BUILDING PERFORMANCE

Statement of proposals for amending Acceptable Solutions and Verification Methods June 2019 update

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

New Zealand Government

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FOREWORD

In the next few months the Ministry of Business, Innovation and Employment (MBIE) are intending to seek your views on a number of changes and improvements to the building regulatory system. The proposals will seek your views on some of the most significant changes to the building and construction system in 15 years. MBIE acknowledge the effort you put into responding to these public consultations.

The first of these consultations, as part of the bi-annual Building Code update programme, is a proposal to update a number of Acceptable Solutions and Verification Methods in the Building Code, and MBIE would like to hear your views on the proposals.

The June 2019 update is the second public consultation under the new bi-annual Building Code update programme, with a package of changes overall larger and more significant than the November 2018 update. This time around MBIE is actively making changes to support more densified housing solutions and the Healthy Homes requirements, while continuing to maintain our Building Code documents.

Your feedback and advice is important as it will help us shape the Building Code to support safe and durable housing. Consultation runs from 11 March until 5 April 2019.

I look forward to hearing from you.

Dave Robson
Manager Building Performance and Engineering
Building System Performance

BACKGROUND

The primary legislation governing building work in New Zealand is the Building Act 2004 and the New Zealand Building Code. The main purpose of this legislation is to ensure that buildings in New Zealand are suitable for people to use and occupy, while contributing to the health and wellbeing of occupants and supporting sustainable development. To do this, the Building Act requires that all building work comply with the Building Code.

Acceptable Solutions and Verification Methods are issued by MBIE and provide one way of demonstrating compliance with relevant clauses of the Building Code.

The Government's goal is a more efficient and productive building industry that builds it right the first time and stands behind the quality of its work. To help achieve this, MBIE seeks to ensure that Acceptable Solutions and Verification Methods reflect the latest research, knowledge and building practices.

JUNE 2019 UPDATE HIGHLIGHTS

The June 2019 Update is the second update in the new bi-annual Building Code update programme, with a package of changes overall larger and more significant than the November 2018 Update.

Within the 12 updates proposed to the Verification Methods and Acceptable Solutions, the most significant changes are in four areas. Two of these support more densified housing typologies, one aligns with proposed Healthy Homes changes, and another responds to November 2018 Update consultation comments and enables the revocation of an Acceptable Solution (this has not happened for some time). In particular the areas of change include:

Supporting building of higher density housing

It is proposed to introduce a new Verification Method (E2/VM2), which references a test method that will enable cladding solutions for buildings up to six storeys. This extends current compliance pathways from the current Verification Method which is limited to buildings of 10m in height. The proposal will help densified housing by streamlining the building consenting process for assessing taller building types as a façade engineer will not always be necessary to confirm a design solution is compliant.

Introduce a new light steel frame solution for low rise buildings

The update proposes the introduction of a non-specific design standard for light steel framing in low rise buildings. This is a significant step forward for this type of construction as it provides a compliance pathway for housing and small commercial buildings using light steel framing. This will mean that developers/designers, including for KiwiBuild, will have more construction options and the certainty of light steel framing compliance pathway.

Align Acceptable Solution G4/AS1 with Healthy Homes changes

This new requirement, which aligns with proposed Healthy Homes changes, recognises new homes are typically more airtight and reduces the reliance on occupants physically opening windows for ventilation. The Acceptable Solution G4/AS1 for ventilation introduces a requirement for extract fans for showers, baths and cooktops in housing and accommodation units. In practical terms it means that new houses and accommodation units that follow the Acceptable Solution must have dedicated extract fans to remove moisture in these areas. The impact will likely be minor for new builds as extracts are already commonplace. It will also provide a solution for homeowners to refer to when renovating existing houses.

Responding to public consultation feedback

In the November 2018 Update it was proposed that the Simple House Acceptable Solution SH/AS1 be revoked as it is now significantly out of date. Following up on comments received during the November 2018 Update consultation, MBIE agreed with commentators that the information in SH/AS1 for foundation design on expansive soils should be retained. MBIE is proposing to relocate this information into Acceptable Solution B1/AS1 making it a mainstream solution. If this proposal is agreed in the June 2019 Update, SH/AS1 will be revoked as advised in BC Update 243.

The other proposed changes in the update continue the maintenance of the Building Code documents by updating references, cited Standards, and correcting editorial errors.

HEADS UP FOR THE NOVEMBER 2019 UPDATE

MBIE are already thinking about the content for next bi-annual Building Code update programme in November 2019. This third update will continue MBIE's work to support housing densification and catching up our Acceptable Solutions and Verification Methods to industry practise. The consultation package is looking at 22 possible changes, primarily focussing on four areas described below. The balance of the changes will continue the work to update references and fix editorial inconsistencies.

The four focus areas where significant changes are being looked into include:

Updating the application of 'good ground' definition

MBIE wants to ensure suitable foundations are being used on ground that has the potential for liquefaction or lateral spread reducing the risk of damage to buildings and occupiers. This proposed change incorporates lessons learned from the Canterbury Earthquake Sequence, particularly about the effects of liquefaction and lateral spread. By revising the application of the 'good ground' definition, MBIE will provide greater clarity for how foundations are to be designed and constructed in regions across New Zealand that are subject to known liquefaction and/or lateral spread potential. The Acceptable Solution B1/AS1 will extend the regions where liquefaction and lateral spread of soil are excluded from the definition. The clarification being considered will allow the consistent application of the 'good ground' definition across New Zealand.

Tightening of controls for the prevention of horizontal fire

MBIE is looking to bring in measures to reduce the risk of fire between adjacent buildings. This is in response to the increased density of housing and buildings getting closer together. The additional controls will bring greater safety to our communities and ensure housing developments can increase in density while adequately protecting occupants from horizontal spread of fire.

Shared ventilation between habitable rooms that include wet areas

To support healthier, drier homes MBIE is considering solutions to address moisture build up in rooms which share ventilation. Designs where wet areas passively ventilate through an adjacent room can cause moisture issues. The Acceptable Solution G4/AS1 will be updated to clarify the requirements for shared ventilation of wet areas, particularly ensuites and bathrooms. This change will ensure healthier, drier homes especially in multi residential developments.

Making it easier to access buildings

MBIE is looking to improve the ease of access for all building users. Currently there is a problem with how people access building in that an accessible route is not always provided from building carparks. The Acceptable Solution D1/AS1 will now require accessible routes to be provided from the carpark and the street boundary. Conscientious owners and developers already provide two forms of access in general; however, this will make it a requirement.

COMMENT SOUGHT ON THIS JUNE 2019 STATEMENT OF PROPOSALS

MBIE seeks your views on proposals to amend Acceptable Solutions and Verification Methods relating to Clauses B1 Structure, B2 Durability, E2 External Moisture, G4 Ventilation, G12 Water supplies and G13 Foul water as below:

- Building Code Clause B1 Structure: B1/VM1, B1/AS1
- Building Code Clause B2 Durability: B2/AS1
- Building Code Clause E2 External moisture: E2/VM2
- Building Code Clause G4 Ventilation: G4/AS1
- Building Code Clause G12 Water supplies: G12/VM1, G12/AS1, G12/AS2
- Building Code Clause G13 Foul water: G13/AS1, G13/VM2, G13/AS2, and G13/AS3.

Materials to be incorporated by reference in these proposals are:

For Standards:

- available for inspection free of charge at the Ministry of Business, Innovation and Employment, 15 Stout Street, Wellington (please ring 0800 242 243 to arrange an appointment), or
- may be purchased from Standards New Zealand, 15 Stout Street, Wellington or online at www.standards.govt.nz.

For BRANZ EM7:

- available from https://www.branz.co.nz/cms_show_download.php?id=dbd81e3cd651458bb4c683253cf2ee4c1191783d

For NASH Part 2:

- available from http://nashnz.org.nz/nash-standard-part-2-light-steel-frame-buildings/

For Worksafe New Zealand, Workplace Exposure Standards and Biological Exposure Indices:

- available from https://worksafe.govt.nz/topic-and-industry/work-related-health/monitoring/exposure-standards-and-biological-exposure-indices/

See pages 13-77 below which describe the proposals and enable you to provide your feedback.

HOW TO PROVIDE YOUR FEEDBACK

MBIE invites written comments on the proposals in this document by **5:00pm, Friday 5 April 2019**.

You are welcome to make submissions on some or all of these proposals. Key questions are provided throughout the document to guide your responses.

You can download a submission form at www.mbie.govt.nz/have-your-say/statement-of-proposals-for-amending-acceptable-solutions-and-verification-methods-2019-part-1 and send your submission by:

- email to buildingfeedback@mbie.govt.nz, with subject line "Consultation – Amendments to Acceptable Solutions and Verification Methods 2019/1"
- post or courier to:

  Consultation – Amendments to Acceptable Solutions and Verification Methods 2019/1
  Building Performance and Engineering
  Ministry of Business, Innovation and Employment
  15 Stout Street, Wellington 6011
  Or:
  PO Box 1473, Wellington 6140

What happens to your feedback?

Your feedback will contribute to updating the Acceptable Solutions and Verification Methods. It will also become official information which means it may be requested under the Official Information Act 1982 (OIA).

The OIA specifies that information is to be made available upon request unless there are sufficient grounds for withholding it. If we receive a request, we cannot guarantee that feedback you provide us with will not be made public. Any decision to withhold information requested under the OIA is reviewable by the Ombudsman.

PROPOSED TIMING OF CHANGES TO ACCEPTABLE SOLUTIONS AND VERIFICATION METHODS

Effective Date: 27 June 2019

It is proposed that the amendments to the Acceptable Solutions and Verification Methods will be published on and have an effective date of 27 June 2019*.

Transitional Arrangements: 4 months

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing Acceptable Solutions and Verification Methods will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

The table below illustrates how the proposed transitional provisions will work, with an explanation to follow:

	Before 27 June 2019* (the proposed Effective Date)	**From 27 June 2019* to 31 October 2019* (the proposed Cessation Date)**	**After 31 October 2019**
Existing Acceptable Solutions and Verification Methods	If used, will be treated as complying with the Building Code	If used, will be treated as complying with the Building Code	If used, must be considered as an alternative solution proposal
Amended or new Acceptable Solutions and Verification Methods	Not yet published	If used, will be treated as complying with the Building Code	If used, will be treated as complying with the Building Code
Revoked Simple House Acceptable Solution **	If used, will be treated as complying with the Building Code	If used, will be treated as complying with the Building Code	If used, must be considered as an alternative solution proposal

* The actual Effective Date and actual Cessation Date may change following consideration of any responses received.

** The revocation of the Simple House Acceptable Solution SH/AS1 was consulted on in the November 2018 Update round. In BC Update 243 MBIE advised that SH/AS1 will be revoked once the document's information on foundation design in expansive soils is transferred to Acceptable Solution B1/AS1. MBIE proposals in this Update round amend B1/AS1 to include this information. If the proposals are accepted and SH/AS1 revoked, the above transitional provisions will apply.

Frequently Asked Questions

The following frequently asked questions will assist you to understand how the proposed transitional provisions will affect your building consent applications:

- **Question – If I lodge a building consent application on or before the Cessation Date, which uses an existing Acceptable Solution or Verification Method (including the Simple House Acceptable Solution), will it comply with the relevant provisions of the Building Code?**

  Answer – Yes, it will be treated as complying with the relevant provisions of the Building Code.

- **Question – If I lodge a building consent application after the Cessation Date, which uses an existing Acceptable Solution or Verification Method (including the Simple House Acceptable Solution), will it comply with the relevant provisions of the Building Code?**

  Answer – Not automatically; the building consent application will be treated as an alternative solution proposal and be assessed as such.

- **Question – If I lodge a building consent application after the Effective Date, using an amended or new Acceptable Solution or Verification Method, will it comply with the relevant provisions of the Building Code?**

  Answer – Yes, it will be treated as complying with the relevant provisions of the Building Code.

To avoid doubt, in the period from the Effective Date to the Cessation Date (dates inclusive) building consent applications will be treated by Building Consent Authorities as complying with the relevant provisions of the Building Code if they correctly use either:

i) an existing Acceptable Solution or Verification Method including the Simple House Acceptable Solution; or

ii) an amended or new Acceptable Solution or Verification Method.

PROPOSED AMENDMENTS TO ACCEPTABLE SOLUTIONS AND VERIFICATION METHODS

The following content changes are proposed to the MBIE published Acceptable Solutions and Verification Methods. To make the changes easier to see, new text has been highlighted in **blue**, and existing text that is being deleted has been highlighted in **red**.

Should you require any clarification please contact buildingfeedback@mbie.govt.nz.

Clause B1 Structure

MBIE are amending B1/VM1 and B1/AS1 to reflect current structural knowledge and construction practices. This will make it easier for common practice solutions to comply, including deeper precast concrete hollow core floors, and light steel frame buildings. The inclusion of updated information for foundations on expansive soils will support housing construction in areas prone to this effect.

Proposal

MBIE proposes to amend Verification Method B1/VM1 and Acceptable Solution B1/AS1 to:

B1/VM1

- Allow support details of hollow core floors to be extended from units of up to 300mm deep to units of up to 400mm deep.

  The New Zealand Concrete Structures Standard (NZS 3101:2006) provides prescriptive solutions for compliant support connect detailing for hollow core precast concrete floors. Currently, the use of 400mm deep hollow core units is restricted in B1/VM1 because no testing had been undertaken of 400mm deep hollow core units; as such the performance of these types of construction was unknown. Researchers from the University of Auckland published a technical paper in the May 2018 issue of the ACI Structural Journal, demonstrating suitable performance on the support connections in 400mm deep hollow core units. The researchers demonstrated that structures incorporating 400mm deep hollow core units perform when built in accordance to the detailing recommended in NZS 3101:2006.

- Disallow the use of cast iron anchors and couplers that otherwise comply with NZS 3101.

  Such connectors were allowed in B1/VM1 up until 1 November 2018. Given this date has passed the provisions are now being deleted. This relates to a previous consultation completed by MBIE in October 2017 and decision made in April 2018.

- Remove NASH Standard Part 1 which relates to specific engineering design of light steel framed buildings and introduce NASH Standard Part 2.

  NASH Standard Part 1 duplicates information currently contained within B1/VM1 and primarily in AS/NZS 1170 and AS/NZS 4600. Many buildings covered by the provision set out in NASH Standard Part 1 can be designed using the non-specific designs given in NASH Standard Part 2, which is to be

included in B1/AS1 (see below). The removal of NASH Standard Part 1 reduces the potential of confusion within the industry to comply with the Building Code for light steel framed buildings.

B1/AS1

- Cite NASH Standard Part 2 which provides non-specific design for low-rise light steel framed buildings.

  This document enables non-specific design of low-rise light steel framing buildings, essentially residential and light commercial buildings. It is a document of similar scope and presentation to NZS 3604 and provides information and detailing for light steel framed buildings. NASH Standard Part 2 has been peer reviewed for technical accuracy and supports the proposed change. Citing the NASH Standard Part 2 will provide a simple step-by-step design method for designers of lower-risk buildings to follow. It will provide the industry with clearer and more specific information than they currently have. It allows designers to apply the more complex specific design methods currently referenced by B1/VM4 without engaging an engineer. This will mean that developers/designers, including for KiwiBuild, will have more construction options and the certainty of light steel framing compliance pathway.

- Include information from SH/AS1 on the design of foundations on expansive soils.

  The November 2018 bi-annual Building Code System Update proposed the revocation of the Simple House Acceptable Solution SH/AS1 as it had limited scope, was not being used and its information was out of date. The proposal was accepted but it was noted that the information on foundations on expansive soils should be retained as it was not contained elsewhere in Acceptable Solutions.

  MBIE proposes relocating the expansive soil foundation design information from SH/AS1 to Acceptable Solution B1/AS1. If these proposals are agreed MBIE will revoke SH/AS1 in June 2019.

  As the structural requirements of the Simple House are limited to NZS 3604 construction (along with other further limitations) it was considered appropriate to include the expansive soil foundation design information as a modification to B1/AS1's citation of NZS 3604: 2011 'Timber-framed buildings'. As a result references to paragraphs in SH/AS1 have been changed to reference appropriate clauses of NZS 3604. Further, all mention of masonry veneer has been removed as only the weight of the cladding is important from a structural point of view. Claddings are simply referred to as 'light wall claddings' or 'medium wall' or 'heavy wall claddings'.

  SH/AS1 was written in 2010 with its structural provisions coming directly from a number of structural publications including NZS 3604:1999 'Timber Framed Buildings' and NZS 3101:1995 'Concrete Structures Standard'. Since then these Standards have been revised and reissued as NZS 3604: 2011 and NZS 3101: 2006 resulting in the following changes:

  -Wind loading:

  NZS 3604: 2011 now provides for Extra High wind zone (EH) whereas SH/AS1 only catered for Very High wind zone (VH)

  -Snow loading:

NZS 3604: 2011 now provides for snow loading up to 2 kPa whereas SH/AS1 only catered for loading up to 1 kPa

-Shear strength of concrete footings:

NZS 3101: 2006 removed the allowance for concrete in footings to provide some shear resistance. This means that shear resistance now has to be provided by reinforcement.

These changes have been accounted for in the B1/AS1 proposals. The new details in B1/AS1, present one significant change and increase the shear reinforcement (i.e. stirrups) needed in the edge beams and internal thickenings.

The advantages of this proposal to amend Verification Method B1/VM1 and Acceptable Solution B1/AS1 are that:

- Current knowledge and practices would be reflected in the B1 Acceptable Solutions and Verification Methods
- Non-specific design information will be provided for low-rise light steel framed buildings
- Information on the design of house foundations on expansive soils will be retained in an Acceptable Solution after SH/AS1 is revoked
- Maintaining and updating B1/AS1 will help consenting efficiency as certain designs on expansive soils or for light steel framed buildings will no longer need to be treated as alternative solution proposals
- Changes reflect continued maintenance of the B1 Acceptable Solutions and Verification Methods to ensure the Building Code System operates efficiently.

Proposed Reference section changes

Current Text		Proposed Changes		Explanation and reasons/justification for change
NASH Standard: Residential and Low Rise Steel Framing Part 1 2010 Design Criteria	VM1 5.3	Reference removed		Deleted as this Part is out of date and its design information is contained elsewhere in B1/VM1. Further Part 2 of the NASH Standard proposed to be cited in B1/AS1 contains non-specific design solutions for buildings covered by Part 1.
Not currently referenced		NASH Standard Part 2:2018 Light Steel Framed Buildings	AS1 9.1	Included as this Part of the NASH Standard provides non-specific design solutions for the light steel-framing of low-rise buildings including houses and low-rise commercial buildings.

Link to NASH Standard Part 2: http://nashnz.org.nz/nash-draft-standard-for-comment/

Questions relating to the Reference section changes:

Question B1 – 1 Do you agree with the proposed changes to the Reference Section of the B1 Acceptable Solutions and Verification Methods document?

Proposed Verification Method B1/VM1 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
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."	**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 400 mm."	The use of 400mm deep hollow core units was restricted in B1/VM1 because no testing had been undertaken of 400mm deep hollow core units and therefore the performance was deemed unreliable. This testing has now been undertaken and demonstrated suitable performance.
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.	Paragraph, along with Comment noted, deleted.	Deleted as the exemption allowed in the Paragraph no longer applies. Note: Comment is not sought on this deletion as it relates to a previous MBIE consultation and decision. The change merely removes wording that is redundant.
5.3 NASH Standard – Residential and Lowrise Steel Framing Part 1: Design Criteria.	Paragraph deleted	This NASH Standard (Part 1) has been revised and needs to be revoked from VM1. It is not considered necessary to consider citing the revised Part 1 as many buildings designed using Part 1 can be designed using the new Part 2 proposed to be included in Acceptable Solution B1/AS1 (see below). Further, all other buildings designed using Part 1 can be designed using the AS/NZS 4600 method that is currently referenced by B1/VM1 Paragraph 5.2. Both the superseded and revised versions of Part 1 reference AS/NZS 4600, AS/NZS 1170, and VM1. Both versions reproduce selected information from AS/NZS 4600, AS/NZS 1170, and manufacturer's product information. This information and the additional design guidance in Part 1 does not need to be in B1/VM1 and revoking it removes the circular reference that

Current Text	Proposed Changes	Explanation and reasons/justification for change
		Part 1 has to the verification method. This removes ambiguity and allows Part 1 to be updated as required independently of B1/VM1.

Questions relating to the B1/VM1 content changes:

Question B1 – 2	**Do you agree with extending the provisions of B1/VM1 to hollow-core units of up to 400mm deep?**
Question B1 – 3	**Do you agree that NASH Part 1 replicates information already in B1/VM1 and therefore its citation can be deleted?**
Question B1 – 4	**What is the impact on you or your business of the proposed changes to B1/VM1, e.g. financial or operational?**
Question B1 – 5	**Do you have any other comments on the proposed changes to B1/VM1?**

Proposed Acceptable Solution B1/AS1 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
1.1 B1/AS1 contains Acceptable Solutions for Masonry (Paragraph 2.0), Timber (Paragraph 3.0), Earth Buildings (Paragraph 4.0) and Stucco (Paragraph 5.0), Drains (Paragraph 6.0) and Glazing (Paragraph 7.0).	**1.1** B1/AS1 contains Acceptable Solutions for Masonry (Paragraph 2.0), Timber (Paragraph 3.0), Earth Buildings (Paragraph 4.0),Stucco (Paragraph 5.0), Drains (Paragraph 6.0), Glazing (Paragraph 7.0), and Steel (Paragraph 9.0).	Paragraph updated for completeness as B1/AS1 now contains information on steel.
3.0 Timber **3.1 NZS 3604** subject to the following modifications:	**3.0 Timber** **3.1 NZS 3604** subject to the following modifications:	**Transferring information on design of foundations in expansive soils from SH/AS1 to B1/AS1** The November 2018 Building Code System Update consulted on the proposal to revoke the Simple House Acceptable Solution SH/AS1. The revocation of SH/AS1 was agreed except for the need to retain the information relating to slab-on-ground foundations for 'simple houses' on expansive soils. The proposals here, namely proposed new Paragraphs 3.1.0.1, 3.1.0.2, 3.1.2D and 3.1.13A, transfer the information on foundations on expansive soils from SH/AS1 to B1/AS1, and specifically into B1/AS1's citation and modifications of NZS 3604: 2011. Some editorial changes are necessary to the SH/AS1 information so that referencing now relates to the appropriate clauses in NZS 3604 instead of paragraphs in SH/AS1. Further mention of masonry veneer has been removed and, consistent with NZS 3604 terminology, reference made to light wall, medium wall or heavy wall claddings. Other than those editorial type changes the provisions now
No equivalent paragraph currently	**3.1.0.1 NZS 3604 Clause 1.1.2 Buildings covered by this Standard** Amend 1.1.2(a) to read: "Buildings founded on good ground or on expansive soils where the requirements of 1.1.5 are met"	
No equivalent paragraph currently [These scope limitations come from SH/AS1 Paragraph 1.2 'Simple house']	**3.1.0.2 NZS 3604 New Clause** Add new: "Clause 1.1.5 Buildings on expansive soils Buildings on expansive soils shall be supported on slab-on-ground foundations complying with 7.5.13 and in addition to 1.1.2 be limited as follows: (a) single storey, stand-alone household unit and (b) maximum length or width of floor of 24.0 m including any attached garage, and (c) simple plan shapes such as rectangular, L, T or boomerang, and (d) concrete slab-on-ground with a minimum thickness of 100mm and a minimum concrete compressive	

Current Text	Proposed Changes	Explanation and reasons/justification for change
	strength of 20 MPa, and (e) maximum overall height of 7.0 m from roof apex from lowest cleared ground level, and (f) maximum roof height 3.0 m, and (g) roof slope between 10° and 35° from the horizontal, and (h) maximum span of roof truss 12.0 m, and (i) external walls maximum of 2.4 m height studs, other than gable end walls and walls to mono-pitched roofs that shall not exceed 4.0 m	relate to NZS 3604: 2011 (instead of the 1999 version) meaning that the foundations cater for buildings in all of the Standard's earthquake zones, wind zones up to and including EH and for snow loadings up to 2 kPa. The only increase in requirements relates to shear reinforcement (stirrups) in the beams and internal thickenings. This has increased due to changes made to the concrete design Standard which reduced the shear strength that the concrete in the foundations is allowed to carry.
No equivalent paragraph currently	**3.1.2D NZS 3604 Clause 7.5.1** Add the following paragraph at the end of Clause 7.5.1: "Slabs on expansive soils for buildings meeting the requirements of 1.1.5, shall, in addition to meeting the requirements of 7.5.1 to 7.5.12, meet the requirements of 7.5.13. Where there is conflict the requirements of 7.5.13 shall apply."	The increased requirements are shown below in Tables 7.4A and 7.4B and Figures 7.22 and 7.23, with this information previously being contained in Tables 3.2.1 and 3.2.2 and Figures 3.2.1 and 3.2.2 of SH/AS1. The proposed tables and figures along with the SH/AS1 versions they replace are shown below. Red in the SH/AS1 versions indicates the text or value that has been changed with blue in the proposed versions being what the text or value has changed to.
No equivalent paragraph currently [Requirements here come from SH/AS1 Paragraph 3.2 'Slab-on-ground in expansive soils']	**3.1.13A NZS 3604 New Clause, Tables and Figures** Add new: Clause 7.5.13 Slab-on-ground in expansive soils 7.5.13.1 Identification of expansive soils 7.5.13.1.1 Should reasonable enquiry as outlined in 3.1.3 show any signs of expansive soils, the expansive soil class, as defined in AS 2870, shall be established. This shall be established by one or all of: (a) enquiry to the local territorial authority (b) reference to the certificate of suitability issued in	

Current Text	Proposed Changes	Explanation and reasons/justification for change
	terms of NZS 4431 (c) a soil test undertaken by a suitably qualified soils engineer. 7.5.13.1.2 Expansive soil class shall be defined as: (a) Slightly 'S', having an Iss Range of 0–1.9%, and a 500 year design characteristic surface movement return (ys) of 22 mm, or (b) Moderately 'M', having an Iss Range of 2.0–3.7% and a 500 year design characteristic surface movement return (ys) of 44 mm, or (c) Highly 'H', having an Iss Range of 3.8–6.5% and a 500 year design characteristic surface movement return (ys) of 78 mm, or (d) Extremely 'E', having an Iss Range of 6.6– 7.5% and a 500 year design characteristic surface movement return (ys) of 90 mm. 7.5.13.2 Maximum aspect ratio of concrete slabs The aspect ratio of the concrete slabs or bays of concrete slabs, such as in the case of L, T or boomerang concrete slab shapes, shall not exceed 5 to 1 (length to width). 7.5.13.3 Foundation details 7.5.13.3.1 For the identified expansive soil class the foundation details, external and internal thickenings shall be as follows. (a) For light wall claddings refer to Table 7.4A and Figure 7.22. (b) For medium wall or heavy wall claddings refer to	

Current Text	Proposed Changes	Explanation and reasons/justification for change
	Table 7.4B and Figure 7.23 7.5.13.3.2 Situations where no internal thickenings shall be required are limited to a rectangular slab with long side not exceeding 17 m. Where this limit is exceeded, add additional internal thickenings across the slab with the same cross section dimensions and reinforcing as the external footing, so that the centre to centre spacing of thickenings is always less than 17m. **COMMENT** Maintenance of foundations in expansive soils Normal maintenance is that work generally recognised as necessary to achieve the expected performance over time of the foundation located on expansive soils. Unless otherwise specified by the designer and noted on the drawings, basic normal maintenance tasks shall ensure that: (a) the drainage and wetting of the site is controlled so that extremes of wetting and drying of the soils is prevented (b) the position and operation of gardens adjacent to the dwelling are controlled, and the planting of trees near to foundations is suitably restricted (c) any leaks which develop in plumbing, stormwater or sanitary sewage systems are repaired promptly	
No current table. [Requirements here come from SH/AS1 Table 3.2.1]	**Table 7.4A** 'Reinforced concrete foundations in expansive soils for light wall claddings' *(see below)*	
No current table. [Requirements here come from SH/AS1 Table 3.2.2]	**Table 7.4B** 'Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings' *(see below)*	
No current figure. [Requirements here come from SH/AS1 Figure 3.2.1]	**Figure 7.22** 'Reinforced concrete foundations in expansive soils for light wall claddings'. *(see below)*	

Current Text	Proposed Changes	Explanation and reasons/justification for change
No current figure. [Requirements here come from SH/AS1 Figure 3.2.2]	**Figure 7.23** 'Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings'. *(see below)*	
No equivalent paragraph currently	**9.0 Steel** **9.1 NASH Standard** Part 2 Light Steel Framed Buildings	Included as this Part of the NASH Standard provides non-specific design solutions for the light steel-framing of low-rise buildings including houses and low-rise commercial buildings.

SH/AS1 Table 3.2.1 'Reinforced concrete foundations in expansive soils for lightweight claddings'

(Replaced by Table 7.4A below)

Table 3.2.1	Reinforced concrete foundations in expansive soils for lightweight claddings Paragraph 3.2.1 and Figure 3.2.1			
Expansive Soil Class	Slightly 'S'	Moderately 'M'	Highly 'H'	Extremely 'E'
Soil embedment (De)	375 mm	525 mm	575 mm	625 mm
Top steel (As top)	2/D 16	2/ D16	2/ D16	2/ D16
Bottom steel (As bottom)	1/ D16	1/ D25	1/ D20	1/ D25
Stirrups	R6/ 600 crs	R6/ 600 crs	R6/ 600 crs	R6/ 600 crs
Maximum spacing of internal thickenings	no internal thickening	no internal thickening	2.5 m crs	2.5 m crs
Depth of thickening (D1)	–	–	400 mm	450 mm
Base width (B1)	–	–	300 mm	350 mm
Top steel (As top)	–	–	2/ D20	2/ D20
Bottom steel (As bottom)	–	–	2/ D16	2/ D20
Stirrups	–	–	R6/ 600 crs	R6/ 600 crs

Proposed Table 7.4A ‘Reinforced concrete foundations in expansive soils for light wall claddings’

(Replaces SH/AS1 Table 3.2.1)

Table 7.4A	**Reinforced concrete foundations in expansive soils for light wall claddings** **Clause 7.5.13 and Figure 7.22**			
Expansive Soil Class	Slightly ‘S’	Moderately ‘M’	Highly ‘H’	Extremely ‘E’
Soil embedment (De)	375 mm	525 mm	575 mm	625 mm
Top steel (As top)	2/ D16	2/ D16	2/ D16	2/ D16
Bottom steel (As bottom)	1/ D16	1/ D25	1/ D20	1/ D25
Stirrups	R6/ **125** crs	R6/ **125** crs	R6/ **300** crs	R6/ **300** crs
Maximum spacing of internal thickenings	no internal thickening	no internal thickening	2.5 m crs	2.5 m crs
Depth of thickening (D1)	–	–	400 mm	450 mm
Base width (B1)	–	–	300 mm	350 mm
Top steel (As top)	–	–	2/ D20	2/ D20
Bottom steel (As bottom)	–	–	2/ D16	2/ D20
Stirrups	–	–	R6/ **150** crs	R6/ **150** crs

SH/AS1 Table 3.2.2 ‘Reinforced concrete foundations in expansive soils for masonry veneer’.

(Replaced by Table 7.4B below)

Table 3.2.2	Reinforced concrete foundations in expansive soils for masonry veneer Paragraph 3.2.1 and Figure 3.2.2			
Expansive Soil Class	Slightly ‘S’	Moderately ‘M’	Highly ‘H’	Extremely ‘E’
Soil embedment (De)	500 mm	550 mm	775 mm	800 mm
Top steel (As top)	2/ D16	2/ D20	2/ D20	3/ D20
Bottom steel (As bottom)	2/ D16	2/ D16	2/ D20	2/ D20
Stirrups	R6/ 600 crs	R6/ 600 crs	R6/ 600 crs	R6/ 600 crs
Maximum spacing of internal thickenings	–	2.5 m crs	2.5 m crs	2.5 m crs
Depth of thickening (D1)	–	350 mm	450 mm	500 mm
Base width (B1)	–	300 mm	300 mm	350 mm
Top steel (As top)	–	2/ D16	3/ D20	3/ D20
Bottom steel (As bottom)	–	2/ D16	2/ D16	2/ D20
Stirrups	–	R6/ 600 crs	R6/ 600 crs	R6/ 600 crs

Proposed Table 7.4B ‘Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings’.

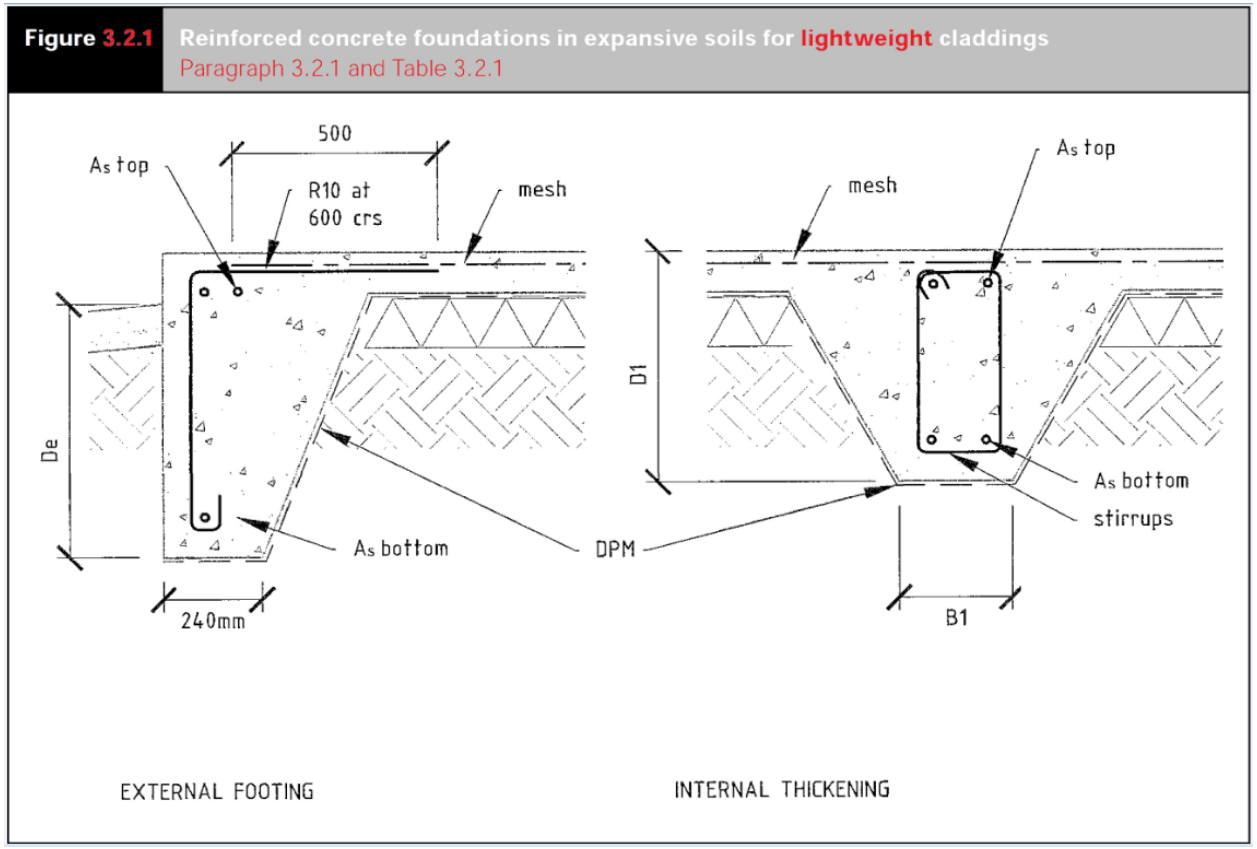
(Replaces SH/AS1 Table 3.2.2)

Table 7.4B	**Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings** **Clause 7.5.13 and Figure 7.23**			
Expansive Soil Class	Slightly ‘S’	Moderately ‘M’	Highly ‘H’	Extremely ‘E’
Soil embedment (De)	500 mm	550 mm	775 mm	800 mm
Top steel (As top)	2/ D16	2/ D20	2/ D20	3/ D20
Bottom steel (As bottom)	2/ D16	2/ D16	2/ D20	2/ D20
Stirrups	R6/ **125** crs	R6/ **250** crs	R6/ **300** crs	R6/ **300** crs
Maximum spacing of internal thickenings	–	2.5 m crs	2.5 m crs	2.5 m crs
Depth of thickening (D1)	–	350 mm	450 mm	500 mm
Base width (B1)	–	300 mm	300 mm	350 mm
Top steel (As top)	–	2/ D16	3/ D20	3/ D20
Bottom steel (As bottom)	–	2/ D16	2/ D16	2/ D20
Stirrups	–	R6/ **125** crs	R6/ **150** crs	R6/ **150** crs

SH/AS1 Figure 3.2.1 'Reinforced concrete foundations in expansive soils for lightweight claddings'.

(Replaced by Figure 7.22 below)

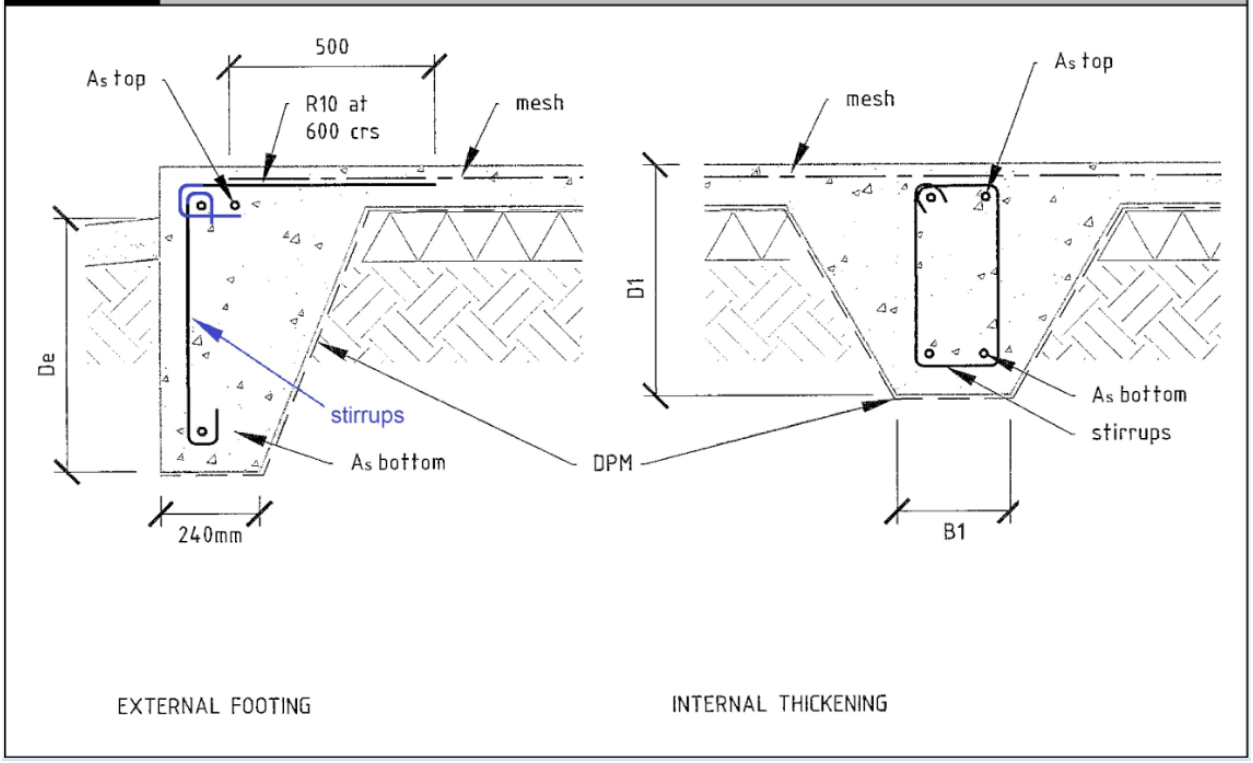
Figure 3.2.1 Reinforced concrete foundations in expansive soils for lightweight claddings
Paragraph 3.2.1 and Table 3.2.1



Proposed Figure 7.22 ‘Reinforced concrete foundations in expansive soils for light wall claddings’

(Replaces SH/AS1 Figure 3.2.1)

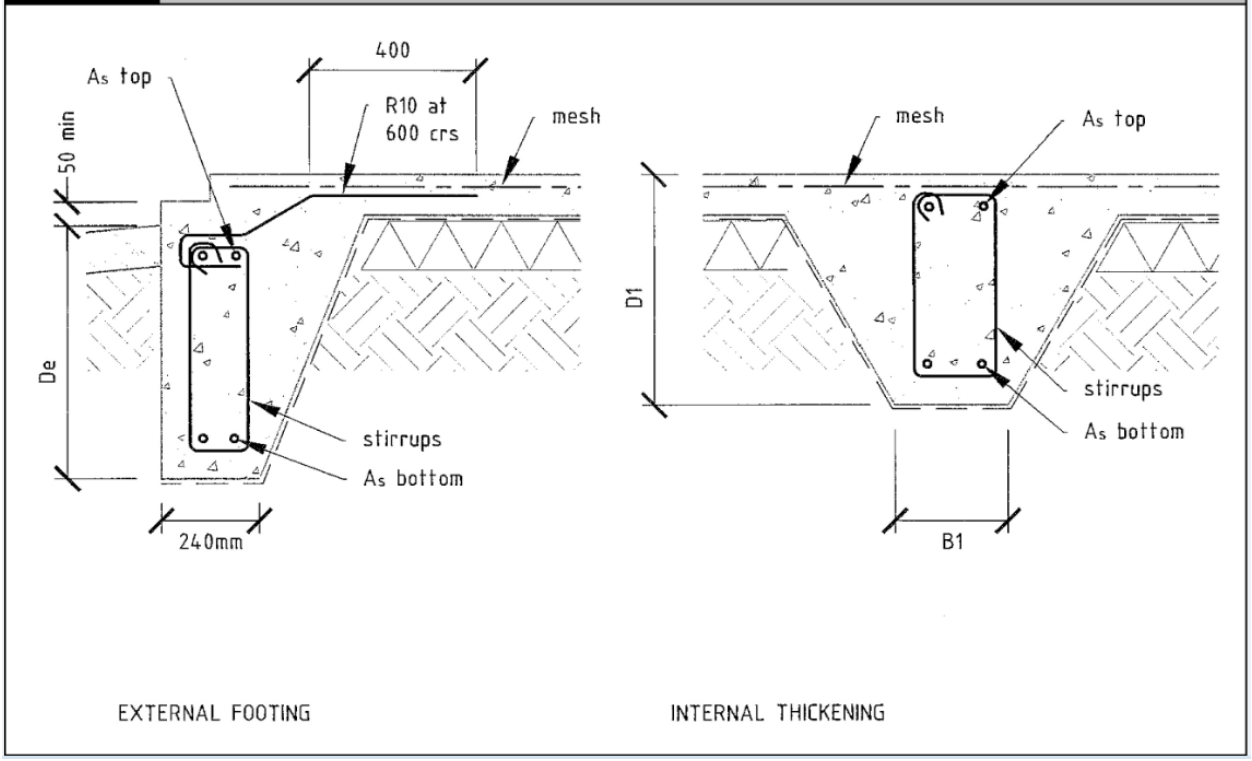
Figure 7.22 Reinforced concrete foundations in expansive soils for light wall claddings
Clause 7.5.13 and Table 7.4A



SH/AS1 Figure 3.2.2 ‘Reinforced concrete foundations in expansive soils for masonry veneer’.

(Replaced by Figure 7.23 below)

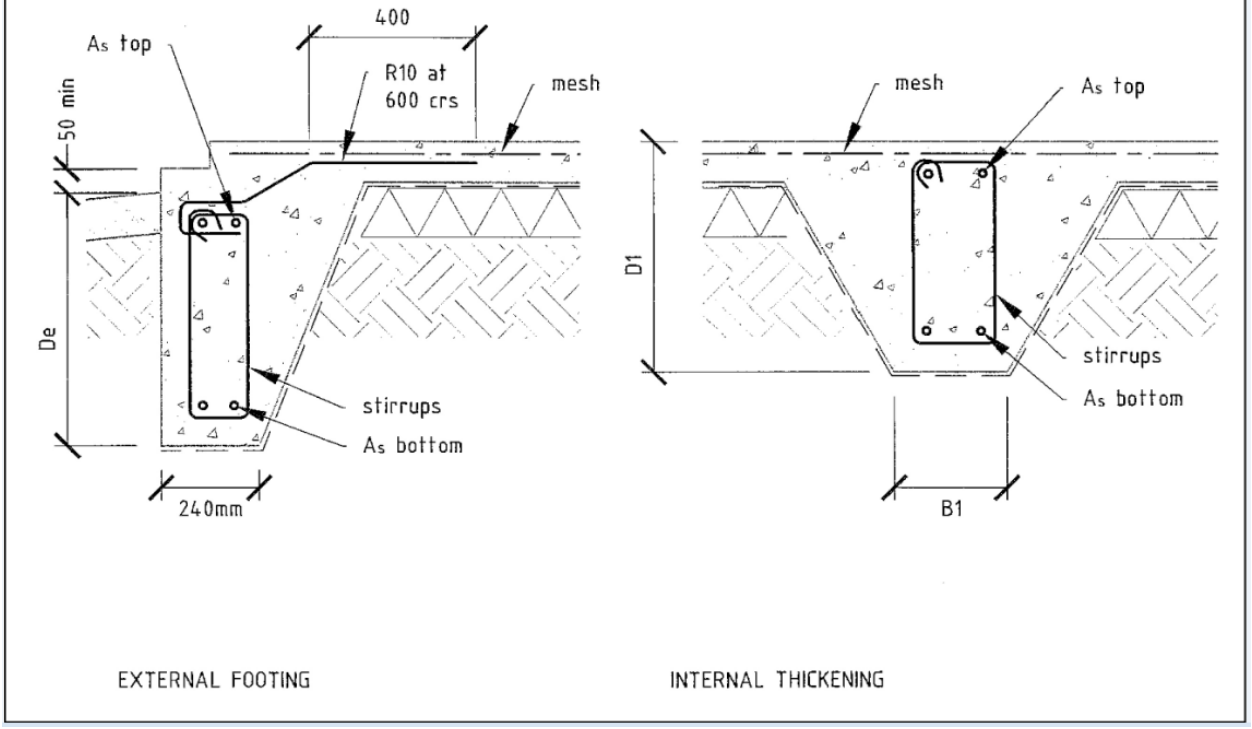
Figure 3.2.2 Reinforced concrete foundations in expansive soils for masonry veneer
Paragraph 3.2.1 and Table 3.2.2



Proposed Figure 7.23 ‘Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings’.

(Replaces SH/AS1 Figure 3.2.2 below)

Figure 7.23 Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings
Clause 7.5.13 and Table 7.4B



Questions relating to the B1/AS1 content changes:

Question B1 – 6 Do you agree that providing design information for light steel framed buildings and the citation of NASH Part 2 is appropriate for B1/AS1?

Question B1 – 7 Do you agree that providing design information for foundations on expansive soils as a modification to NZS 3604 is appropriate for B1/AS1?

Question B1 – 8 What is the impact on you or your business of the proposed changes to B1/AS1, e.g. financial or operational?

Question B1 – 9 Do you have any other comments on the proposed changes to B1/AS1?

B1 Transitional Arrangements

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing B1 Verification Methods and Acceptable Solutions (Amendment 17) will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

Question B1 – 10 Do you agree with the proposed transitional arrangements?

Clause B2 Durability

The introduction of the new light steel framing solution gives greater flexibility for designers to use light steel framing. By amending B2/AS1 this construction material option is now provided with durability performance criteria within the acceptable solution. This will make it easier for users of light steel frame to obtain building consent.

Proposal

MBIE proposes to amend Acceptable Solution B2/AS1 to cite that part of a NASH Standard that contains durability requirements for low rise light steel framing construction. The NASH Standard enables non-specific design of low-rise light steel framing buildings, essentially residential and light commercial buildings. It is a document of similar scope and presentation to NZS 3604 but instead of giving details for timber framed buildings provides information for light steel framed ones. The corrosion protection requirements given are applicable to framing used within a closed building envelope in accordance with the NASH Building Envelope Solutions; a document with similar scope and claddings to Acceptable Solution E2/AS1.

The advantages of doing this are that:

- current knowledge and practices would be reflected in the Acceptable Solution
- the Acceptable Solution would clearly specify requirements for corrosion protection for light steel framing
- maintaining the Acceptable Solution will help consenting efficiency as steel protection measures for light steel framing will no longer need to be treated as alternative solution proposal
- Changes reflect continued maintenance of the B2 Acceptable Solutions and Verification Methods to ensure the Building Code System operates efficiently.

Proposed Reference Section changes

Current Text	Proposed Changes		Explanation and reasons/justification for change
Not currently referenced	NASH Standard Part 2:2018 Light Steel Framed Buildings	AS1 3.6.2	Included as this document provides the durability requirements of light steel-framed low-rise buildings including houses and commercial buildings.

Link to NASH Standard Part 2: http://nashnz.org.nz/nash-draft-standard-for-comment/

Questions relating to the Reference Section changes:

Question B2 – 1 Do you agree with the proposed changes to the Reference Section of the B2 Acceptable Solutions and Verification Methods document?

Proposed Acceptable Solution B2/AS1 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
No equivalent paragraph currently	**3.6 Steel** **3.6.1 Light steel framing** Section 3 of NASH Standard Part 2 is an acceptable solution for meeting the durability requirements of light steel framing building elements used within the Standard's scope.	The durability information in this Standard is proposed as an Acceptable Solution for durability of light steel framing. It specifies the corrosion protection of framing members used in enclosed situations within the document's scope.

Questions relating to the B2/AS1 content changes:

Question B2 – 2 **Do you agree that these changes are appropriate for B2/AS1?**

Question B2 – 3 **What is the impact on you or your business, e.g. financial or operational?**

Question B2 – 4 **Do you have any other comments on the proposed changes to B2/AS1?**

B2 Transitional Arrangements

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing Acceptable Solution B2/AS1 (Amendment 10) will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

Question B2 – 5 **Do you agree with the proposed transitional arrangements?**

Clause E2: External Moisture

The addition of E2/VM2 will help with consenting efficiency as weathertightness designs for certain buildings up to 25 metres in height will no longer need to be treated as alternative solution proposals. This will support new housing designs and give more flexibility to the building and construction sector to show compliance for taller building designs.

Proposal

MBIE proposes to issue a new Verification Method E2/VM2, which references a new BRANZ Evaluation Method EM7 as a means of demonstrating compliance with weathertightness performance criteria. EM7 provides a means of assessing the weathertightness performance of wall cladding systems used on buildings up to 25 m in height, and for which a drained and ventilated cavity is used as part of the cladding design. The demand for buildings of this height is increasing alongside the densification of housing taking place in many of New Zealand's cities.

EM7 consists of a series of tests from AS/NZS 4284:2008 Testing of building facades. The performance levels set by these tests provide a consistent set of parameters appropriate to mid-rise buildings likely to be constructed in New Zealand. EM7 is the result of façade test research work undertaken by BRANZ in conjunction with industry experts.

The advantages of issuing the proposed new Verification Method E2/VM2 are that:

- Current knowledge and practices would be reflected in the E2 Acceptable Solutions and Verification Methods
- A means of demonstrating NZBC compliance for clause E2.3.2 External Moisture for certain buildings up to 25 m in height is made available which does not rely on engaging an expert façade consultant. There is currently no Acceptable Solution or Verification Method for NZBC clause E2 for buildings taller than 10 m in height
- Manufacturers and suppliers of cladding systems who utilise the Verification Method will all demonstrate the same levels of performance, so any such cladding system may be used on any building within the scope of the Verification Method
- Matters that affect the performance of cladding systems will become better known and understood amongst the sector as the Verification Method is adopted and suppliers publish technical information on their conforming cladding system
- Providing this Verification Method will help consenting efficiency because weathertightness designs for certain buildings up to 25 m in height will no longer need to be treated as alternative solution proposals
- Changes reflect continued maintenance of the E2 Acceptable Solutions and Verification Methods to ensure the Building Code System operates efficiently.

Proposed References Section changes

Current Text		Proposed Changes		Explanation and reasons/justification for change
AS/NZS 4284:2008 Testing of building facades	VM1 1.1, 1.4, 1.4.2, 1.4.3, 1.4.4	AS/NZS 4284:2008 Testing of building facades	VM1 1.1, 1.4, 1.4.2, 1.4.3, 1.4.4, VM2 1.0	New reference to Standard which is now quoted in proposed E2/VM2.
Not currently referenced		BRANZ Evaluation Method EM7: 2018 Performance of mid-rise cladding systems*	VM2 1.0	New reference to new BRANZ Evaluation Method, quoted within new Verification Method E2/VM2 Paragraph 1.0.

* BRANZ Evaluation Method EM7:2018 can be seen from:
https://www.branz.co.nz/cms_show_download.php?id=dbd81e3cd651458bb4c683253cf2ee4c1191783d

Questions relating to the Reference Section changes:

Question E2 – 1 Do you agree with the proposed changes to the Reference Section of the E2 Acceptable Solutions and Verification Methods document?

Proposed new Verification Method E2/VM2

Current Text	Proposed Changes	Explanation and reasons/justification for change
No equivalent Verification Method currently	**Verification Method E2/VM2** 1.0 Cladding systems for buildings up to 25 m in height, including junctions with windows, door and other penetrations Wall cladding systems, for buildings within the scope of Section 2 of BRANZ EM7 and that meet the criteria of BRANZ EM7, meet the performance requirements of NZBC clause E2.3.2. The tests in this Verification Method shall be undertaken in a test facility with IANZ or equivalent accreditation for testing to the procedures of AS/NZS 4284:2008. **COMMENT** BRANZ EM7 prescribes a series of tests from AS/NZS 4284:2008 *Testing of building facades*, with specific nominated values for the performance levels. The use of BRANZ EM7 is restricted to buildings which fall within a number of limitations, including limitations on building height, forms of construction, and structural behaviour. A suitably qualified professional, such as a chartered professional structural engineer, will be required to confirm whether a particular building falls within BRANZ EM7's limitations on inter-storey deflections and peak positive wind pressures on the cladding system (BRANZ EM7 does not have any limits on the negative pressure on the façade). This Verification Method does not assess the water penetration resistance of the window and exterior door units used with the wall cladding system. BRANZ EM7 assesses the	A recently published Evaluation Method BRANZ EM7 is proposed as Verification Method E2/VM2 for NZBC clause E2.3.2 for wall cladding systems that fall within its scope. The scope of EM7 is provided in its Section 2. These scope limitations include: • Building height up to 25 m • Peak positive SLS wind pressure on cladding system up to 2250 Pa (3200 Pa ULS) • Maximum inter-storey deflections in SLS seismic events of ±15 mm for a 3000 mm inter-storey height (height/200). Cladding systems within the scope of EM7 must also have the following features: • Cladding system supported on lightweight framing with studs at maximum 600 mm centres • A rigid building underlay • A drained and ventilated cavity of 20 mm minimum depth. The proposed Verification Method provides a means of demonstrating compliance with NZBC clause E2.3.2 for a wider range of buildings than is covered by the currently available Verification Method and Acceptable Solutions. The proposed Verification Method is expected to be useful for buildings between 10m and 25m in height.

Current Text	Proposed Changes	Explanation and reasons/justification for change
	junctions of window and exterior door units with other cladding elements, but it does not assess the units themselves. Instead it relies on the units having been manufactured to resist water penetration when subject to the relevant design parameters for the building. Although there is currently no Verification Method or Acceptable Solution for the window and exterior door units of mid-rise buildings, window suppliers may be able to demonstrate, through testing, adequate water penetration resistance of the windows when subject to: • The peak positive SLS wind pressures acting on the window or exterior door unit (typically calculated in accordance with AS/NZS 1170.2 including all local pressure factors and internal pressures relevant to the location of the window on the building); and • The maximum in-plane horizontal movement to which the window could be subject during SLS events. This Verification Method is a means of demonstrating that a wall cladding system will prevent the penetration of water to the extent required by clause E2.3.2 of the NZBC. It does not demonstrate that wall cladding systems (or their windows), in conjunction with their associated building work, will meet other related NZBC clauses, including clauses such as B1 Structure (relevant to whether the cladding system's members, panels and fixings have the strength and stiffness required by the NZBC), B2 Durability, C1 – C6 Fire safety, E3 Internal moisture, F2 Hazardous building materials, G6 Airborne and impact sound, and H1 Energy efficiency.	

Questions relating to the new E2/VM2:

Question E2 – 2	**Do you agree that the proposed E2/VM2 is appropriate?**

Question E2 – 3	**What is the impact on you or your business, e.g. financial or operational?**

Question E2 – 4	**Do you have any other comments on the proposed E2/VM2?**

E2 Transitional Arrangements

There are no transitional arrangements for the proposed new Verification Method E2/VM2. If the introduction of E2/VM2 is agreed it will come into effect on 27 June 2019 (the proposed Effective Date).

Question E2 – 5	**Do you agree that transitional arrangements are not necessary and E2/VM2 can take effect on 27 June 2019?**

Clause G4: Ventilation

MBIE are amending G4/AS1 to address potential moisture problems brought about by inadequate ventilation of rooms containing baths, showers, and cooktops. This will also provide a compliance solution for homeowners looking to retrofit ventilation into these rooms.

Proposal

MBIE proposes to amend Acceptable Solution G4/AS1 to:

- Require mechanical extract fans to be installed to control moisture from showers, baths and cooktops in household units and accommodation units.
  Mechanical extract fans are proposed to improve ventilation of internal moisture (from showers, baths and cooktops) because new homes typically have less background ventilation.
- Remove passive stack ventilation.
  Passive stack ventilation systems require specific design to perform reliably and efficiently. In multi-unit buildings, the ventilation system must also be designed to maintain fire separations. This design complexity is not adequately covered in the acceptable solution and indications are that passive stack ventilation is not used. Rather than address the issues the proposal here is simply that passive stack ventilation be removed from the acceptable solution.
- Simplify the provisions for combined natural and mechanical ventilation.
  The proposals here merely combine information contained in different places in the acceptable solution so as to avoid duplication. The technical requirements do not change.
- Remove incomplete fire safety requirements.
  The proposals here remove incomplete fire safety requirements from the Acceptable Solution and replace with referral to the appropriate provisions in the Protection from Fire Verification Methods and Acceptable Solutions.

The advantages of doing this are that:

- Current knowledge and practices would be reflected in the Acceptable Solution
- Ventilation methods that are outdated and not used are removed
- Information in the Acceptable Solution is kept relevant with referral provided to other documents where necessary
- Changes reflect continued maintenance of the Acceptable Solution to ensure the Building Code system operates efficiently.

Proposed Reference changes

Current Text		Proposed Changes		Explanation and justification for change
AS/NZS 4740: 2000 Natural ventilators – Classification and performance	G4/AS1 1.3.7 c)	Reference removed		Reference removed as Paragraph 1.3.7 'Passive stack ventilators' is proposed to be deleted.
AS 1668: The use of mechanical ventilation and air-conditioning in buildings Part 2: 2002 Ventilation design for indoor-air contaminant control Amends: 1, 2	G4/AS1 1.2.4, 1.3.7 d) 1.5.1 a) c) i) ii) d) e), f), g)	AS 1668: The use of mechanical ventilation and air-conditioning in buildings Part 2: 2012 Ventilation design for indoor-air contaminant control Amends: 1, 2	G4/AS1 1.2.4, 1.5.1 a) c) i) ii) d) e), f), g)	Update the reference to the latest version, including Amendments 1 and 2. Reference to 1.3.7 d) removed as this paragraph is proposed to be deleted.
Department of Labour (Occupational Safety and Health), Workplace Exposure Standards and Biological Exposure Indices 7th Edition	VM1 2.0.1	Worksafe New Zealand, Workplace Exposure Standards and Biological Exposure Indices 10th Edition, November 2018 *	VM1 2.0.1	Update the reference to the latest version

* The Worksafe document can be seen on:

https://worksafe.govt.nz/topic-and-industry/work-related-health/monitoring/exposure-standards-and-biological-exposure-indices/

Questions relating to the Reference changes:

Question G4 – 1 Do you agree with the proposed changes to the Reference Section of the G4 Acceptable Solutions and Verification Methods document?

Proposed Definition changes

Current Text	Proposed Changes	Explanation and justification for change
Passive stack ventilator A system including a ventilation shaft which uses natural draught to ventilate spaces	Definition deleted	Definition deleted as it is proposed to remove passive stack ventilation from the acceptable solution.

Question G4 – 2 Do you agree with the proposed changes to the Definitions of the G4 Acceptable Solutions and Verification Methods document?

Proposed Acceptable Solution G4/AS1 content changes

Current Text	Proposed Changes	Explanation and justification for change
No equivalent paragraph currently	**1.1.4** In addition to Paragraph 1.1.2, spaces in household units and accommodation units that contain cooktops, showers and baths must have mechanical extract fans installed to remove moisture generated by these fixtures. Mechanical extract fans (including associated ducting) must have a maximum flowrate not less than: a) 25 L/s for showers and baths, and b) 50 L/s for cooktops **COMMENT:** 1. Mechanical extract fans required by Paragraph 1.1.4 are intended to remove moisture from localised sources, and will not necessarily provide adequate ventilation for the whole occupied space. However, these fans may contribute to compliance of mechanical ventilation systems required by Paragraphs 1.4 and 1.5. Within this acceptable solution, natural ventilation (refer Paragraphs 1.2 and 1.3) on its own is not adequate to remove moisture generated from cooktops, showers and baths. **2.** Vented clothes dryers should be ducted to outside or condenser dryers installed. Mechanical extract fans should be installed to remove moisture from un-ducted vented clothes dryers.	A new paragraph 1.1.4, is proposed to require **mechanical extract fans** to be installed to control moisture from showers, baths and cooktops, in household units and accommodation units. Mechanical extract fans are proposed to improve ventilation of internal moisture (from showers, baths and cooktops) because new homes typically have less background ventilation. Background ventilation has decreased because modern construction is relatively airtight, which reduces air infiltration, and because occupants do not always open windows to adequately ventilate indoor spaces to control moisture. An increased focus on energy efficient housing may also lead to more airtight construction and controlled airflow through the building envelop (such as the use of mechanical ventilation systems). Ensuring passive ventilation systems provide an adequate number of air changes, without over-ventilating, requires a level of design that is difficult to standardise in the acceptable solution G4/AS1.

Current Text	Proposed Changes	Explanation and justification for change
1.3 Natural ventilation of household units and accommodation units with one external wall	1.3 Natural ventilation of household units and accommodation units with one external wall	**Passive stack ventilation** is proposed to be deleted from 1.3 in G4/AS1. Paragraphs 1.3.7 and 1.3.8 are deleted. Paragraphs 1.3.1 – 1.3.6 and 1.3.9 are modified.
Scope **1.3.1** Paragraphs 1.3.2 to 1.3.9 specify the natural ventilation to both *household units* and accommodation units with only one external wall, such as those often found in apartments, hotels and motels.	**Scope** **1.3.1** Paragraphs 1.3.2 to 1.3.4 specify the natural ventilation to both *household units* and accommodation units with only one external wall, such as those often found in apartments, hotels and motels. Kitchens, bathrooms, toilets and laundries that do not have an external wall must be mechanically ventilated in accordance with Paragraphs 1.4 or 1.5.	Removing passive stack ventilation simplifies the solution for naturally ventilating a household unit with a single external wall, but limits the solution to only units where the kitchen, bathroom, toilet and laundry have an external wall. Passive stack ventilation systems require specific design to perform reliably and efficiently. In multi-unit buildings, the ventilation system must also be designed to maintain fire separations. This design complexity is not adequately covered by the current Acceptable Solution G4/AS1. Informal feedback indicates that passive stack ventilation in G4/AS1 is not used.
Kitchens, bathrooms, toilets and laundries that have an external wall **1.3.2** For kitchens, bathrooms, toilets and laundries located on the external wall, moisture and other contaminants must be ventilated to the outside by natural ventilation using either: a) windows and/or other openings to the outside with a *net openable area* of no less than 5% of the floor area, o r b) high level *trickle ventilators* located through the external wall or *building elements* within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), where the distance between the external wall and opposing wall is less than 6 metres.	**Kitchens, bathrooms, toilets, laundries and habitable spaces that have an external wall** **1.3.2** Kitchens, bathroom, toilets, laundries and habitable spaces with an external wall must be ventilated to the outside by: a) windows and/or other openings to the outside with a *net openable area* of no less than 5% of the floor area of the space, and b) high level *trickle ventilators* located through the external wall or in *building elements* within the externa wall (see Paragraph 1.3.4 for *trickle ventilators*), and c) a distance between the external wall and opposing wall of the space of less than 6 metres.	

Current Text	Proposed Changes	Explanation and justification for change
Kitchens, bathrooms, toilets and laundries without an external wall **1.3.3** For kitchens, bathrooms, toilets and laundries not located on the external wall, moisture and other contaminants must be ventilated to the outside by natural ventilation having: a) a *passive stack ventilator*, located in the kitchen, bathroom, toilet or laundry, designed to extract a continuous airflow through the surrounding *habitable spaces* (see Paragraph 1.3.7 for *passive stack ventilators*), and b) high level *trickle ventilators*, located within the external wall or in *building elements* that are integrated within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), and c) *permanent openings* for airflow between the surrounding *habitable spaces* and the kitchen, bathroom, toilet or laundry of no less than 5% of the combined floor area of the spaces, and not compromising the privacy of the toilet or bathroom, and d) a combined distance of the *habitable space* and the kitchen, bathroom, toilet or laundry measured between the external wall and furthest opposing wall of less than 10 metres.		

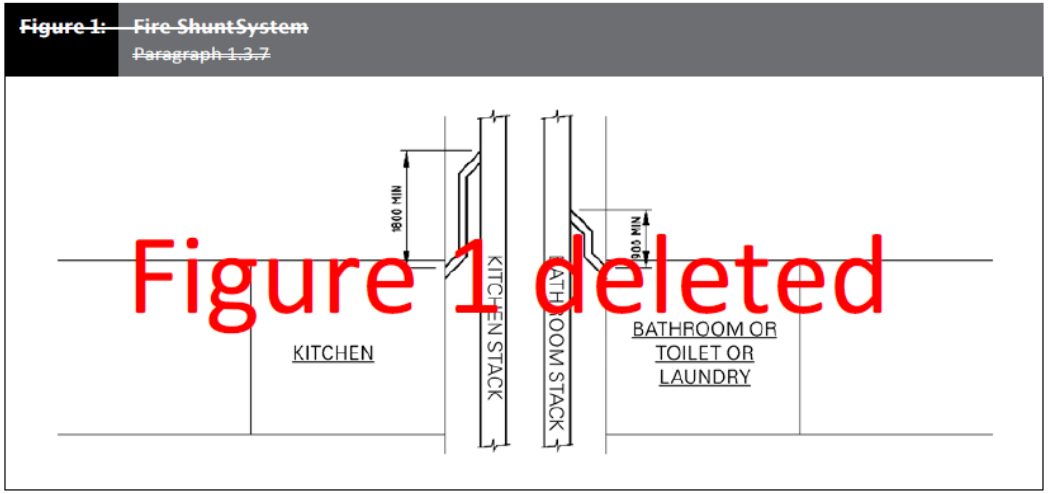
Current Text	Proposed Changes	Explanation and justification for change
Habitable spaces that have an external wall and open to a kitchen, bathroom, toilet or laundry with a passive stack ventilator **1.3.4** For *habitable spaces* with both an external wall and a *permanent opening* to a kitchen, bathroom, toilet or laundry, ventilation shall be achieved by: a) installing high level *trickle ventilators*, located within the external wall or *building elements* within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), and b) having a *passive stack ventilator* installed in the kitchen, bathroom, toilet or laundry, and c) having an area of *permanent opening* between the two spaces of no less than 5% of the combined floor area of the *habitable space* and the kitchen, bathroom, toilet or laundry, and not compromising the privacy of the toilet or bathroom, and d) windows and/or other openings to the outside with an *net openable area* of no less than 5% of the floor area, and e) having a maximum dimension between the external wall and the furthest internal opposing wall, when measured across the combined habitable space and the kitchen, bathroom, toilet, or laundry, of less than 10 metres.		

Current Text	Proposed Changes	Explanation and justification for change
Habitable spaces that have an external wall and do not open to a kitchen, bathroom, toilet or laundry with a passive stack ventilator **1.3.5** For *habitable* spaces with an external wall and no *permanent opening* to surrounding spaces, ventilation must be achieved by having: a) windows and/or other openings to the outside with an *net openable area* of no less than 5% of the floor area, and b) high level *trickle ventilators*, located within the external wall or in *building elements* within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), and c) a distance between the external wall and opposing wall of the *habitable spaces* of less than 6 metres		

Current Text	Proposed Changes	Explanation and justification for change
Habitable spaces ventilated via another habitable space 1.3.6 Ventilation of a *habitable space* without openings to the exterior via another *habitable space* must be achieved by: a) providing from the other *habitable space* to outside, openable windows and/or other openings of *net openable area* of no less than 5% of the combined floor area of the combined *habitable spaces*, and b) providing high and low level *trickle ventilators* located on the external wall (see Paragraph 1.3.9 for *trickle ventilators*), sized according to the combined floor area, and c) providing an area of *permanent opening* between the two spaces of no less than 5% of the combined floor area of the *habitable spaces*, and d) having a combined distance of the *habitable spaces*, measured between the external wall and furthest opposing wall, of less than 6 metres.	**Habitable spaces ventilated via another habitable space** 1.3.3 *Habitable spaces* without openings to the exterior may be ventilated via another *habitable space* by: a) providing from the other *habitable space* to outside, openable windows and/or other openings of *net openable area* of no less than 5% of the combined floor area of the combined *habitable spaces*, and b) providing high and low level *trickle ventilators* located on the external wall (see Paragraph 1.3.4 for *trickle ventilators*), sized according to the combined floor area, and c) providing an area of *permanent opening* between the two spaces of no less than 5% of the combined floor area of the *habitable spaces*, and d) having a combined distance of the *habitable spaces*, measured between the external wall and furthest opposing wall, of less than 6 metres.	
Passive stack ventilators **1.3.7** Passive stack ventilators consist of a vertical ventilation shaft which uses air buoyancy to ventilate spaces. Passive stack ventilators shall: a) have no connections from spaces other than kitchens connecting to the kitchen passive stackventilator, and b) not be used in *household units* in combination with mechanical ventilation systems, and c) be designed in accordance with AS/ NZS 4740 Section 3, and		Passive stack ventilation is proposed to be removed from the acceptable solution and accordingly Paragraphs 1.3.7 and 1.3.8 are deleted. Paragraphs 1.3.1 – 1.3.6 and 1.3.9 are modified as a consequence.

Current Text	Proposed Changes	Explanation and justification for change
d) be designed to achieve extract airflow rates specified in AS 1668.2 Table B1, using the following parameters. Air Density $\rho = 1.2\ kg/m^3$ Gravitational Constant $g = 9.81\ m/s^2$ Temperature Differential $\Delta T = 3K$ Outside Ambient Temperature $T = 300\ K$ Wind Velocity $V_t = 0\ m/s$, and e) be integrated into the *building* without decreasing the performance of the *building* envelope and the partition walls of the *building* for external moisture, fire and acoustics, and f) be capable of drawing air through *trickle ventilators* or *permanent openings* from the room or adjacent spaces. The *permanent openings* to the surrounding spaces and *trickle ventilators* to the outside shall have an *equivalent aerodynamic area* greater than the *equivalent aerodynamic area* of the *passive stack ventilator*. This is to ensure air can be drawn through the *passive stack ventilator* effectively. g) when extracting from kitchens: i) maintain the *fire separation* of the fire separated shaft with a pressure-forming intumescent fire collar around a collapsible duct, and ii) have ducting, downstream of the fire collar, made of non-combustible material, and iii) have connections that contain no more than two bends and do not have any duct that is more than 45° to the vertical, and		

Current Text	Proposed Changes	Explanation and justification for change
iv) have the branch connection to the common duct via a fire shunt of 1800 mm in height (see Figure 1), and v) have the fire shunt and the stack located in a *fire separated* shaft. h) when extracting from bathrooms, toilets and laundries: i) be installed in a *fire separated* shaft, and ii) have the branch connection to the *common extract duct* via a fire shunt of 900 mm in height (see Figure 1), and iii) have connections that contain no more than two bends and do not have any duct that is more than 45° to the vertical, and iv) be ducting made of non-combustible material, unless the *common extract duct* is the only duct in the fire separated shaft. i) have ventilation ducts and stacks that are insulated in any unheated areas with a minimum thickness of 25 mm of a material having a thermal conductivity of no less than 0.04 W/m^2K, and j) have a condensation trap fitted to the part of the duct above the roof level.		
1.3.8 The terminal of a *passive stack ventilator* shall: a) have an *equivalent aerodynamic area* greater than the cross-sectional area of the stack, and b) extend above the roof to at least the ridge height.		Passive stack ventilation is proposed to be removed from the acceptable solution and accordingly Paragraphs 1.3.7 and 1.3.8 are deleted. Paragraphs 1.3.1 – 1.3.6 and 1.3.9 are modified as a consequence.

Current Text	Proposed Changes	Explanation and justification for change
COMMENT: To comply with b) the outlet of the *passive stack ventilator* should be placed at the ridge of the roof to reduce the adverse effects of wind gusts.		
Figure 1 Fire Shunt System	Delete Figure 1	Figure removed as it relates to Paragraph 1.3.7 'Passive stack ventilators' which is proposed to be deleted
~~**Figure 1: Fire ShuntSystem**~~ ~~Paragraph 1.3.7~~  Figure 1 deleted		
Trickle ventilators **1.3.9** *Trickle ventilators* are devices that have an opening to the outside. *Trickle ventilators* shall: (a) have an opening of no less than 2000 mm^2 *equivalent aerodynamic area*, and (b) be located to minimise draughts, and (c) be secured to keep pests and insects out, and(d) have	**Trickle ventilators** **1.3.4** *Trickle ventilators* are devices that have an opening to the outside. *Trickle ventilators* shall: (a) have an opening of no less than 2000 mm^2 *equivalent aerodynamic area*, and (b) be located to minimise draughts, and (c) be secured to keep pests and insects out, and	Current sub-paragraph g) removed as this relates to passive stack ventilators which are proposed to be deleted

Current Text	Proposed Changes	Explanation and justification for change
acoustic attenuation, if required by NZBC G6 Airborne and Impact Sound, and (e) be controllable and closable in all conditioned spaces, and (f) be installed in *household units*, providing they do not contain mechanical supply ventilation, and (g) have the sum of the *equivalent aerodynamic area* greater than the sum of the equivalent area of the *passive stack ventilator*(s), if installed in a *household unit*, and (h) have the *equivalent aerodynamic area*, based on the number of occupants, for the space as given in Tables 1 and 2, and (i) have, where high and low level *trickle ventilators* are required, the high and low level *trickle ventilators* of approximately the same *equivalent aerodynamic area* and separated by a minimum of 1 metre. High level *trickle ventilators* are located in the top half of the wall. Low level *trickle ventilators* are located in the bottom half of the wall. **COMMENT:** There are a range of *trickle ventilators*, sometime called background ventilators, on the market.	(d) have acoustic attenuation, if required by NZBC G6 Airborne and Impact Sound, and (e) be controllable and closable in all conditioned spaces, and (f) be installed in *household units*, providing they do not contain mechanical supply ventilation, and (g) have the *equivalent aerodynamic area*, based on the number of occupants, for the space as given in Tables 1 and 2, and (h) have, where high and low level *trickle ventilators* are required, the high and low level *trickle ventilators* of approximately the same *equivalent aerodynamic area* and separated by a minimum of 1 metre. High level *trickle ventilators* are located in the top half of the wall. Low level *trickle ventilators* are located in the bottom half of the wall. **COMMENT:** There are a range of *trickle ventilators*, sometime called background ventilators, on the market.	
Table 1 Heading 'Number of occupants Paragraph 1.3.9'	**Table 1 Heading** 'Number of occupants Paragraph 1.3.4'	Change to Paragraph reference only.

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Table 1: Number of occupants
Paragraph 1.3.4
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<tr><th>Household unit accommodation unit type</th><th>Number of people</th></tr>
<tr><td>Studio</td><td>2</td></tr>
<tr><td>1 bedroom</td><td>2</td></tr>
<tr><td>2 bedroom</td><td>3</td></tr>
<tr><td>Greater than 2 bedrooms</td><td>Add 1 per bedroom</td></tr>
</table>
</td></tr>
<tr><td>Table 2 Heading

‘Total required equivalent aerodynamic area per space (mm^2)

Paragraph 1.3.9’</td><td>Table 2 Heading

‘Total required equivalent aerodynamic area per space (mm^2)

Paragraph 1.3.4’</td><td>Change to Paragraph reference only.</td></tr>
<tr><td colspan="3">
Table 2: Total required equivalent aerodynamic area per space (mm^2)
Paragraph 1.3.4
<table>
<tr><th></th><th colspan="5">Number of occupants</th></tr>
<tr><th>Ventilator locations</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr>
<tr><td>High and low level</td><td>4000</td><td>8000</td><td>12,000</td><td>16,000</td><td>20,000</td></tr>
<tr><td>High level only</td><td>3000</td><td>6000</td><td>9000</td><td>12,000</td><td>15,000</td></tr>
</table>
</td></tr>
</table>

Current Text	Proposed Changes	Explanation and justification for change
1.4 Combined natural ventilationand mechanical ventilation **Scope** **1.4.1** This section specifies the combined natural and mechanical ventilation requirements for both *household units* and accommodation units, with one external wall, such as those often found in apartments, hotels and motels. *Habitable spaces* will be naturally ventilated, and kitchens, bathrooms, toilets and laundries will be ventilated by continuous or intermittent mechanical extract ventilation **Combination ventilation with continuous mechanical extract** **1.4.2** For *habitable spaces* with both one external wall and a *permanent opening* to a kitchen, bathroom, toilet or laundry, within which a continuous mechanical extract system is installed, ventilation shall be achieved by: a) integrating high level *trickle ventilators*, located within the external wall or *building elements* that are integrated within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), and b) having a *net openable area* of windows and/or other openings to the outside of no less than 5% of the floor area, and c) having the kitchen, bathroom, toilet, or laundry door undercut by 20 mm, and d) having a maximum dimension between the external	**1.4 Combined natural ventilationand mechanical ventilation** **Scope** **1.4.1** This section specifies the combined natural and mechanical ventilation requirements for both *household units* and accommodation units, with one external wall, such as those often found in apartments, hotels and motels. *Habitable spaces* will be naturally ventilated, and kitchens, bathrooms, toilets and laundries will be ventilated by continuous or intermittent mechanical extract ventilation (refer to Paragraph 1.5). **1.4.2** *Habitable spaces* with one external wall and a *permanent opening* to a kitchen, bathroom, toilet or laundry, within which a mechanical extract system is installed, must be ventilated by: a) integrating high level *trickle ventilators*, located within the external wall or *building elements* that are integrated within the external wall (see Paragraph 1.3.4 for *trickle ventilators*), and b) having a *net openable area* of windows and/or other openings to the outside of no less than 5% of the floor area of the spaces combined, and c) having the kitchen, bathroom, toilet, and laundry doors undercut by 20 mm, and d) having a maximum dimension between the external	1.4 **Combined natural and mechanical ventilation** is proposed to be simplified, by combining paragraphs 1.4.2 and 1.4.3 to avoid duplication. The technical requirements would not change. Paragraph 1.4.2 and paragraph 1.4.3 have essentially duplicate requirements for continuous mechanical ventilation and intermittent mechanical ventilation, except that the maximum distance from the external wall to the furthest internal wall is 10 metres for continuous mechanical ventilation and 6 metres for intermittent mechanical ventilation.

Current Text	Proposed Changes	Explanation and justification for change
wall and the furthest internal opposing wall, when measured across the combined *habitable space* and the kitchen, bathroom, toilet, or laundry, of less than 10 metres	wall and the furthest internal opposing wall, when measured across the combined *habitable space* and the kitchen, bathroom, toilet, or laundry, of i) less than 10 metres for continuous mechanical extract systems, or ii) less than 6 metres for intermittent mechanical extract systems. **COMMENT:** If Paragraphs 1.4.2 d) i) & ii) both apply, then ventilation shall be achieved by complying with Paragraph 1.4.2 d) ii).	
Combination ventilation with intermittent mechanical extract **1.4.3** For *habitable spaces* with one external wall and a *permanent opening* to a kitchen, bathroom, laundry, or toilet, within which an intermittent mechanical extract system is installed, ventilation shall be achieved by: a) integrating high and low level *trickle ventilators*, located within the external wall or *building elements* that are integrated within the external wall (see Paragraph 1.3.9 for *trickle ventilators*), and b) having a *net openable area* of windows and/ or other openings to the outside of no less than 5% of the floor area, and c) having the kitchen, bathroom, toilet, or laundry door undercut by 20 mm, and d) having a maximum dimension between the external		

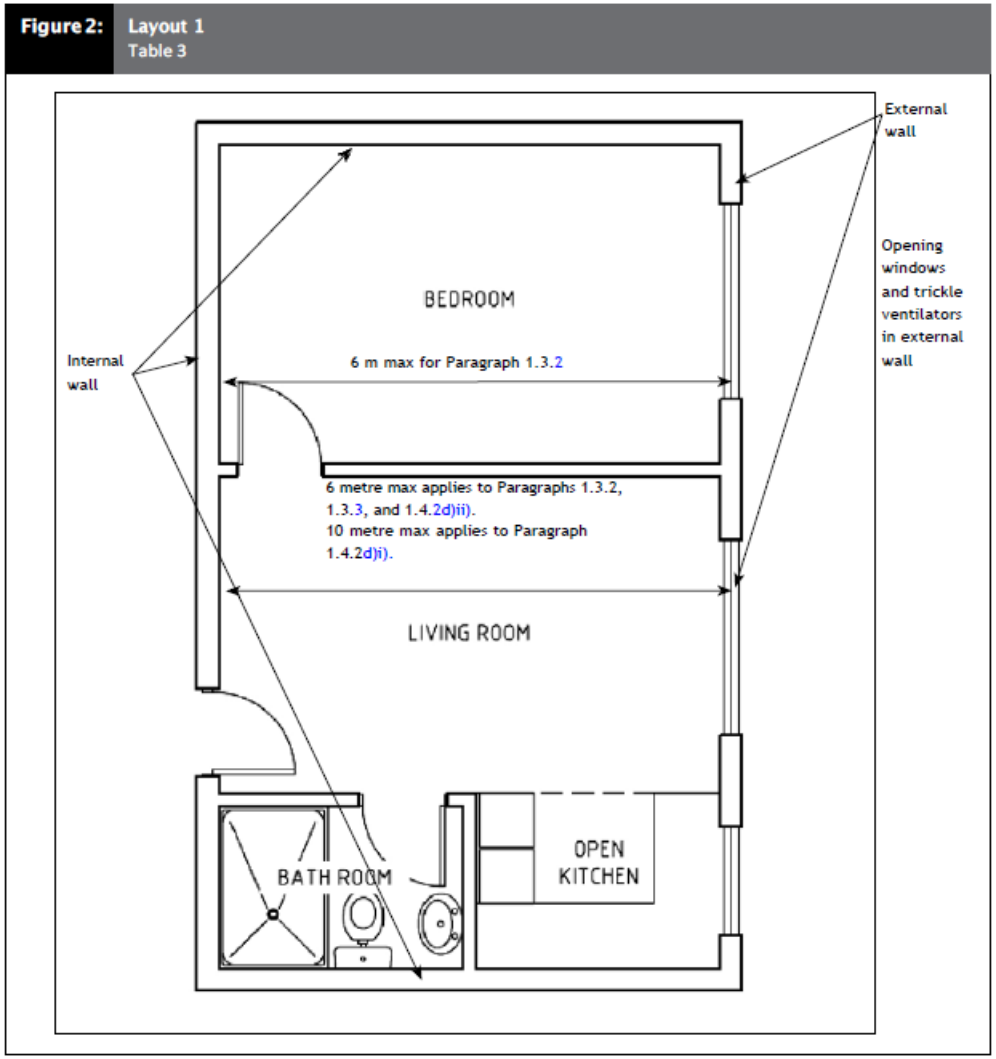
Current Text	Proposed Changes	Explanation and justification for change
wall and the furthest internal opposing wall, when measured across the combined *habitable space* and the kitchen, bathroom, toilet, or laundry, of less than 6 metres. **COMMENT:** If Paragraphs 1.4.2 d) i) & ii) both apply, then ventilation shall be achieved by complying with Paragraph 1.4.2 d) ii).		
1.5 Mechanical ventilation **1.5.1** Mechanical ventilation systems must satisfy the following conditions: a) outdoor air supply shall be designed and equipment installed to comply with NZS 4303, or AS 1668.2 (excluding Table A1 and Sections 3 and 7), and to provide outdoor air to *occupied spaces* at the flow rates given in NZS 4303 Table 2, and b) air-handling systems shall be installed and maintained to the requirements of AS/NZS 3666.1 and AS/NZS 3666.2, and c) extract ventilation shall: i) be constructed so that any products listed in Clause G4.3.3 are removed, collected or diluted by ventilation rates and methods set out in AS 1668.2 Section 5	**1.5 Mechanical ventilation** **1.5.1** Mechanical ventilation systems must satisfy the following conditions: a) outdoor air supply shall be designed and equipment installed to comply with NZS 4303, or AS 1668.2 (excluding Table A1 and Sections 3 and 7), and to provide outdoor air to *occupied spaces* at the flow rates given in NZS 4303 Table 2, and b) air-handling systems shall be installed and maintained to the requirements of AS/NZS 3666.1 and AS/NZS 3666.2, and c) extract ventilation shall: i) be constructed so that any products listed in Clause G4.3.3 are removed, collected or diluted by ventilation rates and methods set out in AS 1668.2 Section 5 **COMMENT:** Commercial kitchen extract ventilation is included in AS 1668.2 Section 5.	Fire requirements for mechanical ventilation systems in section 1.5 are deleted and replaced with a comment alerting designers of the need to also comply with Building Code clauses C1-C6 Protection from fire. Paragraphs 1.5.2 and 1.5.3 relate to passive fire requirements, which are too onerous in situations where ducting does not pass through fire separations, and are incomplete for other more complex designs. Fire requirements for compliance with the Building Code, including those for ventilation systems, are best kept within the Acceptable Solutions and Verification Methods for clauses C1-C6.

Current Text	Proposed Changes	Explanation and justification for change
COMMENT: Commercial kitchen extract ventilation is included in AS 1668.2 Section 5. ii) where provided to remove moisture and other contaminants from kitchens, bathrooms, toilet spaces and laundries in *household units*, exhaust the air to the outside at flow rates given in AS 1668.2, Table B1, and iii) where provided for extract from kitchens, bathrooms, toilets and laundries in buildings containing household units or accommodation units, refer to Paragraphs 1.5.2 and 1.5.3. d) outdoor air intakes shall be located to avoid contamination from any local source in accordance with AS 1668.2 Clause 4.3.1 and NZS 4303 Clause 5.5, and e) recirculated air systems shall comply with AS 1668.2 Clause 4.5, and f) contaminated air discharge systems shall discharge contaminated air in a way that complies with AS 1668.2 Clause 5.10, and g) filtrationshall comply with AS 1668.2 Clause 4.4, and h) commissioning shall comply with CIBSE Code Series A.	i) where provided to remove moisture and other contaminants from kitchens, bathrooms, toilet spaces and laundries in *household units*, exhaust the air to the outside at flow rates given in AS 1668.2, Table B1 **COMMENT:** Extract ventilation systems that pass through fire rated building elements must be designed to maintain the fire performance of the building – refer to NZBC clauses C1-C6 Protection from fire d) outdoor air intakes shall be located to avoid contamination from any local source in accordance with AS 1668.2 Clause 4.3.1 and NZS 4303 Clause 5.5, and e) recirculated air systems shall comply with AS 1668.2 Clause 4.5, and f) contaminated air discharge systems shall discharge contaminated air in a way that complies with AS 1668.2 Clause 5.10, and g) filtrationshall comply with AS 1668.2 Clause 4.4, and h) commissioning shall comply with CIBSE Code Series A.	

Current Text	Proposed Changes	Explanation and justification for change
Extract ventilation from buildings containing household units and accommodation units **1.5.2** Extract ventilation from kitchens must: a) maintain the *fire separation* of the fire separated shaft with a pressure-forming intumescent fire collar around a collapsible duct, and b) have ducting, downstream of the fire collar, made of non-combustible material, and c) have the branch connection to the *common extract duct* located in a fire separated shaft, and d) have the fire shunt and *common extract duct* located in a separated shaft		
1.5.3 Extract ventilation from bathrooms, toilets and laundries must: a) be installed in a fire separated shaft, and b) have the branch connection to the *common extract duct* via a fire shunt of 900 mm in height, and c) be ducting made of non-combustible material, unless the *common extract duct* is the only duct in the fire separated shaft.		
Car park ventilation **1.5.4** Mechanical ventilation of car parks shall comply with the mechanical ventilation part of AS 1668.2 Section 7.	**Car park ventilation** **1.5.2** Mechanical ventilation of car parks shall comply with the mechanical ventilation part of AS 1668.2 Section 7.	Paragraph numbering changed
Positive and negative pressure **1.5.5** *Building* interiors ventilated by mechanical systems incorporating filtration shall, except where Paragraph 1.4.4 applies, be maintained at a positive pressure	**Positive and negative pressure** **1.5.3** *Building* interiors ventilated by mechanical systems incorporating filtration shall, except where Paragraph 1.5.4 applies, be maintained at a positive pressure	Paragraph numbering changed and correct and updated reference given

Current Text	Proposed Changes	Explanation and justification for change
1.5.6 Spaces in which mechanical ventilation is used to remove or collect contaminants shall be maintained at negative pressure relative to other spaces in the building.	**1.5.4** Spaces in which mechanical ventilation is used to remove or collect contaminants shall be maintained at negative pressure relative to other spaces in the building.	Paragraph numbering changed
2.2.2 A mechanical ventilation system shall: a) For each kW of gas consumption (of all appliances in the plant room) provide *outdoor air* at the rate of: i) 3.6 m^3/h for *forced or induced draught appliances*, and ii) 7.2 m^3/h for appliances with *atmospheric burners*, and b) Remove exhaust air from the room either: i) mechanically at one third the inlet rate, or ii) naturally via high-level openings having a free ventilation area of no less than 600 mm2 per kW of total gas consumption for all appliances in the room.	**2.2.2** A mechanical ventilation system shall: a) For each kW of gas consumption (of all appliances in the plant room) provide *outdoor air* at the rate of: i) 3.6 m^3/h for *forced or induced draught appliances*, and ii) 7.2 m^3/h for appliances with *atmospheric burners*, and b) Remove exhaust air from the room either: i) mechanically at one third the inlet rate, or ii) naturally via high-level openings having a free ventilation area of no less than 600 mm^2 per kW of total gas consumption for all appliances in the room.	Editorial change to units given in Paragraph 2.2.2b)ii)
Appendix 1 Typical apartment layouts and ventilation options **Figure 2 'Layout 1 Table 3'**	**Appendix 1 Typical apartment layouts and ventilation options** **Figure 2 'Layout 1 Table 3'** Reference changes indicated in blue	Amendments to referencing of Paragraphs only.

Figure 2: Layout 1
Table 3



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<tr><td>Appendix 1 Typical apartment layouts and ventilation options

Table 3 ‘Ventilation options – Layout 1, Figure 2’</td><td>Appendix 1 Typical apartment layouts and ventilation options

Table 3 ‘Ventilation options – Layout 1, Figure 2’

Reference changes indicated in blue</td><td>Amendments to referencing of Paragraphs only.</td></tr>
<tr><td colspan="3">
<table>
<tr><th>Table 3:</th><th colspan="3">Ventilation options – Layout 1
Figure 2</th></tr>
<tr><th>Room</th><th>Natural ventilation (Paragraph)</th><th>Mechanical ventilation (Paragraph)</th><th>Combined ventilation (Paragraph)</th></tr>
<tr><td>Bedroom</td><td>1.3.2</td><td>1.5</td><td>–</td></tr>
<tr><td>Living</td><td>1.3.2</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
<tr><td>Kitchen</td><td>1.3.2</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
<tr><td>Bathroom</td><td>–</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
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</td></tr>
<tr><td>Appendix 1 Typical apartment layouts and ventilation options

Figure 3 ‘Layout 2 Table 4’</td><td>Appendix 1 Typical apartment layouts and ventilation options

Figure 3 ‘Layout 2 Table 4’

Reference changes indicated in blue</td><td>Amendments to referencing of Paragraphs only.</td></tr>
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Figure 3: Layout 2
Table 4

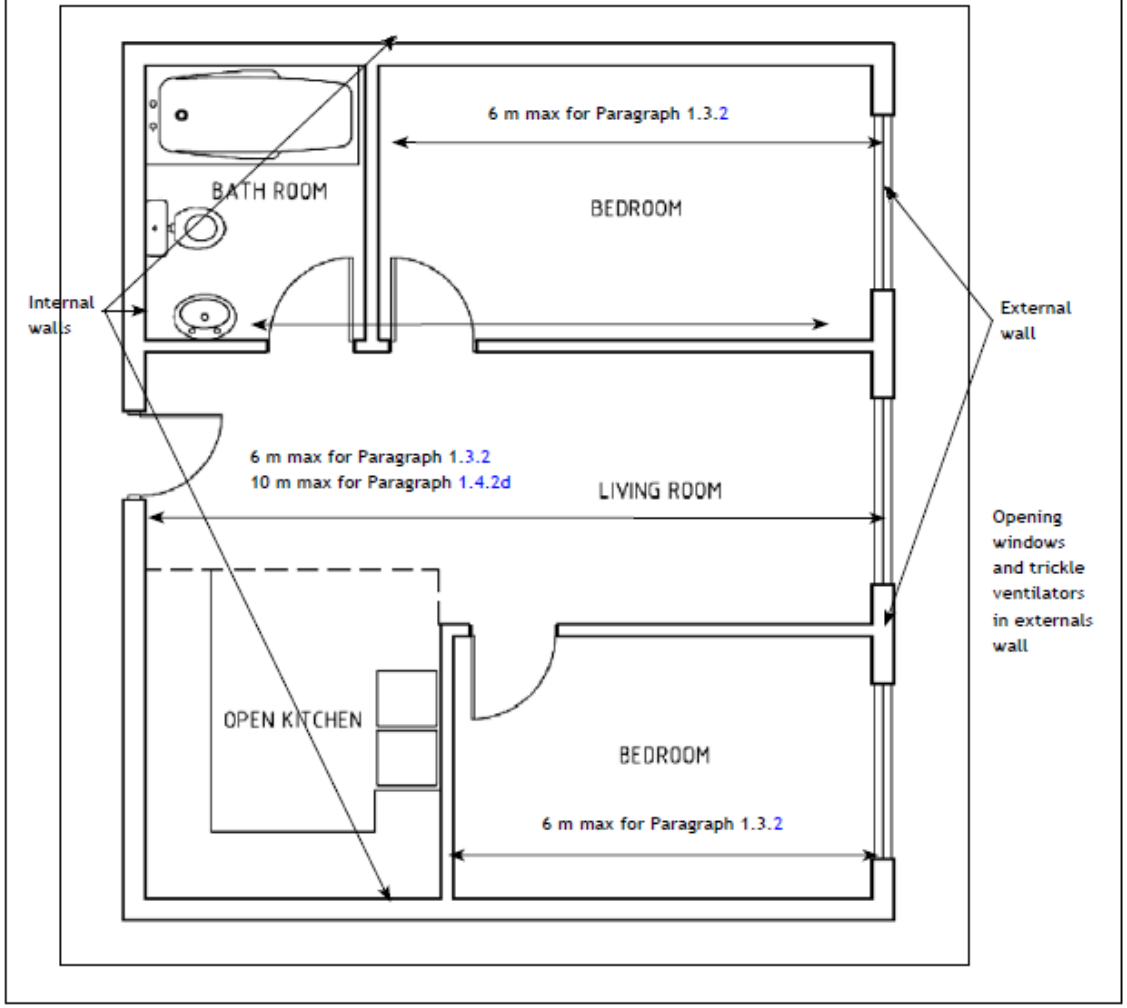

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Table 4 ‘Ventilation options – Layout 2, Figure 3’</td><td>Appendix 1 Typical apartment layouts and ventilation options

Table 4 ‘Ventilation options – Layout 2, Figure 3’

Reference changes indicated in blue</td><td>Amendments to referencing of Paragraphs only.</td></tr>
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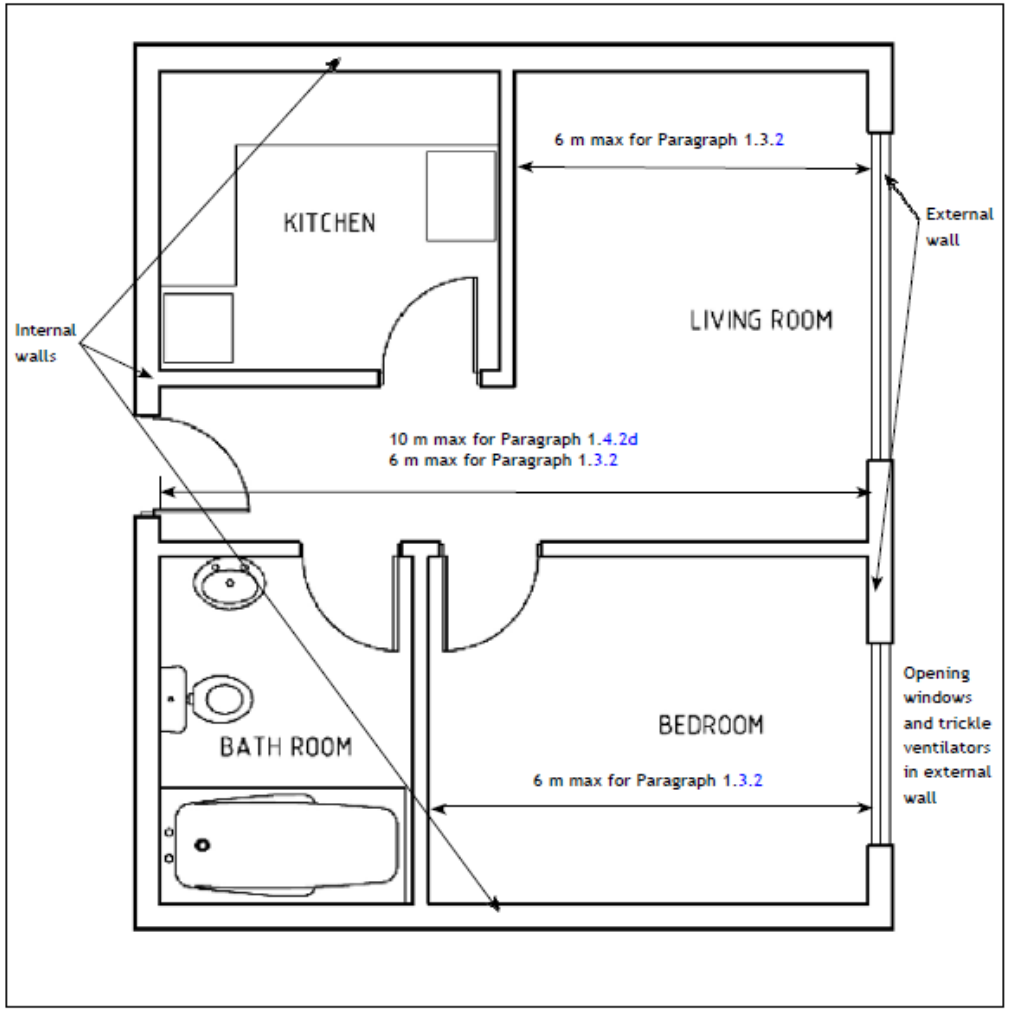
<tr><th>Table 4:</th><th colspan="3">Ventilation options – Layout 2
Figure 3</th></tr>
<tr><th>Room</th><th>Natural ventilation (Paragraph)</th><th>Mechanical ventilation (Paragraph)</th><th>Combined ventilation (Paragraph)</th></tr>
<tr><td>Bedrooms</td><td>1.3.2</td><td>1.5</td><td>–</td></tr>
<tr><td>Living</td><td>1.3.2</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
<tr><td>Kitchen</td><td>-</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
<tr><td>Bathroom</td><td>-</td><td>1.5</td><td>1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Appendix 1 Typical apartment layouts and ventilation options

Figure 4 ‘Layout 3 Table 5’</td><td>Appendix 1 Typical apartment layouts and ventilation options

Figure 4 ‘Layout 3 Table 5’

Reference changes indicated in blue</td><td>Amendments to referencing of Paragraphs only.</td></tr>
</table>

Figure 4: Layout 3
Table 5



Current Text	Proposed Changes	Explanation and justification for change
Appendix 1 Typical apartment layouts and ventilation options **Table 5 'Ventilation options – Layout 3, Figure 4'**	**Appendix 1 Typical apartment layouts and ventilation options** **Table 5 'Ventilation options – Layout 3, Figure 4'** Reference changes indicated in blue	Amendments to referencing of Paragraphs only.

Table 5: Ventilation options – Layout 3
Figure 4

Room	Natural ventilation (Paragraph)	Mechanical ventilation (Paragraph)	Combined ventilation (Paragraph)
Bedrooms	1.3.2	1.5	–
Living	1.3.2	1.5	1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)
Kitchen	-	1.5	1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)
Bathroom	-	1.5	1.4.2d)ii) (10 m max) or 1.4.2d)i) (6 m max)

Questions relating to the G4/AS1 content changes:

Question G4 – 3 Do you agree with the proposed new Paragraph 1.1.4 requiring mechanical extract fans in household and accommodation units?

Question G4 – 4 Do you agree with the proposal to delete passive stack ventilation from Paragraphs 1.3.1 - 1.3.9?

Question G4 – 5 Do you agree with the proposal to condense the requirements for combined natural and passive ventilation in paragraphs 1.4.2 and 1.4.3?

Question G4 – 6 Do you agree with the proposal to replace the passive fire requirements in Paragraph 1.5.2 and 1.5.3 with a reference to other documents?

Question G4 – 7 Do you have any other comments on the proposed changes to G4/AS1?

G4 Transitional Arrangements

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing Acceptable Solution G4/AS1 (Amendment 4) will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

Question G4 – 8 Do you agree with the proposed transitional arrangements?

Clause G12: Water supplies

MBIE are amending G12/VM1, G12/AS1 and G12/AS2 to cite a recent AS/NZS standard which will make it easier to show compliance. It will also allow designs for pipe jointing, UV protection, forced circulation heated water systems and mixing valves to be no longer treated as alternative solution proposals, whilst maintaining compliance with G12 performance requirements.

Proposal

MBIE proposes to cite the latest version of AS/NZS 3500 Parts 1 and 4 to:

- Update requirements for pipe jointing

The jointing materials and methods have been updated to ensure they are complete and easily followed by plumbing practitioners.

- Prohibit the exposure of plastic pipe to UV radiation

There was a lack of clear prescriptive provisions for installing plastic piping in direct sunlight and the consequent adverse effect of UV radiation. Updated provisions in the Standard provide clarity about the protection of different types of plastic pipe from direct sunlight.

- Introduce improved requirements for forced circulation heated water supply systems

The new Part 4 includes a new section titled 'Sizing and installation of circulatory heated water reticulation' as well as three new Appendices dedicated to forced circulation heated water systems. The lack of information in the current version of the Standard has resulted in these heated water systems not being fit for purpose resulting in a reduced service life (with some failures experienced within 2 to 10 years in Australia) and hence non-compliance with the Building Code's durability provisions. These types of larger scale heated water systems are generally found in apartment, commercial or institutional buildings; not in individual household units.

- Allow thermostatically controlled tapware as an alternative to mixing valves

Thermostatically controlled taps have been added as they have been increasingly used in Australia as an alternative to mixing valves.

The advantages of doing this are that:

- Current knowledge and practices would be reflected in the Acceptable Solutions and Verification Methods
- Maintaining and updating the G12 Acceptable Solutions and Verification Methods will help consenting efficiency as improvements in pipe jointing, protection from UV radiation, and the use of thermostatically controlled tapware will no longer need to be treated as alternative solution proposals

- Changes reflect continued maintenance of the G12 Acceptable Solutions and Verification Methods to ensure the Building Code System operates efficiently.

Proposed References Section changes

Current Text		Proposed Changes		Explanation and reasons/justification for change
AS/NZS 3500: Plumbing and drainage Part 1: 2015 Water services *Amend: 1*	VM1 1.0.1a) AS1 3.5.2 Comment	AS/NZS 3500: Plumbing and drainage Part 1: 2018 Water services	VM1 1.0.1a) AS1 3.5.2 Comment	Changes to Part 1 are mainly related to pipe jointing and to protection of plastic pipes from sunlight.
Part 4: 2015 Heated water services *Amend: 1*	VM1 1.0.1b) AS2 1.1.1, 4.2.2 Comment, 5.0.1	Part 4: 2018 Heated water services *Amend: 1*	VM1 1.0.1b) AS2 1.1.1, 4.2.2 Comment, 5.0.1	The changes to Part 4 mainly relate to providing further detail on forced circulation heated water systems. Thermostatically controlled tapware has also been introduced

Questions relating to the Reference Section changes:

Question G12 – 1 Do you agree with the proposed changes to the Reference Section of the G12 Acceptable Solutions and Verification Methods document?

Proposed Verification Method G12/VM1 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
1.0.1 A design method for water supply systems may be verified as satisfying the Performances of NZBC G12 if it complies with: a) AS/NZS 3500.1 Section 2, Section 3 and Appendix C (note that Appendix C is part of this Verification Method even though it is included in the standard as an "Informative" Appendix), and b) AS/NZS 3500.4.	**1.0.1** A design method for water supply systems may be verified as satisfying the Performances of NZBC G12 if it complies with: a) AS/NZS 3500.1 Section 2, Section 3 and Appendix D (note that Appendix D is part of this Verification Method even though it is included in the standard as an "Informative" Appendix), and b) AS/NZS 3500.4.	Reference to Appendix updated to 2018 version of Standard.

Proposed Acceptable Solution G12/AS1 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
3.5.2 To ensure the air gap distance is maintained the overflow pipe discharge flow rate shall be no less than the inlet pipe flow rate. **COMMENT:** AS/NZS 3500.1.2 Appendix F may be used to calculate the size of the overflow.	**3.5.2** To ensure the air gap distance is maintained the overflow pipe discharge flow rate shall be no less than the inlet pipe flow rate. **COMMENT:** AS/NZS 3500.1 Appendix G may be used to calculate the size of the overflow.	Reference to Appendix updated to 2018 version of Standard.

Proposed Acceptable Solution G12/AS2 content changes

Current Text	Proposed Changes	Explanation and reasons/justification for change
Paragraph 4.2.2 **COMMENT** . . . 2. Shading of solar collectors should be minimised to ensure maximum performance of the system. Significant shading between 9:00 am and 3:00 pm will affect the performance of a solar *water heater*. The solar altitude may be determined using a commercial "sun locator" or a simple solar altitude sight may be constructed using the diagrams given in Appendix I of AS/NZS 3500.4: 2003.	**Paragraph 4.2.2** **COMMENT** . . . 2. Shading of solar collectors should be minimised to ensure maximum performance of the system. Significant shading between 9:00 am and 3:00 pm will affect the performance of a solar *water heater*. The solar altitude may be determined using a commercial "sun locator" or a simple solar altitude sight may be constructed using the diagrams given in Appendix H of AS/NZS 3500.4: 2018.	Reference to Appendix updated to 2018 version of Standard.

Questions relating to the G12 Acceptable Solutions and Verification Methods document content changes:

Question G12 – 2 **Do you agree with the improved jointing provisions and limitations to UV exposure introduced in the 2018 versions of AS/NZS 3500?**

Question G12 – 3 **Do you agree with the improved requirements for forced circulation heated water supply systems introduced in the 2018 versions of AS/NZS 3500?**

Question G12 – 4 **Do you agree with including thermostatically controlled tapware in the 2018 versions of AS/NZS 3500?**

Question G12 – 5 **Do you have any other comments on the proposed changes to G12/VM1, G12/AS1 and G12/AS2?**

G12 Transitional Arrangements

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing G12 Acceptable Solutions and Verification Methods (Amendment 11) will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

Question G12 – 6 Do you agree with the proposed transitional arrangements?

Clause G13: Foul water

MBIE are amending G13/AS1, G13/VM2, G13/AS2 and G13/AS3 to cite a recent AS/NZS standard which will align with current industry practise. This will allow a means of renovating sanitary plumbing and drainage systems and providing protection from UV radiation will no longer be treated as alternative solution proposals, whilst maintaining compliance with G13 performance requirements.

Proposal

MBIE proposes to cite the latest version of AS/NZS 3500 Part 2 to:

- Provide a solution for renovating sanitary plumbing and drainage systems

The main amendment within this Part relates to the installation of structural plastic liners for renovating sanitary plumbing and drainage systems. The previous version has a provision for this repair work but did not give a specific solution. A prescriptive solution is now provided that provides certainty about the minimum requirements necessary for this work.

- Prohibit the exposure of plastic pipe to UV radiation

There was a lack of clear prescriptive provisions for installing plastic piping in direct sunlight and the consequent adverse effect of UV radiation. Updated provisions in the Standard provide clarity about the protection of different types of plastic pipe from direct sunlight.

The revised Part also incorporates a number of editorial changes and improvements for clarity.

The advantages of doing this are that:

- Current knowledge and practices would be reflected in the G13 Acceptable Solutions and Verification Methods
- Maintaining and updating the G13 Acceptable Solutions and Verification Methods will help consenting efficiency as a means of renovating sanitary plumbing and drainage systems and providing protection from UV radiation will no longer need to be treated as alternative solution proposals
- Changes reflect continued maintenance of the G13 Acceptable Solution to ensure the Building Code system operates efficiently.

Proposed References Section changes

Current Text		Proposed Changes		Explanation and reasons/justification for change
AS/NZS 3500:- Plumbing and drainage Part 2: 2015 Sanitary plumbing and drainage *Amend: 1, 2*	AS1 7.1.3, VM2 1.0.1 Comment, AS2 6.1.3, AS3 1.0.2	AS/NZS 3500:- Plumbing and drainage Part 2: 2018 Sanitary plumbing and drainage	AS1 7.1.3, VM2 1.0.1 Comment, AS2 6.1.3, AS3 2.0.2	A prescriptive solution is now provided for the installation of structural plastic liners. Certain types of plastic piping must be protected from direct sunlight. A number of editorial changes and improvements have been made for clarity.

Questions relating to the Reference Section changes:

Question G13 – 1 Do you agree with the proposed changes to the Reference Section of the G13 Acceptable Solutions and Verification Methods document?

Question G13 – 2 Do you agree with the prescriptive solution for renovating sanitary plumbing and drainage systems introduced in the 2018 version of AS/NZS 3500 Part 2?

Question G13 – 3 Do you agree with the limitations to UV exposure introduced in the 2018 versions of AS/NZS 3500?

Question G13 – 4 Do you have any other comments on the proposed changes to G13 Acceptable Solutions and Verification Methods document?

G13 Transitional Arrangements

It is proposed that the changes will come into effect on 27 June 2019 (the proposed Effective Date). It is also proposed that the existing G13 Acceptable Solutions and Verification Methods (Amendment 7) will remain in force, as if not amended, until 31 October 2019 (the proposed Cessation Date), a period of four months.

Question G13 – 5 Do you agree with the proposed transitional arrangements?

Feedback on this statement of proposals

Thinking about this consultation do you have any comments or suggestions to help us improve the consultation process?

What worked or didn't work for you; what did you like or not like?

What could we do better?

Any other comments or final thoughts?