BRANZ

Guideline

September 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.

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A chance to reflect on non-structural elements

The BRANZ *Non-structural Elements* seminar series has been completed

The seminar aim was to raise awareness of issues arising from the design and installation of non-structural elements such as:

- suspended ceilings
- above-ceiling services
- partitions
- curtain walls and the like.

The seminar was in response to issues raised regarding the performance of non-structural elements in the Canterbury and Seddon earthquakes such as:

- lack of coordination between disciplines
- lack of checking on site that non-structural elements are being installed correctly
- complexity and misinterpretation in the regulatory requirements
- lack of focus on seismic performance by architects, engineers and contractors
- cost-driven tendering – tagging out bracing for cheaper pricing.

For those in centres we did not visit or who missed the seminar, it will be available to view online later in the year (and you can get LBP or CPD points afterwards).

Two resources just released to support seismically resilient design:

- The BRANZ Seismic Resilience website – an online resource that aims to raise the seismic performance of New Zealand's building stock.
- Seismically Resilient Non-structural Elements Fact Sheets:
  1. Compliance and Standards
  2. Design Criteria
  3. Restraint Systems
  4. Seismic Clearance at Penetrations
  5. Project Process
  6. Suspended Ceilings

Both resources, developed with significant industry engagement, aim to raise the seismic resilience of New Zealand's building stock.

New rules for old parapets

Speaking of non-structural components …

A new category of priority buildings, covering parts of unreinforced masonry like parapets and façades, is to be included in the Building Act requirements for upgrading earthquake-prone buildings.

The new category covers parts of unreinforced masonry buildings (parapet or veranda) that could fall into a public road, footpath or other thoroughfare. Councils must identify public roads, footpaths or other thoroughfares that have sufficient vehicle or pedestrian traffic to warrant prioritisation.

The effect of being a priority building is that the times for assessment and upgrade requirements are halved. In a high-risk area, assessments will need to be completed in 2 and a half years instead of 5. Upgrading must occur within 7 and a half years rather than 15. In a medium-risk area, the assessments will need to occur in 5 years instead of 10, and the repairs within 12 and a half years rather than 25.

BRANZ Maps – wind zones

How do they work?

BRANZ Maps is an online tool that identifies a range of features for a specific location, including earthquake zone, exposure (corrosion risk) zone and climate zone. The tool also provides an experimental wind zone for a given location.

The wind zones in BRANZ Maps are an output from a successful 2014 research project at BRANZ. The project aimed to provide automated calculated wind zones in accordance with NZS 3604:2011 *Timber-framed buildings* using GIS software, which can now be done for a specific site. A number of approximations were made while creating the map, which are explained below.

Steps 1 and 2 from Table 1 of NZS 3604:2011 – determining the wind region and if in a lee zone – were completed by digitising the map in Figure 5.1 of NZS 3604:2011.

Steps 3 and 4 were more challenging, as the NZS 3604:2011 calculation requires counting obstructions (buildings and trees 3 m or higher) around a site. This data doesn't exist on a nationwide level. As a rough proxy, land use data from Landcare Research was used:

- For step 3 (ground roughness), urban areas were assumed to be the built-up areas and forests, and these areas were then trimmed by 500 m, as per clause 5.2.3 of NZS 3604:2011. Open areas were deemed to be everything else.
- For step 4 (site exposure), sheltered areas were assessed using the same built-up areas and forest areas but trimmed by 100 m (representing two rows of obstructions). Steep areas were removed (see step 5). Exposed areas were everything else.
- Step 5 in NZS 3604:2011 requires calculation of the ground slope, which in turn requires identification of ridges and valleys. Once again, BRANZ looked for a proxy and used a LINZ digital elevation model (DEM) of New Zealand. This splits the country into 80 x 80 m pixels, each pixel representing a particular height. This data was processed to create the ridges and valleys – a task that required some assumptions to be made. Finally, a wind zone was calculated for each 80 x 80 m pixel.

The order of resolution of wind zone calculations at the current time is as follows, with the most precise at the top:

- Calculations made specifically for a site following AS/NZS 1170.2:2011 *Structural design actions – Part 2: Wind actions*.
- Calculations made specifically for a site following NZS 3604:2011.

- Council wind maps (if based on AS/NZS 1170.2:2011 or NZS 3604:2011).
- BRANZ Maps.

More information on the BRANZ Maps wind zones is contained in *Build* 147 and the about-to-be-released BRANZ Bulletin 588.

Slab thickness for heated concrete floors
We answer your questions

A number of calls have come in to the BRANZ helpline recently regarding heated concrete floors. The most common query is how thick the slab should be when installing the pipes of a hydronic (water) heating system. When considering in-slab hydronic heating:
- all systems are proprietary, so the supplier's design and installation instructions should be followed
- consult the system supplier to determine suitable water heating options, pipe sizes, manifold locations, pipe layout and minimum concrete thickness for the specified pipe diameter
- a slab R-value of 1.9 is required when using the schedule method of NZS 4218.

Slab thicknesses suggested by system suppliers are in the 100–150 mm range with the proviso that they be designed in accordance with either:
- AS/NZS 1170 *Structural design actions* and NZS 3101:2008 *Concrete structures standard* part 1 for specific designs, or
- NZS 3604:2011 or NZS 4229:2013 *Concrete masonry buildings not requiring specific engineering design* for non-specific design.

One particular proprietary slab system recommends a minimum thickness of 110 mm. However, NZS 3604:2011 is silent on any specific thickness requirements (apart from a minimum 100 mm thickness) where a hydronic in-slab heating system is installed.

When specifying such systems:
- the thicker the slab, the more heat it is able to retain
- response time depends on the proximity of the pipes to the surface.

Flexible wall underlay restraint
How to install

For design to Acceptable Solution E2/AS1, flexible wall underlay must be tautly installed so that the underlay cannot bridge a drained and vented cavity. Typically, this is done by the cavity battens, but E2/AS1 specifies that, where the stud and cavity batten spacing exceeds 450 mm, either:
- install an additional mid-span vertical cavity batten, or
- tautly install wire mesh over the face of the wall underlay, or
- install taut horizontal polypropylene tapes or galvanised wires at 300 mm maximum centres.

Suspended floor insulation
Bulk fill versus foil

While perforated foil is still permitted as a means of insulating suspended floors, BRANZ recommends installing a bulk-fill insulation material for the following reasons:
- Bulk insulation provides better performance over a longer period of time.
- The performance of the foil depends on having a still air space between it and the floor and the foil remaining shiny and intact. Both of these are difficult to achieve on site and in service.

Foil loses performance over time:

- as the surface tarnishes
- if dust builds up on the surface
- where wind flows through the gap between the foil and the flooring, as an airtight seal is difficulty to achieve at the end of each draped section
- if damaged by wind.

Where a bulk insulation is specified, it should not be replaced with foil.

BRANZ CPD – Detail, Science, Build

Advance notice

Designing and constructing buildings is a complex balance of design/detailing prowess, science and building skill. Getting any one of them wrong can mean that the completed building may not perform as expected and may be less durable or structurally compromised. The science behind a successful detail is equally important. The designer must design it so that it will work and is able to be built. On site, the builder must ensure that it will work when built and that the performance aspects of the detail are achieved.

This 3-hour CPD/LBP points event for designers, builders and BCA staff will be run from late October through to early December in over 20 centres. We will take a number of building details and explain the science behind them to show how the detail works. The aim is to cover what the designer needs to incorporate and what the builder needs to consider when constructing it to ensure that the science behind it is not compromised.
