Issue No. 140 **September 2011**

In this issue we have articles on:

- Lodging a Building Consent
- Gib Ezybrace ® 2011 – Frequently asked questions (FAQs)
- DBH – Information sheet on seismicity changes – structures B1/VM1, B1/AS1, B1/AS3.
- DBH – Questions and answers changes to structure and external moisture Building Code documents (1 August 2011).
- DBH – Guidance on reinforcement for concrete slabs-on-ground.
- DBH – Evidence on using NZS 3804 construction on ground with potential for liquefaction.
- Liquefaction (what is it)
- Invercargill City Council's approach to areas with potential liquefaction.
- Pryda Stren – Joist Information
- Rural sanitary plumbing and drainlaying
- Quiz on articles in this news sheet.

For any enquiries regarding this news sheet, please contact Simon Tonkin on **(03) 211 1777**.

LODGING A BUILDING CONSENT

Owing to Council only accepting applications with the appropriate fee, an issue has arisen with the amount of time taken in receiving/checking the applications at the counter.

To overcome this issue, Council's Building Department will stop receiving building consent applications from 4.30 pm each day.

The Building Department's counter will remain open for all other enquiries until 5.00 pm as usual.

Q. Why is the wind loading demand for a given Wind Zone so much lower than before when I was using NZS3604:1999?

A. For a given Wind Zone the NZS3604:2011 demand is indeed lower. However, the process for determining Wind Zones in accordance with NZS3604:2011 is different from the NZS3604:1999 process. It is common for Wind Zones determined using NZS3604:2011 to be one category higher than Wind Zones determined in accordance with NZS3604:1999. In other words, "H" under NZS3604:1999 could well be "VH" under NZS3604:2011. Wind Zone maps prepared by Local Authorities in accordance with NZS3604:1999 are unlikely to still comply with NZS3604:2011. Carefully check that Wind Zone determinations are in accordance with the NZS3604:2011.

Q. Why is there no provision for hip or mono-slope roofs in the GIB EzyBrace® 2011 software?

A. In the along direction the provisions in NZS3604:2011 for hi-ends and mono-pitch roofs are very conservative and not consistent with specific engineering principles. From a wind loading perspective there is no difference between a traditional equal sided triangular gable end and a triangular mono-pitch with the same roof above eaves height.

Q. Why does GIB EzyBrace® 2011 software give answers that differ from my manual calculations using the NZS3604:2011 demand tables?

A. The NZS3604:2011 tables give requirements for rounded building dimensions, eg 7.0 building height, 2.0 roof height above eaves, etc, and in addition the NZS3604:2011 tables have underlying assumptions relating to dimensions such as floor height above ground.

The GIB EzyBrace® 2011 software does not read the tables but is based on "first principles engineering" and permits entry of accurate building dimensions.

Differences can also occur because the "multiplication factors" used with the NZS3604:2011 tables have been rounded and more accurate seismic coefficients are used in the GIB EzyBrace® 2011 software.

Another common reason for differences is where NZS3064:2011 assumes the same dimensions for both storeys in a two storey building whereas the BIG EzyBrace® 2011 software permits entry of difference dimensions for lower and upper floor.

It is important to note that the GIB EzyBrace® 2011 software has been written based on first principles engineering, has been independently reviewed, and independently appraised as complying with NZS3604:2011.

Q. What is the 'annual exceedence probability' in the GIB EzyBrace® 2011 software?

A. Houses designed in accordance with NZS3604 have an assumed minimum life of 50 years and need to be designed for a 1/500 year earthquake exceedence probability (the default). However, some home owners wish to build a more robust and durable home and wish to design for a 1/1000 exceedence probability which equates to a life expectancy of 100 years. Other buildings (such as schools or medical facilities) can often be designed and constructed in accordance with NZS3604 but sometimes have to meet a different earthquake exceedence probability. This selection is now available to designers using the GIB EzyBrace® 2011 software by selecting the 'Annual Exceedance probability' button on the 'Demand' calculation sheet.

Q. I can't seem to enter 'custom elements' like I used to. Do I need a password?

A. A password is not required to operate the software. If a password warning comes up you are trying to modify a locked cell. The workbook now contains a separate 'Custom Elements' tab. Here you can enter custom elements and these will now be available for use on all resistance sheets.

Q. Why have the changes to GIB EzyBrace® 2011 been needed?

A. The changes have been made due to the updated New Zealand Standard NZS 3604:2011.

Q. Not all the changes appear to be related just to NZS 3604:2011, why?

A. Winstone Wallboards reviewed all GIB EzyBrace® systems, due to the changes to the NZS3604:2011, and decided to make some additional changes to the systems to deliver easy and efficient systems.

Q. What are the key changes to GIB EzyBrace® 2011 systems?

A.
- New GIB EzyBrace® software, that is compliant with NZS 3604:2011
- Slightly modified single fastener pattern (50/50/50/75/75/150)
- Larger-headed GIB Braceline® screws no longer required when installing BL systems
- Increased allowance for use of the new GIB® Standard in ceiling diaphragms
- Responsibly conservative bracing methodology

Q. When should the new GIB EzyBrace® 2011 systems be used?

A. The Department of Building and Housing (DBH) has cited NZS 3604:2011 as of 1st August 2011. The DBH has stated that NZS3604:1999 will still be valid until January 2012, at that time any consented plans will have a two year completion period. Any new consent applications from February 2012 will have to use NZS 3604:2011. Our recommendation is that designers should move to using GIB EzyBrace® 2011 immediately now that the DBH has cited NZS 3604:2011. The new installation requirements for GIB EzyBrace® 2011 should only be installed on plans specified with GIB EzyBrace® 2011 systems. If the plans are still specified with GIB EzyBrace® 2009 systems they should be installed using the 2009 systems.

Q. How can the GIB EzyBrace® 2009 and 2011 systems be identified?

A. To make identification easier the new GIB EzyBrace® 2011 systems have a suffix added to the system identifier as per the table below.®

JD;LKJ GIB EzyBrace® 2009	System	GIB EzyBrace® 2011
GS1	GIB ® Standard plasterboard one side	GS1-N
GS2	GIB® Standard plasterboard two sides	GS2-N
-	GIB® Standard plasterboard one side, Plywood the other	GSP-H
BL1	GIB Braceline® one side	BL1-H
BLG	GIB Braceline® one side, GIB® Standard plasterboard the other	BLG-H
BLP	GIB Braceline® one side, Plywood the other	BLP-H

Q. What do the 'N' and the 'H' refer to in the GIB EzyBrace® 2011 systems?

A. The 'N' identifies the system does not have hold-downs, the 'H' indicates the requirement of hold-downs in the system

Q. Can the GIB EzyBrace® 2011 systems be installed in plans that are specified GIB EzyBrace® 2009?

A. Winstone Wallboards recommend that systems should be installed as specified. However, if the design follows the WWB recommendation of resistance being 10% greater than demand, then the 2011 systems, with minimum GIB® Grabber® 32mm x 6g, can be used as long as all GS and BL elements are installed using the new fastener pattern.

Q. Can plans be converted to GIB EzyBrace® 2011 systems?

A. Yes, but the plan will need to be re-complied by the Building Consent Authority (BCA).

Q. Why is GIB® Grabber® branded screws the only brand 'tested and approved' in GIB EzyBrace® 2011 systems?

A. As with the 2006 and 2009 GIB EzyBrace® systems, GIB® Grabber® screws are the only brand of screw used in the Winstone Wallboards testing and hence make up the full system appraised. These are the only screw brand that Winstone Wallboards monitors the quality of and can confidently confirm the consistency of performance and that Winstone Wallboards can stand behind.

Q. What can be done if an alternate brand of screw than GIB® Grabber® is used in GIB EzyBrace® systems?

A. As only GIB® Grabber® screws have been tested and approved for use in GIB EzyBrace® systems a producer statement from the alternate supplier covering the use may be required to gain compliance.

CHANGES BEING INTRODUCED ON 1 AUGUST 2011

Department of Building and Housing
Te Tari Kaupapa Whare

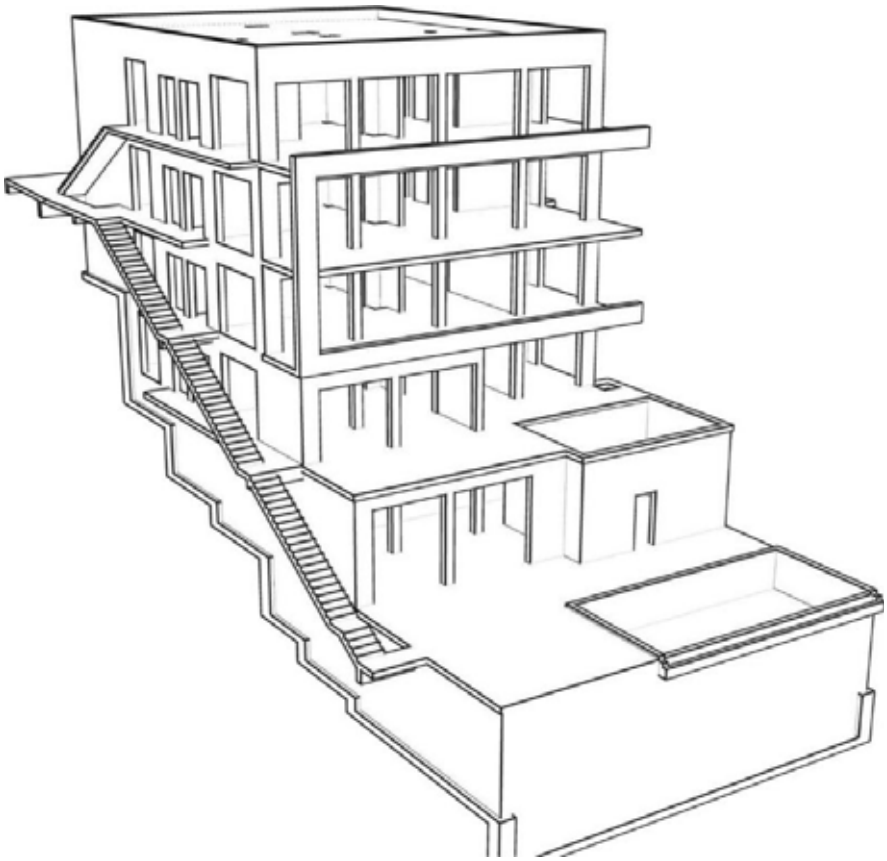
The Department is introducing changes on 1 August 2011 to key Building Code documents dealing with Structure (Code clause B1) and External Moisture (Code clause E2). The changes bring the documents in line with the latest Standards, reflect the latest studies and research, respond to changes in building practices and broaden the range of solutions available. Important documents that the majority of designers and builders use day-to-day, like NZS 3604 and Acceptable Solution E2/AS1, are affected by the changes, which address foundations, structure and the building envelope. Other documents relate to steel-framed housing, seismic performance of engineering systems in buildings, barriers, and the weather tightness of concrete and concrete masonry construction.

If you work with any of these materials or building elements, you need to be informed about these changes, and read the questions and answers about them.

The changes take effect today, on 1 August 2011, with a transition period through to 31 January 2012. During the transition period there will be two Acceptable Solutions or Verification Methods - the old document and the revised one. From 1 February 2012 only the new versions apply.

The Department is planning education on the changes during the transition period. Consultation in November 2010 to February 2011 drew broad support for the proposals. We thank all those who took the time to make submissions on the proposals, and contributed to their final development.

We urge building officials and practitioners to become familiar with the new versions of these Acceptable Solutions and Verification Methods, which can be downloaded at www.dbh.govt.nz/compliance-documents. The barrier guidance document will also be available shortly on the Department's website (www.dbh.govt.nz).



INFORMATION SHEET ON SEISMICITY CHANGES

Department of Building and Housing
Te Tari Kaupapa Whare

Information Sheet on Seismicity Changes - Structure B1/VM1, B1/AS1, B1/AS3

19 May 2011

CHANGES FOR CHRISTCHURCH SEISMICITY

The objective of Building Code clause **B1** is to:

- Safeguard people from injury caused by structural failure
- Safeguard people from loss of amenity caused by the way the structure behaves
- Protect other property from physical damage caused by structure failure.

This objective is supported by the Verification Method, **B1/VM1**, and the Acceptable Solutions **B1/AS1** and **B1/AS3**.

New knowledge about the seismic risk for Christchurch means that the Department has made immediate changes to **B1/VM1**, **B1/AS1** and **B1/AS3**, effective from 19 May 2011.

The changes affect the Canterbury Earthquake Region only. This is the area covered by the Christchurch City Council, the Selwyn District Council and the Waimakariri District Council.

CHANGES TO VERIFICATION METHOD B1/VM1 – HAZARD FACTOR FOR CHRISTCHURCH

- In the Verification Method, the hazard factor Z (which is described in **AS/NZS 1170**), for the Canterbury Earthquake Region has been increased from 0.22 to 0.3 minimum. The Verification Method references **AS/NZS 1170**, so this means that anywhere where **AS/NZS 1170** currently shows Z<0.3, the Z factor is now 0.3. Anywhere the factor is shown as >0.3, the larger factor will apply.
- The increased hazard factor only applies to all structure periods <1.5 seconds. For structure periods >1.5 seconds, the Z factor needs to be determined by special study and advice needs to be sought from a seismologist, for example GNS.
- In the Canterbury earthquake region, the risk factor for the serviceability limit state shall be taken as R_s=0.33.

CHANGES TO ACCEPTABLE SOLUTION B1/AS1

The changes affect the referencing of **NZS 3604**, **NZS 4229** and **NZS 4299** in the Acceptable Solution.

NZS 3604:1999

Outside the Canterbury earthquake region, use **NZS 3604:1999** unchanged.

Inside the Canterbury earthquake region, the following changes apply:

- A new definition of ‘good ground’ excludes ground where liquefaction and/or lateral spread could occur.
- For bracing demand, replace Section 5 of **NZS 3604:1999** with Section 5 of **NZS 3604:2011**.
- The Canterbury earthquake region shall be taken as Earthquake Zone 2.
- Piled foundation details and perimeter concrete foundation wall details are unchanged.
- All concrete slab-on-ground foundations on ‘good ground’ are to have reinforcing steel.

- All perimeter foundations must be tied to the concrete slab with reinforcing steel.
- All reinforcing is to be Ductility Class E, in accordance with **NZS 4671**.
- Minimum slab reinforcing is to be 2.27kg/m^2 welded reinforcing mesh sheets (1.15kg/m^2 in each direction) lapped 225mm.
- Once slabs exceed 24m, a free joint must be formed as required in the Standard, except that there shall be dowel bars placed to minimise the risk of differential settlement.
- Brick veneer tie requirements are to be determined from **NZS 4210** for Earthquake Zone A.
- Foundations where 'good ground' has not been established, are outside **B1/AS1** and need to be subject to specific engineering design. In particular:
  - → Where liquefaction and lateral spread up to 50mm is possible and there is perimeter ground protection, designs may be based on the Department's 'Guidance on house repairs following the Canterbury Earthquake'.
  - → Outside this, ie, where there has been severe land damage, the specific engineering design must include appropriate geotechnical investigations. These areas are defined by the Christchurch City Council, the Selwyn District Council and the Waimakariri District Council.

  (The following diagrams illustrate the options in NZS 3604:1999 that can and cannot be used).

NZS 4229:1999

Outside the Canterbury earthquake region, use **NZS 4229:1999** unchanged.

Inside the Canterbury earthquake region, use **NZS 4229** modified as follows:

- Bracing demand is to be determined as for Earthquake Zone A. Currently this is determined for Earthquake Zone B.
- For foundations on 'good ground', concrete slabs on ground are to be as for **NZS 3604:1999** as modified above.
- Foundations where 'good ground' has not been established are outside **B1/AS1**, and need to be subject to specific engineering design.

NZS 4299:1998

Outside the Canterbury earthquake region, use **NZS 4299:1998** unchanged.

Inside the Canterbury earthquake region, use **NZS 4299:1998** modified as follows:

- Bracing demand shall be determined using the earthquake zone factor >0.6.
- For foundations on good ground, concrete slabs on ground are to be as for **NZS 3604:1999** as modified above.
- Foundations where good ground has not been established are outside **B1/AS1** and need to be subject to specific engineering design.

CHANGES TO ACCEPTABLE SOLUTION B1/AS3

- Earthquake bracing units are to be determined for the Canterbury earthquake region from Table 2 for Earthquake Zone A.

Designers need to refer to the B1 documents for full details.

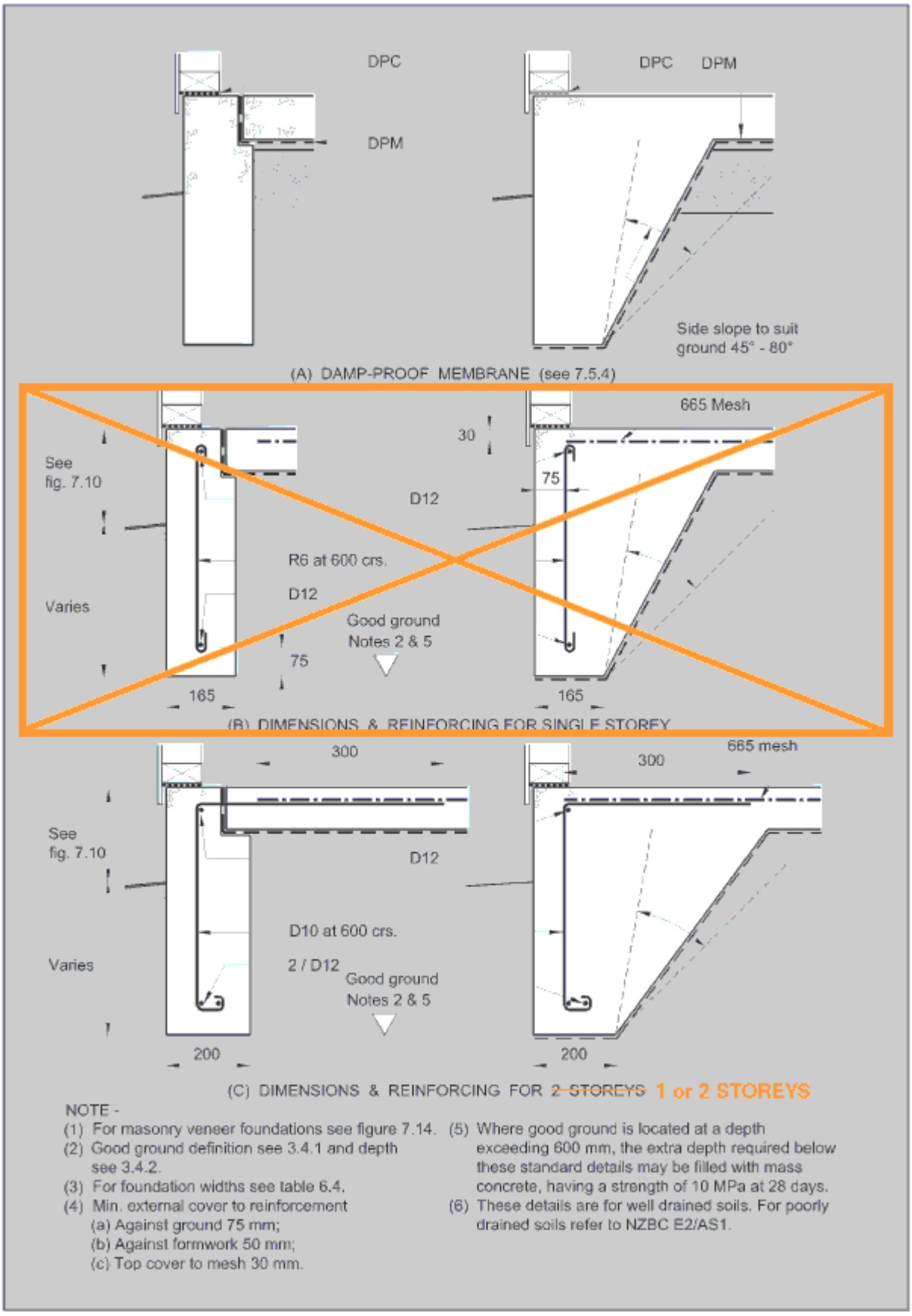


Figure 7.12 - Foundation edge details - In situ concrete (see 7.5.2.3)
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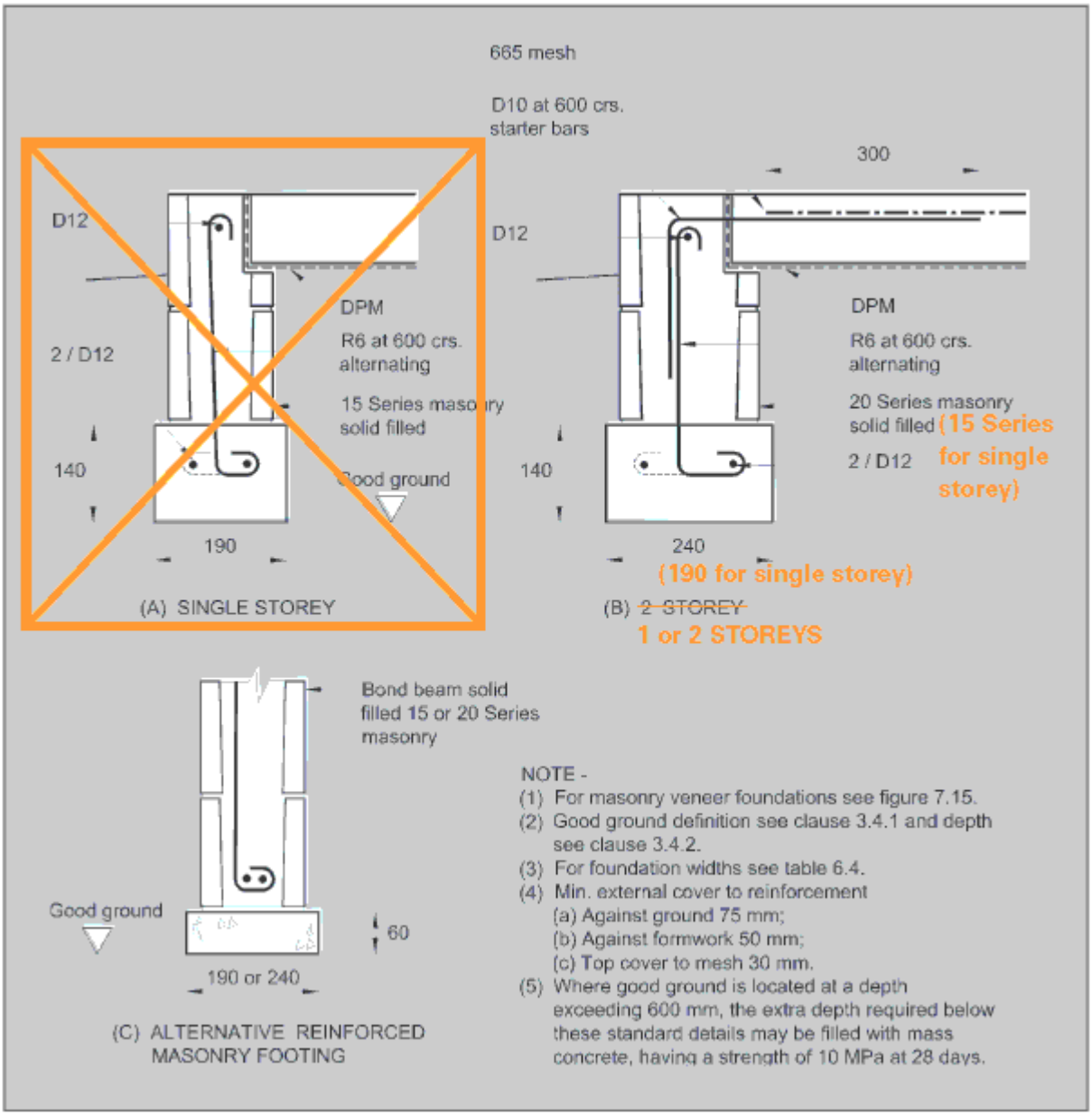

Figure 7.13 - Foundation edge details - Concrete masonry (see 7.5.2.3)

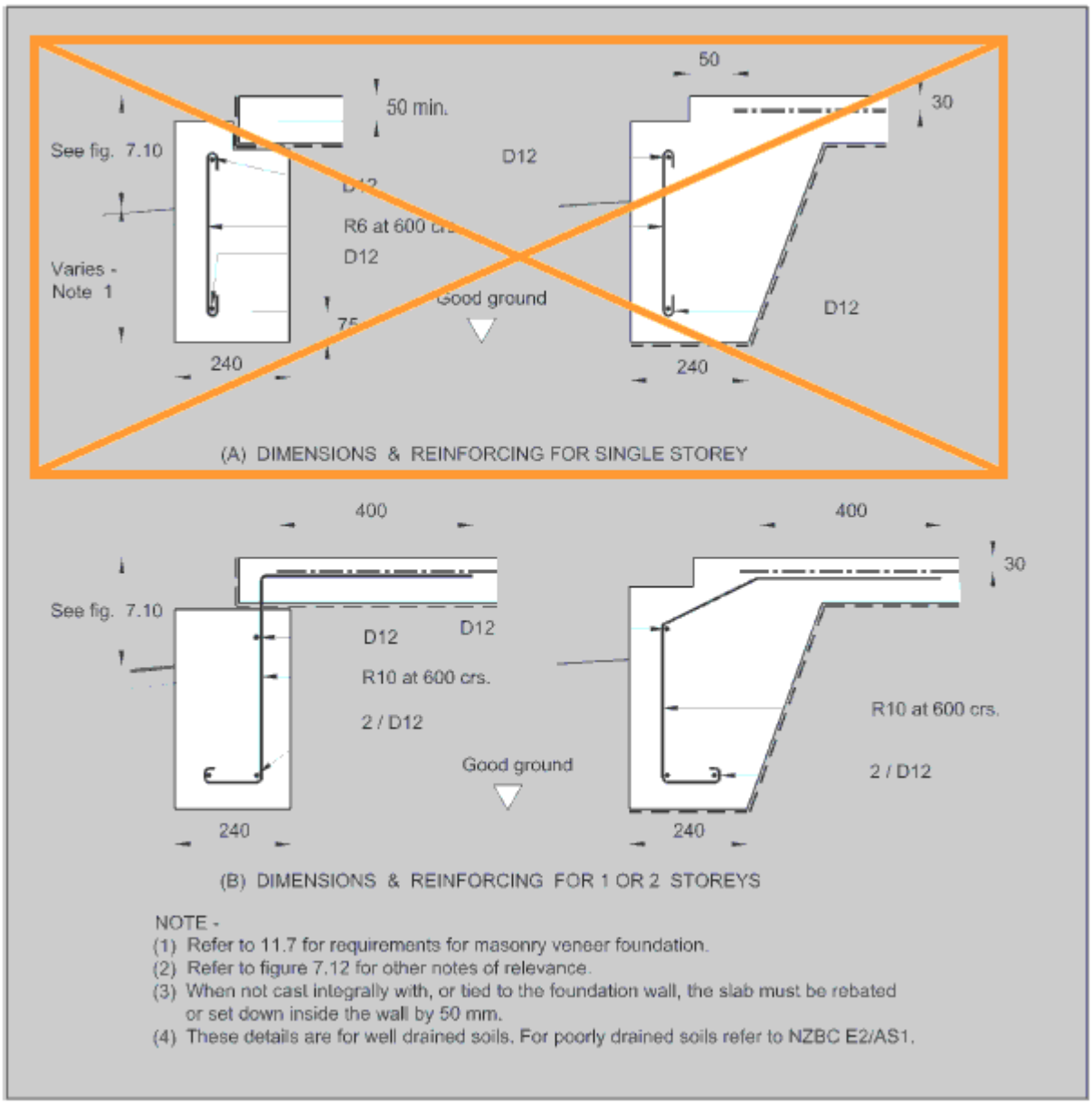

Figure 7.14 - Masonry veneer foundation edge details - In situ concrete - (see 7.5.2.3 and 11.7)

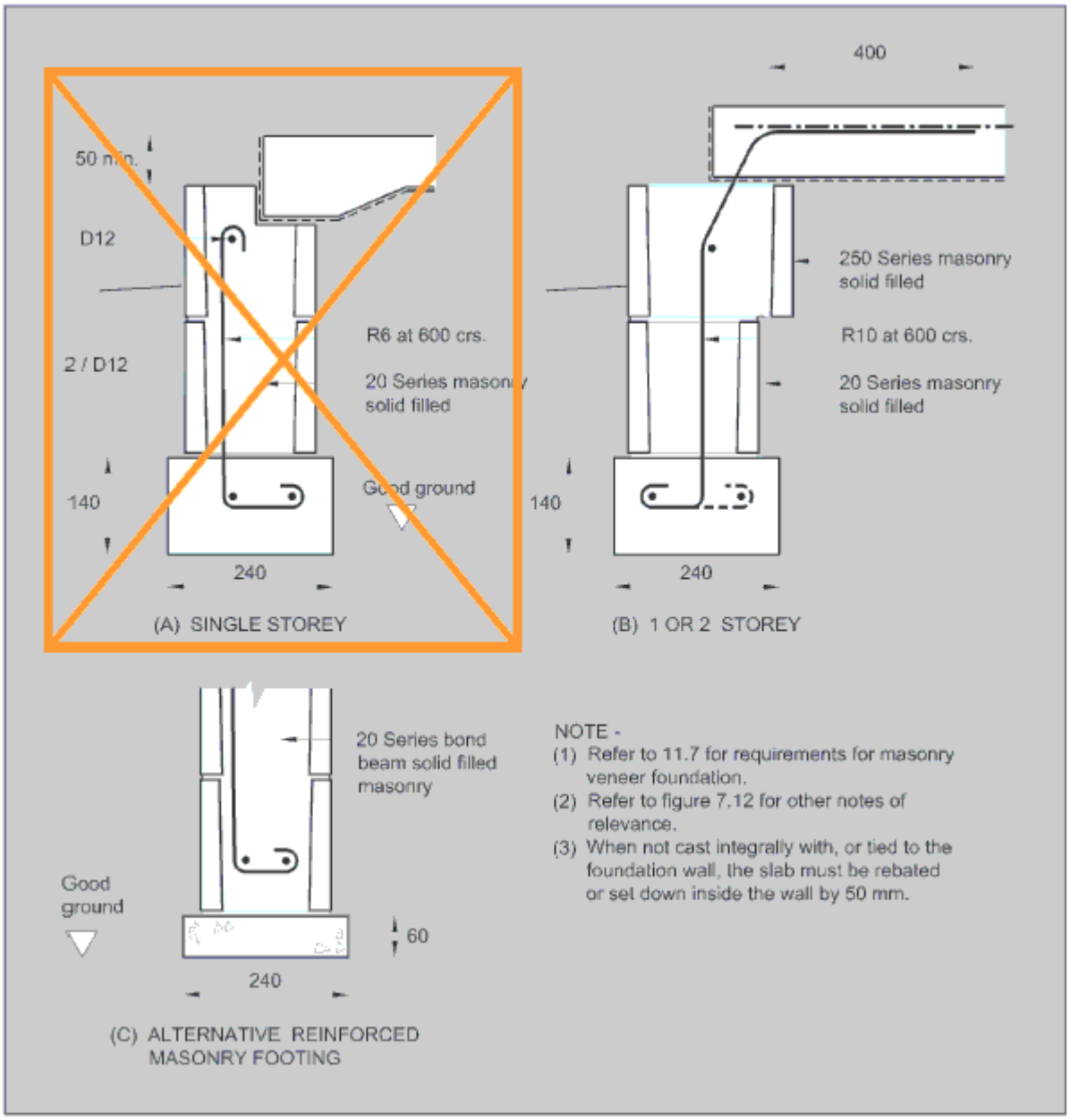

Figure 7.15 - Masonry veneer foundation edge details - Concrete masonry - (see 7.5.2.3 and 11.7)
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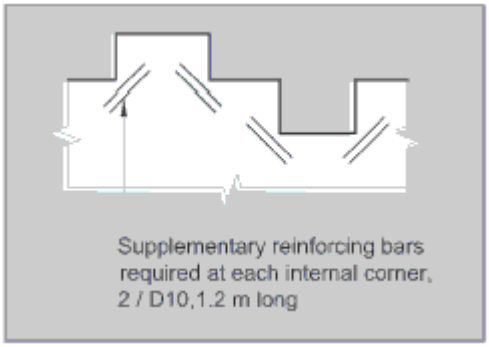

Figure 7.17 - Irregular slab (plan view) (see 7.5.8.6.2.4)
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QUESTIONS AND ANSWERS – CHANGES TO STRUCTURE AND EXTERNAL MOISTURE BUILDING CODE DOCUMENTS – 1 AUGUST 2011

Department of Building and Housing
Te Tari Kaupapa Whare

Questions and Answers - Changes to Structure and External Moisture Building Code documents (1 August 2011)

WHAT ARE THE CHANGES FOR STRUCTURE (BUILDING CODE CLAUSE B1)?

- NZS 3604 has been updated. B1/AS1 now references NZS 3604:2011 instead of the 1999 version. There are modifications. All concrete slabs must be reinforced with ductile steel and tied to perimeter foundations; you can't use unreinforced slabs anywhere in New Zealand.
- The definition of 'good ground' in the Canterbury earthquake region excludes ground subject to liquefaction or lateral spread.
- Two new documents are referenced in B1/VM1:
  - → A Standard for designing seismic restraints for equipment in earthquakes, NZS 4219:2009 - Seismic performance of engineering systems in buildings. The referencing modifies NZS 4219:2009 by increasing the seismic hazard factor for buildings in Canterbury to 0.3 minimum.
  - → A standard for light steel framing. NASH standard "Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria".
- B1/AS2, the Acceptable Solution for timber barriers, is being withdrawn. A design guide for barriers using timber, glass and metal will be published shortly.

WHAT ARE THE CHANGES FOR EXTERNAL MOISTURE (BUILDING CODE CLAUSE E2)?

- Acceptable Solution E2/AS1 has been clarified and updated to include new information.
- Verification Method E2/VM1 has been expanded.
- A new Acceptable Solution E2/AS3 for concrete and concrete masonry construction references CCANZ CP 01:2011.

ARE THERE ANY MODIFICATIONS TO NZS 3604:2011 IN THE NEW B1/AS1?

Yes.

- Modifications for the Canterbury earthquake region

  On 19 May 2011, the Department made changes to Acceptable Solution B1/AS1, which apply to the Canterbury earthquake region. These changes took effect immediately. The definition of 'good ground' was changed to exclude ground subject to liquefaction and /or lateral spread, and stronger foundations were required for that region. These modifications to the referencing of NZS 3604:1999 have been carried forward to the referencing of NZS 3604:2011.

  The changes for Canterbury were made to allow homeowners in the region to quickly progress with their repairs or rebuilding. Details on the changes for Canterbury can be found in the Department's information sheet.

- Modifications for all New Zealand for concrete slab floors and foundations

  On 1 August 2011 the Department extended the requirement for stronger foundations to the rest of New Zealand. It modified its referencing of NZS 3604:2011 to exclude unreinforced slabs. All concrete floor slabs on 'good ground' are required to have reinforcing steel mesh and all perimeter foundations are required to be tied to the concrete slab with reinforcing steel.

  This modification has been made to provide the rest of New Zealand with the same readily administered, effective and robust Acceptable Solution requirements as those already made in the Canterbury earthquake region.

WHAT IS THE PURPOSE OF THE REINFORCING MESH AND OF TYING THE PERIMETER FOUNDATION TO THE SLAB REINFORCEMENT?

The purpose of the mesh is to provide crack control, some flexural capacity to allow the slab to span local weak spots, and to provide some resistance against differential settlement by dowel action. Mesh will stop or limit the spread of a crack if it opens up. Without mesh, a crack in an unreinforced slab is likely to widen and spread across the whole slab, and differential settlement can occur, resulting in loss of amenity.

The requirement to tie the perimeter foundation to the slab reinforcement is to provide a more robust composite foundation/floor, and limit movement and damage between these elements that might occur during earthquake shaking and subsequent ground settlement/displacement.

WON'T IT COST MORE TO USE DUCTILE REINFORCING MESH, AND TO REMOVE THE OPTION FOR UNREINFORCED SLABS?

There is little cost difference between ductile and non-ductile mesh. However, there is a cost of reinforcing slabs as opposed to using unreinforced slabs. The estimated cost of about $\$14.50/m^2$ (including supply and placement) brings considerable benefits in terms of dealing with slab cracking during shrinkage and limiting damage that may result from earthquake shaking.

THE REINFORCING MESH REQUIRED IN B1/AS1 IS NOT CURRENTLY AVAILABLE IN NEW ZEALAND. HOW IS THE DEPARTMENT ADDRESSING THIS?

The reinforcing for concrete slabs-on-ground, required in the Acceptable Solution B1/AS1, is a minimum of $2.27kg/m^2$ of Grade 500E reinforcing mesh fabric which complies with AS/NZS 4671.

Currently Grade 500E reinforcing mesh fabric of this specification is not available from any of the suppliers in New Zealand. Therefore, the Department of Building and Housing has published guidance on an alternative solution for the Canterbury earthquake region to provide time for manufacturers to produce Grade 500E reinforcing mesh fabric.

The Department has amended this guidance on alternatives to ductile steel mesh, to cover the whole country and not just the Canterbury earthquake region.

The alternative solution allows for lower yield strength steel than Grade 500E to be used if an equivalent tensile capacity in the slab can be achieved. The amount of steel (kg/m^2) necessary to achieve the equivalent capacity is determined as 2.27 x 500 / Strength Grade of steel (where the strength grade of the steel is the verified lower characteristic yield strength of the steel bar in MPa). The uniform elongation A_{gt} (refer Table 2 of AS/NZS 4671) must equal or exceed 10%.

For full details consult the Department's Guidance on Reinforcement for Concrete slabs-on-ground which can be downloaded from www.dbh.govt.nz/earthquake-concrete-slabs-guidance.

WHY IS THE DEPARTMENT NOT EXTENDING TO THE REST OF NEW ZEALAND THE NEW DEFINITION OF 'GOOD GROUND' IT INTRODUCED FOR THE CANTERBURY EARTHQUAKE REGION IN MAY THIS YEAR?

The defining of 'good ground' in terms of liquefaction and/or lateral spread potential is complex and new knowledge is still being gained from the Canterbury experience. In the case of Canterbury, there was a need to take steps immediately with the best available knowledge, so that homeowners could progress with necessary repairs and rebuilding. However, the Department considers it prudent to consider this matter further on the basis of fuller learnings from Canterbury, before taking steps to address the issue of 'good ground' for the rest of the country.

In the meantime, the Department has prepared guidance for homeowners building where there may be a potential for liquefiable soils and who may choose to use foundation details which are even more robust than those provided by the Acceptable Solution. For full details consult the Department's Guidance on using NZS 3604 construction on ground with potential for liquefaction which can be downloaded from www.dbh.govt.nz/liquefaction-construction-on-ground-guidance.

ARE THERE ANY MODIFICATIONS TO NZS 4219:2009 IN THE NEW B1/VM1?
Yes. The Standard NZS 4219:2009 is referenced with modification to incorporate the new seismic hazard factor for Canterbury of 0.3 minimum. (The seismic hazard factor for the Canterbury earthquake region was increased to 0.3 minimum in B1/VM1 on 19 May 2011.) This reflects Canterbury's increased seismic risk for the next few decades. In addition, the component risk factor R_c in the Canterbury earthquake region must be taken no less than 0.33.

WHERE CAN I OBTAIN…?

- **The new versions of the Structure (B1) and External Moisture (E2) documents?**

  You can download the new versions of the B1 and E2 documents (contained in the B1 and E2 Compliance Documents) from the Department's website at: www.dbh.govt.nz/compliance-documents.

- **Copies of NZS 3604:2011 or NZS 4219:2009?**

  Copies can be purchased from Standards New Zealand through its website: www.standards.co.nz.

- **Copy of the CCANZ Code of Practice for weathertight concrete and concrete masonry construction (CP 01:2011)?**

  Copies of the Code of Practice for Weathertight Concrete and Concrete Masonry Construction can be downloaded (or hardcopies purchased) from the CCANZ website: www.ccanz.org.nz .

- **Copy of the NASH standard "Residential and Low-Rise Steel Framing Part 1 2010 Design Criteria?**

  Copies can be purchased from NASH through its website: www.nashnz.org.nz.

GUIDANCE ON REINFORCEMENT FOR CONCRETE SLABS-ON-GROUND

Department of Building and Housing
Te Tari Kaupapa Whare

Guidance on Reinforcement for Concrete Slabs-on-ground

This document is issued as guidance under Section 175 of the Building Act.

BACKGROUND

The recent changes to the B1 Compliance Document require that concrete slabs-on-ground constructed in accordance with NZS 3604:2011 on good ground be reinforced with a minimum of 2.27 kg/m2 of Grade 500E reinforcing mesh fabric which conforms with AS/NZS 4671.

ISSUE

Currently Grade 500E reinforcing mesh fabric of this specification is not available from any of the suppliers in New Zealand.

INTERIM SOLUTION

The Department has considered wire mesh product currently available in New Zealand. Grade 500E mesh fully complying with AS/NZS 4671 is not yet available. Yield strengths are lower than 500 MPa and elongations are less than the 15% required for Grade 300E bar.

Therefore, to comply with the Building Code using an alternative solution as the means of compliance, reinforcing bars would need to be used (refer to Satisfactory Alternative Solutions using reinforcing bars).

However, the Department is issuing guidance under section 175 of the Building Act, advising that the option which follows provides an alternative solution using an equivalent capacity mesh as an interim measure.

It is the Department's understanding that manufacturers will have Grade 500E reinforcing mesh fully compliant with AS/NZS 4671 available from October 2011.

SATISFACTORY ALTERNATIVE SOLUTION: EQUIVALENT CAPACITY MESH

The steel properties of the mesh need to comply with the requirements of AS/NZS 4671, except that lower yield strength steel than that required for Grade 500E can be used, provided that an equivalent capacity in the slab can be achieved.

- The amount of steel (kg/m2) necessary to achieve the equivalent capacity is determined as: 2.27 x 500 divided by the Strength Grade of steel (where the strength grade of the steel is the verified lower characteristic yield strength of the steel bar in MPa).
- The uniform elongation A^{gt} (refer Table 2 of AS/NZS 4671) must equal or exceed 10%.
- Properties are to be determined in accordance with Appendix C of AS/NZS 4671. Testing shall be carried out by independent qualified testing organisations and evidence shall be presented to Building Consent Authorities and to others on request. Extensometer measurement taken across the necked portion of the test specimen shall be ignored.
- Reinforcing mesh fabric laps need to be a minimum of one grid wire spacing plus 50mm but not less than 150mm. Where deformed mesh wire with no cross wires is lapped with another sheet also with no cross wires, or where reinforcing bars are used, a lap length of 40 wire diameters or reinforcing bar diameters will be required.
- Reinforcement must be supported on chairs to ensure reinforcement position and 30mm top cover is maintained.
- Mesh shall be suitably identified to confirm conformance with these requirements.

SATIFACTORY ALTERNATIVE SOLUTIONS USING REINFORCING BARS

Reinforce the slab using either:

- Grade 300E - DI0 reinforcing steel bars (conforming with AS/NZS 4671) at 300mm centres each way with 30mm top cover, or
- Grade 300E - D12 reinforcing steel bars (conforming to AS/NZS 4671) at 450mm centres each way with 30mm top cover.

Published in August 2011 by

Department of Building and Housing
PO Box 10-729, Wellington, New Zealand.

GUIDANCE ON USING NZS3604 CONSTRUCTION ON GROUND WITH POTENTIAL FOR LIQUEFACTION

Department of Building and Housing
Te Tari Kaupapa Whare

BACKGROUND

The latest version, NZS 3604:2011, was published by Standards New Zealand in February 2011, and is now referenced, with some modifications about reinforcing concrete slabs on ground and foundations, as an Acceptable Solution (B1/AS1) in the B1 Structure Compliance Document. With the modifications, the construction details in NZS 3604:2011, are suitable where there is "good ground" as defined in that Standard.

The referencing of NZS 3604:2011 with modifications as an Acceptable Solution applies to all regions in New Zealand. The modification to the definition of good ground made for the Canterbury Earthquake Region (to exclude ground subject to liquefaction or lateral spread) still applies, but only to that region.

It is clear that the issue of amending the definition of good ground to include consideration of potential loss of structural support due to liquefaction or lateral spread is both complex and not sufficiently well defined to incorporate in the B1 Compliance Document for the whole country at this point in time.

There is considerable work to be done to: properly specify the performance requirements expected; the conditions under which they apply; how to assess those conditions in a practical and cost effective manner; and to provide cost effective construction solutions. Lessons are still being learnt from Christchurch, and work needs to be done with other Councils to provide some certainty, so that individual engineering investigations are not required for every property.

The Department is researching this, and will develop proposals that would provide robust and effective support for an amended definition of good ground in locations other than the Canterbury Earthquake region and will consult on these proposals.

In the interim, the Department is issuing the following guidance.

GUIDANCE

The Department recommends to building designers and property owners that where the ground they are building on has potential for liquefaction and/or lateral spread, they seek advice from a chartered professional engineer about using foundation details that provide enhanced performance over those in NZS 3604:2011 (including as it is modified in B1/AS1).

Ground with a potential for liquefaction and/or lateral spread may already have been identified by the Territorial Authority or Regional Council, and may be identified on the LIM (Land Information Memorandum) for the property.

The Department also recommends to Building Consent Authorities that they advise building designers and owners to seek advice from a chartered professional engineer if the property is situated in an identified liquefaction hazard zone on a regional hazard map.

There is potential for liquefaction and/or lateral spread when all of the following conditions occur:

- Loose non-cohesive saturated soils that lose a large percentage of their shear resistance under seismic shaking (loose fine sands and many loose silt-sand mixtures), and
- Ground saturation – where the liquefaction susceptible material lies below the ground-water table, and
- Sufficient shaking to trigger liquefaction (the level of seismic shaking to trigger liquefaction can vary significantly from site to site).

Where there is the potential for minor liquefaction, and provided anticipated lateral spreading across the property is limited to 50mm maximum, chartered professional engineers may advise the use of

enhanced house foundations based on the Department's 'Guidance on house repairs and reconstruction following the Canterbury Earthquake', published in December 2010 (available from http://www.dbh.govt.nz/earthquake-reconstruction-guidance).

Following the on-going Canterbury earthquake sequence, and particularly the damaging 22 February 2011 Christchurch earthquake, the Department is reviewing the house repair and reconstruction guidance document. The enhanced raft slab options without deep piles are not appropriate on land where there is the possibility of significant settlement during liquefaction. This is likely to occur in areas where the crust (the depth between the ground surface and the water table) is thin, generally occurring in low-lying coastal and estuarine areas.

In areas with major liquefaction potential (lateral spread exceeding the 50mm limit or where there is likely to be significant overall settlement from liquefaction), site specific geotechnical investigations and specific engineering designs using chartered professional engineers are strongly advised.

Designers should refer to the B1/AS1 Acceptable Solution for Structure for full details of the modifications to NZS 3604:2011.

Further information about liquefaction may be found at http://www.nzgs.org/wp-content/uploads/GeoEarthquakeEngineer.pdf (NZ Geotech Society guidelines)

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Department of Building and Housing
PO Box 10-729, Wellington, New Zealand.

INVERCARGILL CITY COUNCIL'S APPROACH TO AREAS WITH POTENTIAL LIQUEFACTION

Invercargill City Council has maps available showing areas of potential liquefaction.

Designers should check those maps and if the proposed building is to be constructed in areas of potential liquefaction the following approach is to be taken.

All foundations slabs-on-ground, services eg drains to the building and driveways are to be designed by a chartered professional engineer.

Please note that the Department of Building and Housing has issued guidance on using NZS3604:2011 construction on ground with potential liquefaction. This guidance is included in this news sheet.

Liquefaction
The recent sequence of earthquakes and aftershocks in the Christchurch area has highlighted a phenomenon that previously has had a very low public profile. Now, 'liquefaction' is visible. Its effects in Christchurch are extensive and have resulted in significant damage to property, buildings and infrastructure, not to mention creating a widespread mess. Silt, sand and water bubbled up in people's backyards, in streets and parks and even through the concrete floors of buildings. Some refer to the sand and silt as liquefaction, but that is not correct. The soil at the surface is a result of liquefaction.

What is liquefaction and why does it occur?
Liquefaction is the process that leads to a soil suddenly losing strength, most commonly as a result of ground shaking during a large earthquake. Not all soils however, will liquefy in an earthquake. The following are particular features of soils that potentially can liquefy:

- They are sands and silts and quite loose in the ground. Such soils do not stick together the way clay soils do.
- They are below the water table, so all the space between the grains of sand and silt are filled with water. Dry soils above the water table won't liquefy.

When an earthquake occurs the shaking is so rapid and violent that the sand and silt grains try to compress the spaces filled with water, but the water pushes back and pressure builds up until the grains 'float' in the water. Once that happens the soil loses its strength – it has liquefied. Soil that was once solid now behaves like a fluid.

What happens next?
Liquefied soil, like water, cannot support the weight of whatever is lying above it – be it the surface layers of dry soil or the concrete floors of buildings. The liquefied soil under that weight is forced into any cracks and crevasses it can find, including those in the dry soil above, or the cracks between concrete slabs. It flows out onto the surface as boils, sand volcanoes and rivers of silt. In some cases the liquefied soil flowing up a crack can erode and widen the crack to a size big enough to accommodate a car.

Some other consequences of the soil liquefying are:

- Settlement of the ground surface due to the loss of soil from underground.
- Loss of support to building foundations.
- Floating of manholes, buried tanks and pipes in the liquefied soil - but only if the tanks and pipes are mostly empty.
- Near streams and rivers, the dry surface soil layers can slide sideways on the liquefied soil towards the streams. This is called lateral spreading and can severely damage a building. It typically results in long tears and rips in the ground surface that look like a classic fault line.

Not all of a building's foundations might be affected by liquefaction. The affected part may subside (settle) or be pulled sideways by lateral spreading, which can severely damage the building. Buried services such as sewer pipes can be damaged as they are warped by lateral spreading, ground settlement or floatation. Fact sheets compiled and distributed by the Institution of Professional Engineers of New Zealand 6

After the Earthquake
After the earthquake shaking has ceased, and liquefaction effects have diminished (which may take several hours), the permanent effects include:

- Lowering of ground levels where liquefaction and soil ejection has occurred. Ground lowering may be sufficient to make the surface close to or below the water table, creating ponds.
- Disruption of ground due to lateral spreading.

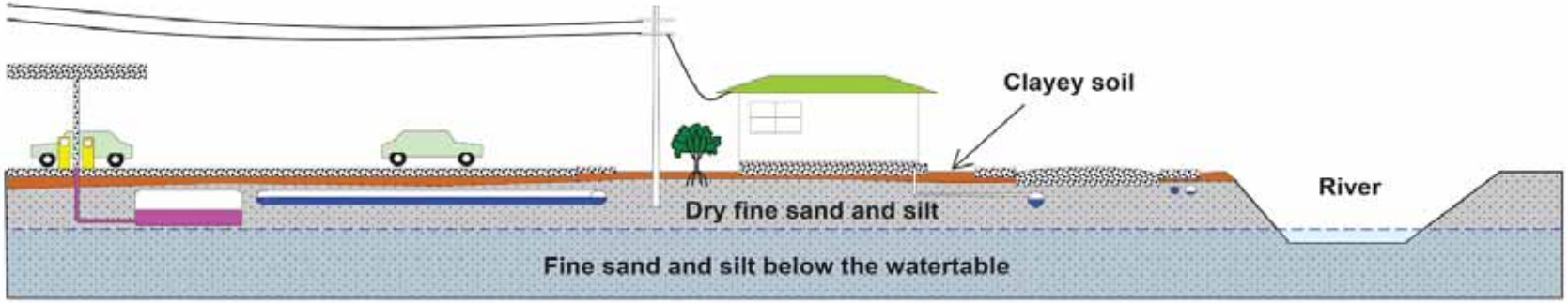
The liquefied soil that is not ejected onto the ground surface re-densifies and regains strength, in some cases re-densified soil is stronger than before the earthquake. Careful engineering evaluation is required to determine whether ground that has suffered liquefaction can be redeveloped.

Prepared with the assistance of Members of the New Zealand Geotechnical Society • 4 March 2011

Liquefaction and its Effects

Before the Earthquake

Areas of flat, low lying land with groundwater only a few metres below the surface, can support buildings and roads, buried pipes, cables and tanks under normal conditions.



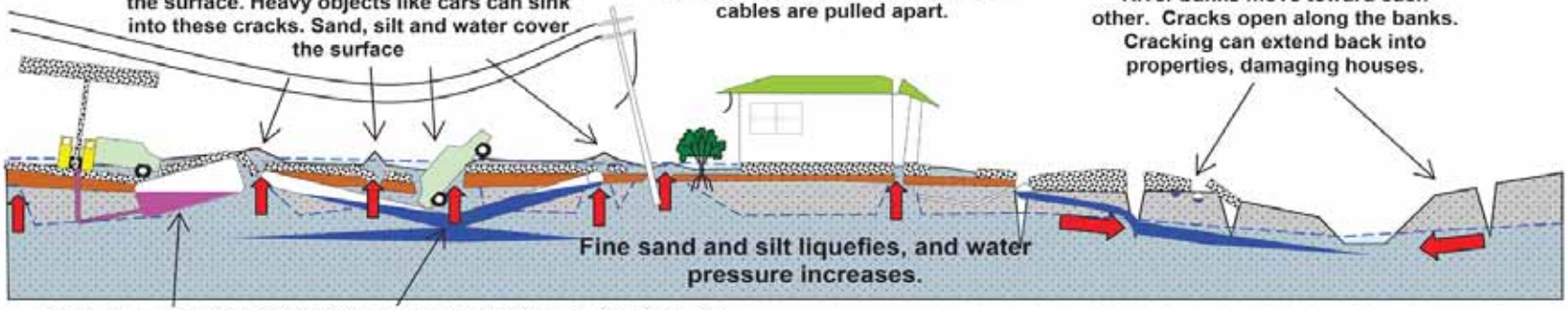
During and after the Earthquake

During the earthquake fine sand, silt and water moves up under pressure through cracks and other weak areas to erupt onto the ground surface. Near rivers the pressure is relieved to the side as the ground moves sideways into the river channels.

Sand Boils (Sand Volcanoes)
Sand, silt and water erupts upward under pressure through cracks and flows out onto the surface. Heavy objects like cars can sink into these cracks. Sand, silt and water cover the surface

Power poles are pulled over by their wires as they can't be supported in the liquefied ground. Underground cables are pulled apart.

Lateral Spreading
River banks move toward each other. Cracks open along the banks. Cracking can extend back into properties, damaging houses.



Tanks, pipes and manholes float up in the liquefied ground and break through the surface. Pipes break, water and sewage leaks into the

PRYDA STREN – JOIST INFORMATION

Invercargill City Council has received the following information from Pryda for a product that will re-instate the integrity of the joists which have been penetrated by holes greater than the joist depth as required by NZS3604:2011 Clause 7.1.7.

Product Update

pryda

February 2011

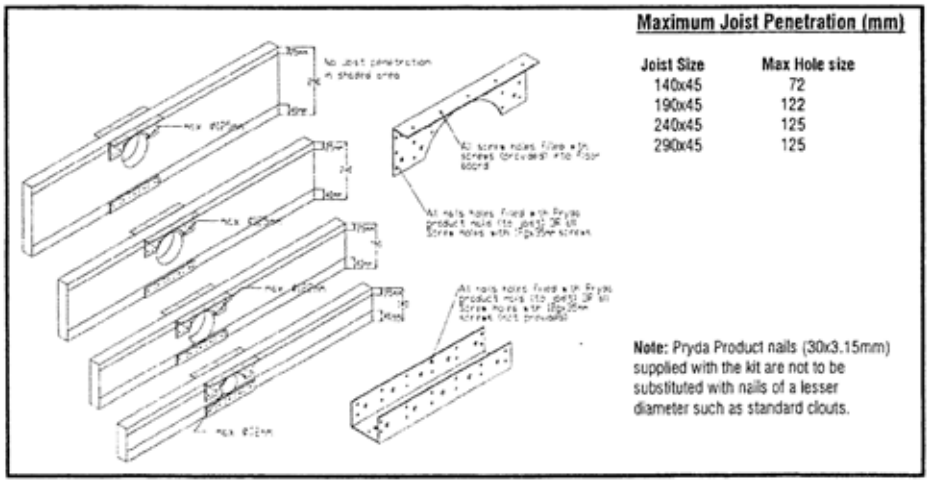
Pryda Stren-Joist

The Pryda Stren-Joist has been designed to allow holes to be cut in floor joists to enable pipes, wiring or other services to be passed through the joist. The fitting of a Pryda Stren-Joist re-instates the integrity of the penetrated joist.

Advantages:

- Quick and easy to install
- Fixing option of either nailing or screwing. Note—Fixing to the flooring must be done with screws provided. All other holes can use either nails or screws
- Can be retro-fitted. There is no requirement to remove services to fit the Stren-Joist
- Comes in one size, designed to fit 140—290mm joists
- Allows an easy solution to fix penetrations in floor joists made by other trades
- Timber grade can be MSG8 or better
- The edge of the penetration shall be at least the joist depth from the end of the joist
- All components are available in a single kit - **Pryda Code NPSJ**

Each kit contains: 1 x 'U' channel, 2 x arched angles, 1 x 500gm of Pryda Product Nails and 10 /8g x 20mm screws. (If the hex screw fixing option is used then 30 /12g x 35mm hex head type #17 galvanised screws are required. Not supplied)



Maximum Joist Penetration (mm)

Joist Size	Max Hole size
140x45	72
190x45	122
240x45	125
290x45	125

Note: Pryda Product nails (30x3.15mm) supplied with the kit are not to be substituted with nails of a lesser diameter such as standard clouts.

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Producer Statement

pryda

March 2011

Pryda Stren-Joist

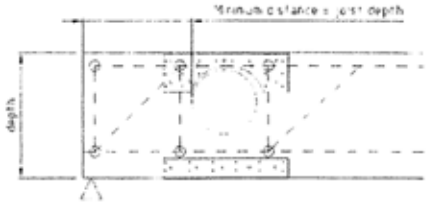
This Producer Statement is issued by Pryda NZ to cover the use and installation of the Pryda Stren-Joist for both structural application and durability as required by the New Zealand Building Code clauses B1 & B2 respectively.

DESCRIPTION

The Pryda Stren-Joist is manufactured from Z275 1.6mm thick galvanised coil. Each kit contains: 1 x 'U' channel, 2 x arched angles, 1 x 500gm of Pryda Product Nails and 10 /8g x 20mm screws. (If the hex screw fixing option is used then 30 /12g x 35mm hex head type #17 galvanised screws are required. Not supplied). The product can be retrofitted after the hole has been cut in the joist.

APPLICATION

The Pryda Stren-Joist is intended to reinstate the structural integrity of joist that has suffered service holes after erection. The hole can be made in any position along the span of the joist provided that the hole edge is not closer than one joist depth from the end supports of the joist.



INSTALLATION

The Pryda Stren-Joist retrofit installation is self-evident and normal good building practice is assumed during installation. The product is suitable for the all joist sizes between 140 x 45 to 290 x 45 but is not suitable for 90 x 45 joist.

STRUCTURAL INTEGRITY AND STRENGTH

The installed Pryda Stren-Joist will reinstate the strength joist in the vicinity of the service hole and this is calculated using the verification methods in accordance with the NZBC standards including NZS3603:1993.

DURABILITY

The durability of the Pryda Stren-Joist is in accordance with the acceptable solutions contained in Table 4.1 of NZS3604:2011 and is intended for internal "closed spaces". It is not suitable where this table specifies 304 stainless steel products.

A C van Blerk B Sc (Eng). (Civil), MIPENZ (214689) CPEng IntPE.
ENGINEER - PRYDA TIMBER CONNECTORS

Pryda New Zealand | A Division of ITW New Zealand Ltd
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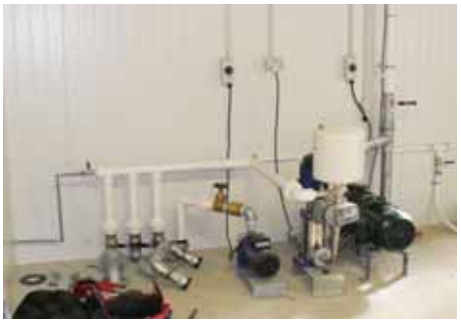
Website: www.pryda.co.nz

RURAL SANITARY PLUMBING AND DRAINLAYING

The New Zealand dairy industry is the world's eighth largest milk producer, accounting for approximately 2.2% of the world's production. The effective supply of water and removal of waste water are critical elements in the sector's productivity.

A number of licensed tradespeople and consent authorities have recently approached the Board enquiring whether it's necessary that people working on water supplies or undertaking drainage in the dairy industry be authorised by the Board to do so. As a result, we felt it timely to clarify the legal requirements under the Act here…

Sanitary plumbing, as defined in the Act, includes any work undertaken within a legal boundary, which involves the fixing or unfixing of pipework for the supply of water to any sanitary fixture or appliance for whatever purpose. Sanitary plumbing also involves the removal of waste via wastepipes or soil pipes to the exterior of a building.



In order to determine if the work to be undertaken is considered sanitary plumbing under the Act it's important to ascertain, in the first instance, if the water supplies are intended to supply any sanitary fixtures or appliances.

On farms there are often complex and extensive water reticulation systems. Nonetheless, if water is supplied to a sanitary appliance or fixture regardless of whether or not the water is potable water, hot or cold, it should be regarded as sanitary plumbing and meet Building Code compliance.

For example, a dairy shed may have a single supply, if that supply also supplies the plant and equipment and a kitchen, or toilet then the work is sanitary plumbing. However, if the supply only supplies the plant and equipment (wash down, heat exchanger) and is a separate supply from the reticulated supply (that being a separate supply or isolated by means of a testable backflow prevention device or registered air gap), it is not considered sanitary plumbing.

Drainlaying, as defined in the Act, includes any work involving the installation, alteration or repairs of a drain, including the fixing or unfixing of a drain to an onsite wastewater system (ie septic tank) or any trap. Drains are considered in the Act to be a pipe or series of pipes constructed or laid for the conveyance of foul water, stormwater or industrial liquid waste. Drainlaying starts from the exterior of the building and finishes at an approved on-site wastewater system within the boundary or at an approved outfall at the boundary.

In the Board's June Info Brief we overviewed on-site wastewater systems (OWS). Like sanitary plumbing, this area of work, when undertaken within the confines of a legal boundary, is also considered restricted work and can only be undertaken by persons authorised by the Board.

Any work involving the installation of drains from yards or dairy sheds is considered drainlaying and therefore can only be undertaken by a person authorised by the Board.

In summary, it is illegal for any work considered to be sanitary plumbing or drainlaying under the Act to be undertaken by anyone not authorised by the Board.

Article reproduced from Plumbers, Gasfitters and Drainlayers Board - August Info Brief

QUIZ ON ARTICLES IN THIS NEWS SHEET

1. Wind maps proposed by local authorities under NZS3604:1999 are now unlikely to comply with wind zones under the new NZS3604:2011.

   a. True
   b. False

2. GIB EzyBrace® 2011 software has been written based on principles engineering.

   a. True
   b. False

3. NZS3604:1999 is still able to be used until what date?

   a. September 2011
   b. December 2011
   c. January 2012

4. GIB recommends that GIB EzyBrace® 2011 should be used immediately.

   a. True
   b. False

5. The new GIB EzyBrace® 2011 uses the letter N or H after bracing element type eg GSI – N. The N means that the system does not have hold downs.

   a. True
   b. False

6. The H means that the system has a requirement for hold downs.

   a. True
   b. False

7. GIB® Grabber® branded screws must be used when installing GIB® bracing systems.

   a. True
   b. False

8. The changes to B1 and E2 **all** came into effect on 1 August 2011. There is no transition period.

   a. True
   b. False

9. The Canterbury earthquake region is now Earthquake Zone ___.

   a. 1
   b. 2
   c. 3

10. In the Canterbury region, brick veneer requirements are determined from NZS4210 for Earthquake Zone A.

    a. True
    b. False

11. Reinforcing mesh in a slab on ground is to provide _____ control, some flexural capacity to allow the slab to span local weak spots and to provide some resistance against differential settlement by dowel control.

    a. crack
    b. seismic
    c. local

12. Reinforcing mesh must be lapped ____mm both ways.

    a. 100mm
    b. 150mm
    c. 225mm

13. Reinforcing mesh in a slab must be tied to the perimeter foundation.

    a. True
    b. False

14. Designers should refer to B1/AS1 acceptable solution for structure for **full** details of the modifications to NZS3604:2011.

    a. True
    b. False

Questions 15 to 26 relate to Pryda Sten-Joist.

15. The Pryda Sten-Joist is suitable for all sizes of joists including a 90 x 45 mm joist.
    a. Tue
    b. False

16. Pryda Stren-Joist is intended for internal closed spaces.
    a. True
    b. False

17. Pryda product nails (supplied with the Pryda Stren-Joist kit cannot be substituted with nails of a lesser diameter such as standard clouts.

    a. True
    b. False

18. The maximum size of a hole in a 140 x 45 mm joist is.
    a. 32 mm
    b. 50 mm
    c. 72 mm

19. The maximum size of a hole in a 190 x 45 mm joist is.

    a. 72 mm
    b. 140 mm
    c. 122 mm

20. Fixing to the flooring must be nails.

    a. True
    b. False

21. Timber grade of joists must be MSG __ or better.

    a. 6
    b. 8
    c. 10

22. The maximum size of a hole in a 240 x 44 mm joist is

    a. 72 mm
    b. 122 mm
    c. 125 mm

23. The maximum size of a hole in a 290 x 45 mm joist is

    a. 72 mm
    b. 122 mm
    c. 125 mm

24. The edge of any hole must be at least the depth of the joist from the end of the joist.

    a. True
    b. False

25. Hex screws can be substituted for nails.

    a. True
    b. False

26. The size of the hex screws is 30/12 g x ___mm hex head type 17 galvanised screws.

    a. 15 mm
    b. 25 mm
    c. 35 mm

ANSWERS TO QUIZ

1	a	14	a
2	a	15	b
3	c	16	a
4	a	17	a
5	a	18	c
6	a	19	c
7	a	20	b
8	b	21	b
9	b	22	c
10	a	23	c
11	a	24	a
12	c	25	a
13	a	26	c