# Guideline

November 2015

Welcome to this update on technical and informative advice for the building and construction industry on issues relating to building controls and good construction practices.

**In this issue:** BRANZ CPD – Detail, Science, Build seminar • Securing aluminium windows through the reveal • Carports • Foundation reinforcing bars • Installing timber boards and wood-based panelling • Materials compatibility • Roof insulation – material thicknesses • Concrete slab shrinkage • Nailing timber weatherboards • Specifying flexible wall underlays • BRANZ Good Repair Guides – special Christmas offer • Detail, Science, Build seminar – dates and locations

## BRANZ CPD – Detail, Science, Build seminar

Don't miss out

Final dates and locations and online registration for the 1–4 pm seminars are available here and at the end of this *Guideline*.

## Securing aluminium windows through the reveal

Fixing requirements

E2/AS1 clause 9.1.10.8 gives the fixing requirements for installing an aluminium window into a timber-framed rough opening where the fixing is through the reveal. However, the wording of the clause is ambiguous as it states 'fixings shall be pairs of nails or screws'.

A 1200 x 1200 mm window, if nailed in accordance with E2/AS1, would have 24/75 x 3.15 mm galvanised jolthead nails, which gives a design strength in shear of 12 kN. Calculations by BRANZ's engineers show that 12/8 g x 65 mm screws would a have design strength in shear of 11.8 kN – in essence, the same capacity. Therefore, it is logical to use 1/8 g x 65 mm screw in lieu of 2/75 x 3.15 mm galvanised jolthead nails.

## Carports

Design requirements

Carports are defined as buildings without walls and as such are not covered by NZS 3604:2011. All carports, even those attached to an existing building, will need to be specifically designed to resist wind (particularly uplift) and earthquake loads.

## Foundation reinforcing bars

Which grade steel?

A question from a BRANZ Detail, Science, Build seminar was 'Must grade 500E steel be used for the D12 bars in the foundation wall?' The answer is no – grade 300E D12 and D16 bars for foundations designed to NZS 3604:2011 are acceptable.

B1/AS1 Amendment 11 requires ductility class E reinforcing steel to be used for the slab reinforcing. For mesh, it shall be a minimum of 2.27 kg/$m^2$ welded reinforcing mesh sheets (1.14 kg/$m^2$ in each direction).

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**Installing timber boards and wood-based panelling**
Moisture content is key

Two key actions are required before installing internal timber board linings or wood-based panelling.

The first is to check that the moisture content of timber framing is at or below the required level. NZS 3602:2003 *Timber and wood-based products for use in building* requires an in-service moisture level of 16% or less, but check what the manufacturer requires – a lower moisture content may be stipulated.

The second is to allow the panels time to acclimatise or condition to the moisture levels in the space. Wood-based panelling and timber strip linings typically have a lower moisture content when delivered than that expected after the panels are installed. Immediately fixing panelling after delivery is likely to result in expansion of the panelling and may cause buckling.

Conditioning involves storing the panelling or timber boards in the room they are to be installed in for enough time to allow the moisture content to equalise with the building space. Strip-stack the panelling or boards and take moisture readings at regular intervals until moisture contents match. Then the material can be installed. Conditioning should not be done while concrete slabs are still drying out as moisture from the concrete will be absorbed in the timber.

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**Materials compatibility**
Avoiding damage

Materials used in construction need to be selected so that the performance of one will not be adversely affected by an adjacent material. Typically, compatibility becomes an issue where materials are used in direct contact with each other. Here are some examples:

- A steel fixing can corrode in damp timber that has been treated with a copper-based treatment. (For copper azole and copper quaternary H3.2 timber treatments, hot-dip galvanised fixings will also corrode in damp timber.)
- Run-off from one material can affect the material below. Acidic cedar extractives leached out by rain running down a wall or roof can corrode unprotected aluminium/zinc-coated or galvanised steel, for instance.

Guidance on the compatibility of materials is given in:

- E2/AS1 Tables 21 and 22
- BRANZ Bulletin 519 *Fasteners selection*
- NZS 3604:2011 Section 4 Durability
- BRANZ Bulletin 575 *Timber treatment*.

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**Roof insulation - material thicknesses**
Clearance required

For roofs, check that the insulation material being specified will fit in the space available. An increase in roof member size may be required to be able to install the required level of insulation.

A 25 mm minimum clearance must be provided and maintained between the insulation material and:

- a roof underlay
- a sheet substrate supporting a membrane or asphalt shingle roofing system.

The gap must be maintained over the life of the building and must take account of any lofting (increase in thickness) that may occur in some insulation materials after installation.

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**Concrete slab shrinkage**

Avoiding damage

Concrete shrinks as it dries. About 50% of the shrinkage happens within the first 4 months after placing, but concrete will continue to shrink for at least 12 months, depending on drying conditions. Often, insufficient time is allowed in construction programmes for concrete to cure sufficiently before finishes that are intolerant of shrinkage movement such as tiles are laid.

A floor slab is restrained by the ground on which it is built by friction and by the keying effect of various foundations. When the shrinkage is restrained, the slab goes into tension, and cracking can occur at a weak point, such as an internal corner. The bigger the slab, the more shrinkage and the more restraint. Reinforcement helps, but only so far.

Shrinkage damage to conventionally reinforced floor slabs can be controlled by observing maximum slab and bay sizes using concrete slab shrinkage control joints and free joints. These features minimise the potential for cracking and control where cracking will occur. It is also important to use correct mixing ratios and to control mix properties (particularly slump) to minimise shrinkage as well as properly curing (see BRANZ Bulletin 382 *Curing concrete*) the slab once laid.

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**Nailing timber weatherboards**

Know the fixing requirements

The nailing requirements for timber weatherboards such as fixing types, framing penetration and fixing location are given in E2/AS1 (E2/AS1 does not cover screw fixing). All nail and screw-fixed timber weatherboards require a single fixing at each stud with the fixing located 10 mm above the lap of the board below.

For rusticated profile boards, there should always be a 2 mm gap between the boards to allow for movement, and successive boards must not be fitted tight to the preceding board.

For proprietary systems, such as those using concealed fixings, the manufacturer's instructions must be followed.

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**Specifying flexible wall underlays**

What to consider

Designers need to specify the particular wall underlay that is to be used. Before making a final selection designers should:

- read the manufacturer's technical literature and any independent product appraisal and be satisfied that the product selected is suitable for the situation it is being used in
- determine the maximum time the product can be exposed to the weather and whether this is likely to be achieved on site – if exposure times are exceeded, product warranties may be voided

- check for any specific installation requirements – for example, is allowing the material to get wet permitted?
- ensure that accessories used with the wall underlay such as flexible flashing tapes are compatible with it – check with the supplier
- ensure that, where the flexible wall underlay is being used as an air barrier, it meets the air barrier requirements of Table 23 of E2/AS1
- ensure that the wall underlay is compatible with the timber treatment specified.

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**Detail, Science, Build seminar – dates and locations**
Reserve your place now

A common theme among questions to the BRANZ helpline and previous seminar feedback from builders and designers is 'Why?' Designing and constructing buildings is a complex balance of building skill based on sound science and design/detailing prowess. How well we do this depends on how well we understanding the why – the science behind the detail. This 3-hour CPD/LBP points session will apply the building science and performance expectations to a range of aspects of construction.

Why we need to detail and construct:
- a gap here but not there
- a strap here but not there
- effective drying behind claddings
- air seals and air barriers
- effective cavity drainage
- appropriate fixings for bottom plates – slab edge distance and verified fixing performance
- taut and effective flexible wall underlay
- stop-ends, spreaders
- insulation without gaps
- thresholds
- as specified without substitution
- and much more…

The aim is to demonstrate what the designer needs to incorporate and the **builder** needs to construct on site to achieve the why. A number of practical building details will be discussed to explore the why. What are the essential science and performance requirements? Why must the builder ensure that all performance aspects of the detail are achieved on site? Why may getting any aspect of the construction wrong mean that the completed building does not perform as expected? It may be less durable, allow water in, be structurally compromised and not perform to the level the client expects.

The remaining dates and locations are:

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| Whakatane | Mon 30 Nov | Tuscany Villas Boutique Hotel |
| Tauranga | Tue 1 Dec | Trinity Wharf |
| Auckland – Albany | Wed 2 Dec | QBE Stadium |
| Whangarei | Wed 9 Dec | Forum North |
| Auckland – Central | Thu 10 Dec | Crowne Plaza Auckland |