the words "given in Table 1" add "or the New Zealand Geomechanics Society Guidelines".

Clause 5 In definition of Pt, replace "AS 4058" with "AS/NZS 4058"

Clause 6.4 Replace the word "may" with "shall". Delete the words "Superimposed concentrated dead loads should be avoided."

Clause 6.5.3.1 Delete the words "The appropriate road vehicle loading shall be specified by the relevant highway authority or owner".

Clause 6.5.3.2.2.2 Replace the word "may" with "shall".

Clause 6.5.4.3 Delete the words "unless otherwise specified by the Relevant Authority".

Clause 6.5.5 Delete the first words "For" and after the words "for aircraft types" add the words "is outside the scope of this Standard but..."

Clause 7 Replace the word "should" with "shall".

Clause 10.3 After the words "the test load" add "or proof load".

Appendix A Delete "Normative" and replace with "Informative"

Appendix B Delete "Normative" and replace with "Informative"

Amend 9
Sep 2010

Index B1/VM1/VM2/VM3/VM4 & AS1/AS2/AS3/AS4 (Revised by Amendment 4)

All references to Verification Methods and Acceptable Solutions are preceded by **VM** or **AS** respectively.

Amend 11
Aug 2011

Buildings **AS3** 1.9.2, 1.9.4
 building elements **VM4** 2.0.3
 earth buildings **VM1** 8.0, **AS1** 4.0

Amend 8
Dec 2008

masonry buildings **AS1** 2.0, **AS3** 1.1.1
 timber framed buildings **AS1** 3.0, **AS3** 1.1.1

Amend 11
Aug 2011

Chimneys **AS1** 1.2, 8.0, **AS3** 2.1

bracing units **AS3** 1.9, 1.9.3, 1.9.6, Table 2
 brick chimneys **AS3** 1.1, 1.1.3 a) b), 1.2.1 a), 1.6.2 a), 1.7.1,
 1.7.6, 1.8.1, 1.8.5 a), Figures 2, 3, 4, 7, Table 1

cantilever height **AS3** 1.1.2

chimney bases **AS3** 1.1.3 a), 1.6.1, 1.9.4 b)

chimney breasts **AS3** 1.5, Table 1

chimney depth **AS3** 1.1.3

chimney height **AS3** 1.1.2

chimney liners **AS3** 1.1.4

chimney lintels **AS3** Table 1

chimney materials **AS3** 1.8

chimney stacks **AS3** 1.1.2, 1.6.1

chimney wall thicknesses **AS3** 1.2, 1.2.1

chimney width **AS3** 1.1.3

concrete chimneys **AS3** 1.1.1, 1.1.3 a) c), 1.2.1 b) c),
 1.6.2 a) b), 1.7.1, 1.7.13, 1.8.2,
 1.8.5 b), Figures 4, 5, Table 1

concrete masonry **AS3** 1.8.4

floor brackets **AS3** 1.7.1, 1.7.3, 1.7.4, 1.7.5, 1.8.4, 1.9.4 b) c), Figure 6

foundations **AS3** 1.1.2, 1.1.3 a), 1.3, 1.3.1, 1.3.2,
 1.3.3, 1.7.4, 1.7.5, 1.8.4, Figure 1

 foundation slabs **AS3** 1.1.2, 1.3.2, 1.7.4, 1.7.5

gathers **AS3** 1.6.1, 1.6.2, 1.7.5

packers **AS3** 1.7.2, 1.7.6 c)

precast pumice concrete chimneys **AS3** 1.1.1, 1.1.3 a) c),
 1.2.1 c), 1.6.2 b), 1.7.1, 1.7.13, 1.8.3,
 1.8.3 c), 1.8.5 c), Figures 5, 7, Table 1

 compressive strength **AS3** 1.8.3 c)

 construction of **AS3** 1.8.3

restraint **AS3** 1.7, 1.7.1, 1.7.13, Figures 6, 7

roof brackets **AS3** 1.7.1, 1.7.3, 1.7.4, Figure 6

roof ties **AS3** 1.7.5

structural diaphragms **AS3** 1.9.5

Amend 8
Dec 2008

Chimneys (continued)

- wall ties **AS3** 1.7.5, 1.7.7, 1.7.8
- closely spaced wall ties **AS3** 1.7.5, 1.9.4 c)

Concealed works **VM4** A1.2.1 b)

Concrete see Design, concrete

Design

- aluminium **VM1** 7.0
- Amend 17 Nov 2018 | composite steel-concrete **VM1** 5.1.4A
- concrete **VM1** 3.0
- Amend 8 Dec 2008 | concrete masonry **VM1** 4.0, **AS1** 2.0, **AS3** 1.3.3
- drains see Drains
- Amends 8 and 11 | earth building **VM1** 8.0, **AS1** 4.0
- foundations see Foundations
- loadings **VM1** 2.0
- Amend 10 May 2011 | earthquake **VM1** 1.0, 2.0, **AS1** 1.4, **AS3** 1.9, Table 2
- limit state **VM1** 2.0, 7.1
- Amend 8 Dec 2008 | siteworks **VM1** 10.0
- steel **VM1** 5.0
- strength reduction factor **VM4** 2.0.1, 3.5.1, 4.7, Tables 1, 4
- Amend 8 Dec 2008 | structural design actions Standards **VM1** 2.0
- timber **VM1** 6.0, **AS1** 3.0
- Amend 11 Aug 2011 | windows see Windows

Drains **VM1** 11.0, **AS1** 6.0

- Ductile steel mesh** **VM1** 3.1(d), 14.0
- Amend 14 Nov 2016 | Grade 500E welded steel mesh **VM1** 14.1, **AS1** 2.1.3, 3.1.8

Earth retaining structures **VM4** 2.0.3

Amend 8 Dec 2008

Effluents **VM4** A1.2.1 f)

Amend 8 Dec 2008

Amend 11 Aug 2011

Amend 8 Dec 2008

Foundations **VM1** 9.0, **VM4**

- design parameters
- continuous vibration **VM4** 1.0.6
- depth **VM4** 2.0.4
- ground stability **VM4** 1.0.4
- long-term loading **VM4** 2.0.6
- short-term loading **VM4** 2.0.6
- serviceability deformations **VM4** 1.0.3, Appendix B