Invercargill City Council Building Sector news

Issue No. 141 **_October 2011_**

In this issue we have articles on the following subjects:

BRANZ Articles
- BRANZ product technical statements
- Reported misuse of BRANZ Appraisal

Trade-seal Building Envelope Penetration Seal

Trade-flash 2.7 – The flexible back flashing

DBH Update No 118 on Guidance on Building Code Compliance for Retrofitting insulation in External Walls

CCANZ E2/AS3 + link to download the Code of Practice for Weathertight Concrete and Concrete Masonry construction – 130 pages CCANZ CP 01:2001

Gib Information Bulletins

Designing Bracing Upgrades
Efficient Bracing Design Guidelines
Installing Gib Ezybrace® 2011 2009 using Gib Ezybrace® 2011 systems

DBH Update – Guidelines for documenting Fire Safety Designs – Version 1 – September 2011

Quiz on articles in this news sheet.

BRANZ Articles – BRANZ Product Technical Statements

BRANZ has recently issued Product Technical Statements (PTS) for all of its current BRANZ Appraisals. They replaced the introduction page for Appraisals on the BRANZ website listing.

A BRANZ Product Technical Statement (PTS) is an abstract or summary of an associated BRANZ Appraisal. Please note that it must be read and utilized in conjunction with this source document. It provides a brief description of the product, scope of use and applicable clauses of the New Zealand Building Code. A BRANZ PTS should not be used as the basis for consent applications. Always refer to the supporting verification documentation, which is detailed within the BRANZ PTS.

The PTS is seen as a critical element in the Department of Building and Housing product assurance framework and hence the work done to add the PTS "addition" to the Appraisal solution BRANZ offers its clients.

Reported Misuse of BRANZ Appraisals

BRANZ has been informed that BRANZ Appraisals are being used by suppliers other than the Appraisal holder to show compliance for a material that is a component of an appraised system.

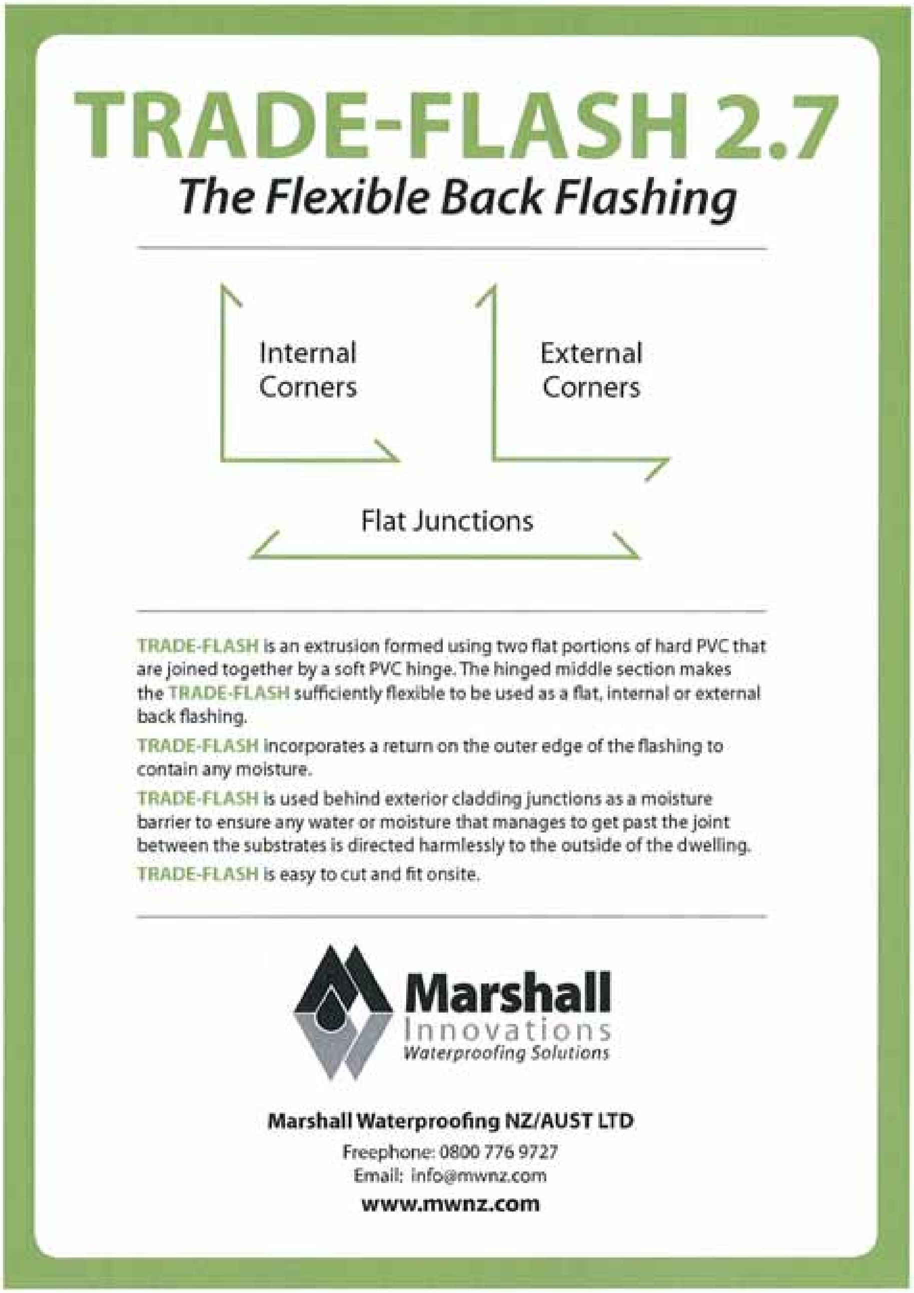
Whilst the product being supplied may be similar to that appraised and it may be being used in a very similar manner, there are often other significant issues that are assessed during the Appraisal process that may not be met by the other supplier including:

- Structural design – How is the product attached to the building? Will this method be able to carry all expected loads?
- Durability – How will the product interact with other components in the system that have not been assessed?
- Weathertightness – Has the alternative supplier's system undergone E2/VM1 or AS/NZS 4284 testing?
- Energy – Will the alternative system have the same overall R- value?
- Installation – Have the installers been assessed as being suitably qualified? Have they received suitable training?
- Manufacturing quality – Is the manufacturing process of the product covered by a manufacturing quality system? All BRANZ appraised products and systems have the product specification and quality monitored. For products not monitored changes can mean that the product might not perform as expected or tested.

Only the BRANZ Appraisal holder can use their Appraisal to demonstrate compliance of their product or system with the New Zealand Building Code, as only the Appraisal holder has had their complete system assessed by BRANZ. Using only part of the relevant information to make approvals creates exposure to significant risks.

BRANZ takes a dim view when this "passing off" of BRANZ Appraisal occurs and we take corrective measures as required to protect BRANZ's reputation in the market and with industry.

To view all current BRANZ Appraisals go to www.branz.co.nz/appraisals.


TRADE-FLASH 2.7
The Flexible Back Flashing
Internal Corners
External Corners
Flat Junctions
TRADE-FLASH is an extrusion formed using two flat portions of hard PVC that are joined together by a soft PVC hinge. The hinged middle section makes the TRADE-FLASH sufficiently flexible to be used as a flat, internal or external back flashing.
TRADE-FLASH incorporates a return on the outer edge of the flashing to contain any moisture.
TRADE-FLASH is used behind exterior cladding junctions as a moisture barrier to ensure any water or moisture that manages to get past the joint between the substrates is directed harmlessly to the outside of the dwelling.
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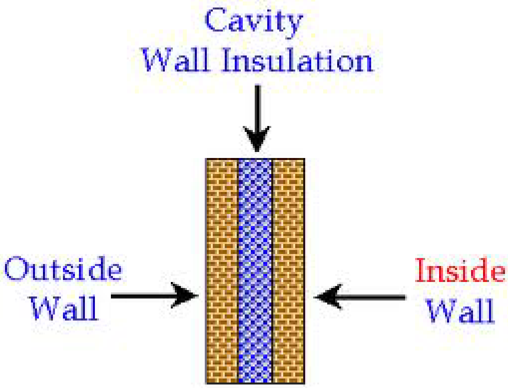
RETROFITTING INSULATION IN EXTERNAL WALLS



August 2011: The Department has published a useful guide on Building Code requirements for retrofitting insulation in external walls. This Guidance document is now available on the Department's website.

Retrofitting wall insulation requires a building consent, unless a council specifically exempts it. The Guidance will help building consent authorities (BCAs) decide whether wall insulation projects should be exempt from a building consent or to approve or decline applications for retrofitting wall insulation.

The Guidance includes information on the following:

- Why a building consent is required for retrofitting insulation in exterior walls
- Complying with the Building Act and Building Code
- Risks with retrofitting wall insulation
- Appendices explaining:
- Building Code performance criteria relating to retrofitting insulation
- How retrofitted insulation can affect the way a house performs

Each retrofit will be different so BCAs need to look at the specific characteristics of the project when deciding whether the building is suitable for retrofitted wall insulation. Different types of house construction, insulation, and the climate will affect a BCA's decision and advice. The guidance highlights important considerations when deciding if retrofitting is suitable for a particular property.

BCAs may wish to recommend the Guidance to designers and installers who want to check the relevant Building Code requirements for retrofitting insulation. It is not a guide to retrofitting insulation; New Zealand Standard (NZS) 4246 covers the practical aspects of insulation and can be downloaded free of charge from the EECA website.

The guidance document is reproduced in full for your information.

Introduction

This guidance provides information on the Building Code[1] and Building Act 2004 (the Building Act) requirements that relate to retrofitting insulation in external walls of buildings. It highlights the main considerations when assessing work for compliance and lists the relevant Building Code performance criteria for common types of insulation retrofits, such as retrofitting rigid or semi rigid segments and sheet insulation, injected loose fill insulation or injected foam insulation.

Decisions on this work can be complex. Insulation is usually retrofitted into older houses that have stood the test of time but are now too cold and draughty for modern lifestyles. Old houses often have simpler designs and are built of more rot-resistant timber than houses built during the 1990's, which are now stigmatised by moisture problems. Insulation retrofits deliver tangible benefits, but there can be unintended problems if the insulation or the installation is unsuitable.

This guidance does not provide solutions or recommend installation methods for particular types of insulation or house construction. Insulation specialists should be consulted if you have doubts about how best to retrofit insulation.

Who is it for?

The guidance is intended for building consent authorities (BCA's), to help them decide whether to exempt wall insulation from a building consent or to approve/decline building consent applications for retrofitting wall insulation. Designers and installers may also find the document a useful guide to the relevant Building Code requirements for retrofitting wall insulation.

Is a building consent required?

Schedule 1 of the Building Act now exempts underfloor and roof insulation retrofits from building consent[2]. However, retrofitting insulation into a wall cavity is not exempt; it either requires a building consent or specific approval from a BCA that a building consent is not required[3].

Building consent applications for retrofitting wall insulation will need to cover all the associated building work, show that it will comply with the Building Code and that it will not adversely affect the performance of the existing building.

Why is retrofitting wall insulation not included in Schedule 1?

Retrofitting insulation to walls involves more work than simply placing or injecting insulation in walls. All the associated work must be assessed to see if it complies with the Building Code, whether it is as small as drilling and repairing holes in interior linings or as significant as removing and reinstating exterior claddings. Even if the building work is relatively simple, the effects on the existing building may be complex and potentially problematic.

Retrofitted wall insulation may affect moisture transfer inside timber framed walls and change drying rates, which in turn may cause moisture to accumulate in the wall and affect the durability of timber framing and cladding. Poorly installed insulation may also affect the fire and electrical safety of houses. Houses must be assessed on a case-by-case basis to determine if they are suitable for retrofitting wall insulation and if the proposed methods and materials are appropriate.

Compliance with the law

Complying with the Building Act

Retrofitting insulation into the external walls of an existing building is "building work"[4] and therefore must comply[5] with the Building Code. When a building consent is required (see previous section), it should not be granted until it is shown that the alteration (i.e. the insulation retrofit) will not reduce the extent to which the existing building meets the Building Code performance criteria[6].

It is important to distinguish between the need for “building work” (i.e. retrofitting insulation) to comply with the Building Code (as required by section 17 of the Building Act) and the need to ensure retrofitted insulation does not reduce the extent to which the existing building complies with the Building Code (as required by section 112(1)(b)[7] of the Building Act). These two requirements relate to different parts of the building (i.e. new part versus existing parts); the extent of Code compliance is different; and they can relate to different Building Code performance criteria.

Complying with the Building Code

When buildings, or parts of buildings, are constructed or altered they must meet Building Code performance criteria[8]. Retrofitted insulation material, sitting within the wall cavity, is required to meet relevant Building Code performance criteria. The associated building work, such as repairing cracks in claddings, fixing holes that have been drilled and reinstating linings or claddings must also comply with the relevant Building Code performance criteria.

Performance criteria that relate to the existing building (particularly the wall framing, cladding and internal lining) and with which the building must continue to comply to the same extent[9], may or may not be the same as those relating to the insulation retrofitting work. The Building Code performance criteria relevant to the retrofitting work and the Building Code performance criteria relevant to the existing building are analysed in Appendix A and B.

How do I show the work complies?

There are no acceptable solutions or verification methods specifically for retrofitting insulation into wall cavities. The current acceptable solutions provide useful benchmarks when deciding if relevant performance criteria are met, in some instances. However, not all the performance criteria relevant to retrofitting wall insulation have corresponding acceptable solutions, which means judgements will need to be made on each ‘specific design’.

Decisions on the Code compliance of retrofitting wall insulation, in particular the effects of the retrofit on the existing building, can be complex. These decisions are not easily distilled into a one-size-fits-all solution. Appendix A and B highlight relevant factors to consider when deciding whether insulation retrofits comply with the Building Code. A number of different approaches may be used to support claims that work complies with the Code including Determinations, compliance with Standards, test results, expert opinion, appraisals or in-service history[10].

Risks with retrofitting wall insulation

The greatest unknown, and potential risk, when insulation is installed into the external walls of existing houses is the effect on moisture transfer within walls, and the effects any increase in moisture will have on fungal growth in a wall.

Sources of moisture within a wall cavity may include: external water passing through a porous envelope (eg rain on brick veneer); external moisture entering around openings (eg a defective or ineffective window flashing); moisture generated within the building (eg clothes drying or cooking); or moisture rising from inadequately ventilated subfloor space where the ground is poorly drained.

Moisture transfer into and out of walls occurs in a variety of ways through the movement of liquid water and water vapour or from diffusion through building materials. The amount of water that transfers through a wall via these different mechanisms will vary with different types of construction. Moisture transfer through walls is not, in itself, a problem, but it can be problematic when drying and ventilation is inadequate to remove moisture and moisture accumulates inside walls, providing suitable conditions for fungal growth.

Potential problems with fungal growth inside walls are

1. Timber decay, which reduces the strength of framing and other wall components, and
2. Production of mycotoxins, which are deleterious/harmful to human health.

There has been a substantial amount of effort to develop robust 'weathertight' designs for new houses, but little guidance is available when altering existing houses. Timber treatments and drainage cavities that are usual in new houses are often not present in older houses making them more vulnerable to fungal growth and the problems that arise from this. On the other hand, older houses may have mitigating factors such as,

- Native heartwood timber that is more resistant to fungal growth/decay than radiata pine
- Simple designs (e.g. wide eaves) that are less prone to moisture leaks
- High ventilation rates from relatively large air-leakage, both within wall cavities and within the interior of the house.

Specific consideration should be given on a case-by-case basis to:

- The amount and source of moisture that may be transferred into a wall (i.e. the existing weathertightness, defects and subfloor conditions), and whether such defects should be repaired
- The extent to which ventilation of the framing cavities in a wall, and drainage cavity if included, would be affected by the installation of insulation
- The resistance to fungal growth (e.g. timber treatments)

Fire safety can be affected if insulation is installed over or around appliances that dissipate heat. There have been reports of fires in buildings where ceiling insulation has covered downlights. In these situations heat builds up within the insulation, downlight and adjacent parts of a ceiling until it reaches combustion temperatures. Similar problems could occur in an insulated wall that has recessed luminaries or internal flues. The use of highly flammable insulation could affect the performance of fire separation walls, such as external walls of houses that are close to boundaries.

Electrical safety can be compromised if existing electrical wires are covered by thermal insulation and, as a consequence, the current-rating of the wire is reduced below the electrical loads on the circuit. Old electrical circuits are most at risk, as the electrical insulation covering the wires[11] can be fragile and prone to fail. Old circuits also tend to have hard wired fuses, which provide less overload protection than modern mini circuit breakers. Mini circuit breakers help to mitigate the adverse effects of covering electrical wires with thermal insulation.

Appendices

Appendix A - Building Code performances that retrofitted insulation must comply with[12]

The Building Code performance criteria listed below are the relevant provisions of the Code to consider when assessing retrofitted wall insulation and whether it complies with the Code. Other Building Code performance criteria may also need to be considered for the building work associated with retrofitting insulation. For example, removing and reinstating structural wall linings or drilling holes through studs would require compliance with the Building Code clause B1.3.1. However the insulation itself does not need to comply with B1.3.1 as it is not part of the structural system of a building.

It is useful to highlight upfront that the R-value of the retrofitted wall does not need to comply with the Building Code clause H1 Energy efficiency. There is no doubt that insulation is retrofitted to improve the wall R-value, but from a regulatory point of view retrofitting insulation is simply an alteration of the 'thermal envelope' described in H1.3.1(a). Unless the cladding, framing and linings of the wall are also reconstructed it is hard to consider how the 'thermal envelope' has been reconstructed, which would trigger compliance with H1.3.1(a). Therefore, the energy efficiency provisions of the Building Code are not mentioned in this section, which lists the performance criteria that insulation retrofits must comply with.

Durability

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

(a) The life of the building, being not less than 50 years, if:

(iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

Guidance: The durability requirement in the Building Code applies only to the extent that other Building Code performance criteria apply. The Building Code requires 50 year durability for building elements that are difficult to access or replace, or where failure of the building element to comply would go undetected.

The durability requirement is not relevant to E2.3.6, which relates to moisture at the time of construction (see External moisture below). Common types of insulation are likely to meet the performance criteria F2.3.1 for a period of 50 years. Unusual types of insulation or very harsh environments may cause insulation to degrade over time and produce hazardous materials, though such a possibility could only be assessed on a case-by-case basis.

External moisture

E2.3.6 Excess moisture present at the completion of construction must be capable of being dissipated without permanent damage to building elements.

Guidance: Moisture levels in most types of insulation should be at acceptable levels when installed. Moisture levels in insulation that is installed wet are likely to drop over time, provided the existing wall is vapour permeable and does not have pre-existing moisture problems. However, compliance of insulation that is installed wet with NZBC E2.3.6 will be difficult to assess given the variability in drying rates that occur and would need to be assessed on a case-by-case basis that could involve measurements.

There is no acceptable solution for the dissipation of construction moisture from retrofitted insulation. Although not directly applicable, the Acceptable Solution E2/AS1 does provide a useful upper limit of 20% for timber moisture levels in timber framed walls[13]. The water content of some types of insulation that are installed wet is approximately 75% by weight, so the insulation must dry out after it is installed. The moisture content of adjacent timber framing should not exceed 20%, as suggested by the Acceptable Solution.

A study of moisture levels in cavity walls show that drying rates vary widely depending on the type of wall construction, temperature and ventilation rate[14]. Drying times of 600 hours (i.e. 25 days) were measured for timber framing in south-facing, direct fixed walls with insulation installed in the framing cavities. In a separate study, moisture readings of timber framing in a brick veneer wall took approximately 60 days to drop below 20% moisture content after urea-formaldehyde foam was injected into the wall drainage cavity[15]. It was noted that the drying rate, which was measured in summer, would be significantly worse in winter and would likely result in south facing walls staying 'wet' throughout winter.

Factors that will affect the drying potential of insulation in a cavity wall include,

- The vapour permeability of the wall linings and claddings (including any building wraps, paints and surface coatings)
- The rain and wind environment (i.e. the wetting potential)
- The ground conditions and foundation connections to a wall
- The condition of the existing cladding (e.g. cracks and gaps)
- The ventilation rate within the wall cavity

- Temperature of the external and internal wall surfaces

Hazardous materials

F2.3.1 The quantities of gas, liquid, radiation or solid particles emitted by materials used in the construction of buildings, shall not give rise to harmful concentrations at the surface of the material where the material is exposed, or in the atmosphere of any space.

Guidance: Provided insulation is properly manufactured and installed, in accordance with manufacturers' instructions, it is likely that it will comply with F2.3.1.

There is no Acceptable Solution covering hazards associated with insulation. However, off-gassing and small airborne particles are the primary hazards to consider with insulation.

A number of different chemicals are used in various types of insulation materials and in the binders that hold some types of insulation together. While such chemicals can be hazardous in high concentrations, generally the concentrations that are associated with thermal insulation are not high enough to be considered problematic. Formaldehyde is such an example, and while relatively common in many different building products it is generally not found in sufficiently high concentrations to be considered hazardous.

Appendix B - Building Code performances that should not be compromised by retrofitted insulation

Retrofitted insulation may effect the way existing parts of a house perform, particularly parts of a house that are adjacent to the insulation such as wall frames, claddings and linings. The performance of an existing house should not be reduced in relation to the following provisions of the Building Code.

Structure

B1.3.1 Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives.

Guidance: Retrofitted insulation could affect the structural performance (i.e. B1.3.1) of an existing house if moisture were to accumulate in a wall cavity and cause timber studs to rot and collapse. This could only occur if the weathertight performance of an existing house was compromised, as discussed below in relation to the effect retrofitted insulation has on compliance with the Building Code performances E2.3.2 and E2.3.5. The impact of retrofitted insulation on B1.3.1 is considered in the analysis for E2.3.5 below.

The performance of structural claddings or linings may be affected, when claddings and linings are altered as part of retrofitting insulation. Any holes, patching or reinstatement of structural claddings or linings will need to be done to a standard that doesn't reduce the overall structural performance of the house.

Durability

B2.3.1 Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:

(a) the life of the building, being not less than 50 years, if:

(i) Those building elements (including floors, walls, and fixings) provide structural stability to the building, or

(ii) Those building elements are difficult to access or replace, or

(iii) Failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.

(b) 15 years if:

(i) Those building elements (including the building envelope, exposed plumbing in the subfloor space, and inbuilt chimneys and flues) are moderately difficult to access or replace, or

(ii) Failure of those building elements to comply with the building code would go undetected during normal use of the building, but would be easily detected during normal maintenance.

(c) 5 years if:

(i) The building elements (including services, linings, renewable protective coatings, and fixtures) are easy to access and replace, and

(ii) failure of those building elements to comply with the building code would be easily detected during normal use of the building.

Guidance: Durability applies only to the extent that other Building Code performances apply. The effect retrofitted insulation has on the durability is considered in the discussion of the other Building Code performances.

Outbreak of fire

C1.3.2 Fixed appliances shall be installed in a manner that does not raise the temperature of any building element by heat transfer or concentration to a level that would adversely affect its physical or mechanical properties or function.

Guidance: Retrofitted insulation can affect compliance of an existing house in relation to outbreak of fire (i.e. C1.3.2) if the insulation covers appliances that generate heat. Sufficient clearance must be provided between thermal insulation and a heat source to prevent an undue build up of heat in adjacent building elements. The Acceptable Solution C/AS1 specifies clearances for insulation around downlights in ceilings, but no specific details are given for wall insulation.

Spread of fire

C3.3.5 External walls and roofs shall have resistance to the spread of fire, appropriate to the fire load within the building and to the proximity of other household units, other residential units, and other property.

Guidance: Retrofitted insulation can only affect compliance of an existing house with respect to spread of fire (i.e. C3.3.5) if the retrofitted wall is required to be fire rated. Insulation that is retrofitted into walls of detached dwellings that are lined with plaster board will comply with C3.3.5, by complying with the Acceptable Solution C/AS1. C/AS1 allows insulation materials to be used in walls provided they are protected from ignition, which in turn means that the insulation must comply with flame propagation criteria and be protected by a flame barrier[16].

In addition, many insulation materials are either inherently non-flammable or have fire retardant additives improving their performance in a fire.

Moisture penetration

E2.3.2 Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to building elements, or both.

Guidance: The effect retrofitted insulation has on compliance of an existing wall with E2.3.2 will depend largely on the existing wall and the physical properties of the insulation. Walls with porous claddings, poorly maintained claddings, walls with pre-existing leaks or moisture problems and walls exposed to high wind and rain are more likely to have water penetrate through the cladding. Insulation materials that are porous or hydrophilic will tend to hold and transfer moisture through the insulation. In these situations, retrofitted insulation may help transfer moisture from the cladding to other building elements, thereby reducing compliance with E2.3.2. Conversely, walls with well maintained impermeable claddings, which have low exposure to rain, and include building paper inside the cladding are unlikely to have water penetrate the cladding. In this situation insulation will not reduce compliance with E2.3.2

The penetration of water through wall claddings is unlikely to be affected by insulation, unless the cladding is damaged and compromised by poor installation. Insulation has potential to reduce the penetration of wind driven water through claddings by increasing the air tightness of the wall and reducing the pressure differences that are generated across the cladding. However, any increase in air tightness will adversely affect the drying rate within the wall cavity, as discussed below in relation to NZBC E2.3.5.

The largest potential problem for retrofitted insulation in relation to E2.3.2 is the bridging effect of the material, which allows moisture on the inside of the cladding to penetrate further into the wall cavity, to framing and the lining. This bridging effect may be mitigated where well defined gaps exist between the insulation and the framing, cladding and/or lining. Small gaps between the insulation and the framing, cladding and/or lining will act as a physical barrier to moisture transfer, similar to the drainage cavity that is designed into new timber framed walls. However, such gaps generally diminish the thermal effectiveness of the insulation and should be avoided when insulation is installed unless they are specifically designed. Therefore, any mitigation from small gaps in the insulation should not be relied upon when assessing the building performance for a building consent, unless specifically designed.

Building paper, between the cladding and framing, will help to mitigate any moisture bridging by insulation as it will reduce the amount of moisture that comes into contact with the insulation.

Moisture accumulation

E2.3.5 Concealed spaces and cavities in buildings must be constructed in a way that prevents external moisture being accumulated or transferred and causing condensation, fungal growth, or the degradation of building elements.

Guidance: There are many contributory factors that affect condensation, fungal growth or degradation of building elements. This complexity means it is difficult to provide simple rules for assessing compliance with E2.3.5 that are not overly conservative in many situations. Installers, designers and BCAs need to consider the merits of each installation when assessing the affects of retrofitted insulation on the compliance of existing walls with E2.3.5.

Retrofitted insulation has potential to affect the accumulation of water in wall cavities, causing condensation, fungal growth or degradation of building elements. Its affect will depend to a large degree on the design and condition of the existing wall/building, the climate and the physical properties of the insulation.

Insulation will reduce the air movement in wall cavities and in doing so will reduce the rate at which moisture dries out of wall cavities. However, the drying rate depends on a number of factors, including climate, wall design and the permeability of the claddings, linings and insulation, as well as the ventilation rate. In addition, the ventilation rate and moisture exposure are not the only factors affecting condensation, fungal growth and degradation of a wall. The materials used to construct the wall and the treatments applied will also impact on compliance with E2.3.5.

Factors that will tend to lessen the impact of insulation on compliance of an existing wall with E2.3.5 include:

- Impermeable claddings that are well maintained,
- Low exposure to rain (e.g. wide eaves and low wind)

- Building paper inside the cladding
- Steel or treated timber framing
- Permeable wall linings
- Warm climate

Factors that may lessen compliance of existing walls with E2.3.5 when insulation is retrofitted include:

- Porous claddings,
- High rain exposure
- Untreated timber framing and cladding, including native sapwood
- Vapour barriers
- High humidity
- Cold climate

Noise performance

G6.3.1 The Sound Transmission Class of walls, floors and ceilings, shall be no less than 55.

Guidance: Insulation will have no affect on the compliance of an existing house in relation to noise (i.e. G6.3.1), because the Building Code does not control the noise transmission through external walls.

Only when insulation is retrofitted to intertenancy walls is there potential for it to affect compliance with G6.3.1. In these unlikely situations, the insulation materials and the installation will have a large bearing on the noise performance of the wall, and so must be considered on a case-by-case basis.

Electrical safety[17]

G9.3.1 The electrical installation shall incorporate systems to:

(d) safeguard people from injury which may result from electromechanical stress in electrical components caused by currents in excess of the installation rating,

(e) protect building elements from risk of ignition, impairment of their physical or mechanical properties, or function, due to temperature increases resulting from heat transfer or electric arc,

Guidance: Retrofitted insulation can affect the continued electrical safety of an existing house (i.e. G9.3.1) if either, the thermal insulation reduces the heat dissipation from the wires, the thermal insulation and electrical insulation are incompatible, or if the thermal insulation causes electrical circuits to short.

The safety of electrical systems may be compromised by retrofitted insulation if electrical wires that lie within a wall cavity are encased/enclosed by the insulation. Both the current carrying capacity of the wiring (i.e. G9.3.1(d)) and heat dissipation from the wires (i.e. G9.3.1(e)) will be reduced by the thermal insulation.

The safety of an electrical wire enclosed by insulation will depend on the original rating of the electrical circuit, the proximity of the wire to combustible building elements and the electrical load on the circuit. The current-carrying capacity of electrical wires completely surrounded by thermal insulation is half that of wires surrounded by air[18,19] .

The compatibility of thermal insulation with the electrical insulation protecting the wiring must also be checked. The common material incompatibility is polystyrene thermal insulation and PVC insulation on electrical wires. Care must be taken to avoid contact between these materials, as polystyrene has the potential to embrittle PVC.

Liquid-applied and loose-fill insulation may cause short-circuits if it migrates into unsealed electrical flush boxes or contacts surface mounted electrical switches and fittings. Old electrical circuits which use VIR (vulcanised indian rubber) or TRS (toughened rubber sheathed) cables may also short-circuit if insulation is pushed onto and around these old cables. This is because the electrical insulation on VIR and TRS cables tends to degrade and become fragile and brittle over time.

When the safety of electrical circuits is likely to be compromised by retrofitting insulation, or when electrical wiring is modified, a registered electrician should check and certify the electrical safety. Miniature circuit breakers can be used to improve protection from overload currents, on circuits when the electrical wiring is surrounded by thermal insulation. Alternatively, the size of electrical wiring may be increased to safely carry the current and limit temperature build up. VIR and TRS cables may also need to be replaced, depending on their condition.

Energy efficiency

H1.3.1 The building envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to—

(a) Provide adequate thermal resistance; and

(b) Limit uncontrollable airflow.

Guidance: It is almost certain that retrofitted insulation will improve both the thermal resistance and the airtightness of an existing wall, so will not adversely affect the compliance of an existing house in relation to H1.3.1[20].

The compliance of retrofitted insulation with H1.3.1 is not a consideration for retrofit situations where the thermal envelope of the building (which H1.3.1 relates to) is not being replaced.

For example, the thermal envelope of an old timber framed house would comprise the weatherboard cladding, the still air in the framing cavity and the interior wall linings. Installing insulation into the framing cavity would not alter the thermal performance of the weatherboards or linings, and would improve the performance of the still air, which would by and large be replaced by insulation. Replacing the still air with insulation, while altering an element within the thermal envelope, does not trigger any requirement to upgrade the thermal envelope to meet the Building Code. This principle of not having to upgrade to Code compliance when alterations are undertaken on only part of a building is described in section 112(1)(b) of the Building Act.

The thermal performance of retrofitted insulation can vary considerably, depending on the type of insulation, the quality of installation and the in-service conditions. While the thermal performance is not relevant to issuing a building consent, it is likely to be fundamental to any contract between a homeowner and the supplier/installer. In this regard, the relevant legal mechanisms that ensure retrofitted insulation delivers good thermal performance are; the contract, the implied warranties in the Building Act and the Fair Trading Act.

Footnotes

1. Refer to the Schedule 1 of the Building Regulations 1992.

2. Refer to Building (Exempt Building Work) Order 2010, which came into effect on 23 December 2010. Note that homeowners can still seek a building consent for this work should they choose to.

3. Clause k of Schedule 1 in the Building Act allows territorial authorities to exempt work from needing a building consent if the work is unlikely to not comply with the Building Code or if it will have low consequences if it fails.

4. Refer to section 7, 8 and 9 the Building Act 2004 for a definition of “building work”.

5. Refer to section 17 of the Building Act 2004 for Building Code compliance. Note, councils can choose to modify or waive Building Code requirements under section 67 of the Act, so compliance with the Building Code would not be required in such circumstances.

6. Refer to section 112(1)(b) of the Building Act 2004.

7. Section 112 of the Building Act only applies when a building consent is required.

8. Refer to section 400(1) of the Building Act 2004.

9. As required by section 112(1)(b) of the Building Act.

10. The Department of Building and Housing , “Means of establishing compliance: alternative solutions”, October 2008.

11. VIR (vulcanised indian rubber) and TRS (tough rubber sheathed) cables were used in New Zealand up until the late 1950’s when they were replaced by more durable TPS (toughened plastic sheathed)

12. Note that existing parts of the building do not need to be upgraded to comply with the Building Code.

13. Refer Acceptable Solution E2/AS1, Section 11.2 Maximum acceptable moisture contents

14. McNeil, S. and Bassett M. “Moisture recovery rates for walls in temperate climates”, 11th Canadian Conference on building science and technology, Banff, Alberta, 2007

15. BRANZ, “Investigation into the performance of brick veneer walls installed with urea-formaldehyde foam insulation – a case study”, Study report 234, 2010

16. Flame barriers are described in C/AS1 Appendix C9.1. Plasterboard wall lining is an acceptable flame.

17. In addition to the Building Code clause G9, the Electricity (Safety) Regulations 2010 must be complied with when thermal insulation is installed near electrical wiring and appliances. Regulation 17(d) of the Electricity Regulations states, “A person commits a grade A offence if the person places thermal insulating material on or around fittings in an installation in such a way that the safety of the installation is compromised.“.

18. Refer AS/NZS 3000:2007 Electrical Installations, Table C5.

19. BRE Report BR 262, Thermal insulation: avoiding risks, Appendix A, 2002.

20. No consideration is given to the compliance of the insulation with H1.3.1, as the ‘thermal envelope’ is not replaced by retrofitting insulation

CCANZ - NEW ZEALAND BUILDING CODE E2/AS3

Building a home to take advantage of concrete's excellent weathertight credentials has become even simpler with a new Acceptable Solution that references the Cement and Concrete Association of New Zealand (CCANZ)'s Code of Practice CCANZ CP 01:2011.

From August 2011 Clause E2 (External Moisture) of the New Zealand Building Code has an Acceptable Solution (E2/AS3) for weathertight concrete and concrete masonry construction that references CCANZ's Code of Practice for Weathertight Concrete and Concrete Masonry Construction.

The Code of Practice covers the weathertightness of the building envelope for concrete slabs on the ground, concrete walls and associated methods of insulation, concrete flat roofs and decks, and concrete to timber construction junctions.

To aid planners and builders, the Code of Practice follows the same format as existing weathertightness solutions, but offers larger detail drawings following the text.

CCANZ developed the Code of Practice in partnership with building and construction industry representatives, and its acceptance into the New Zealand Building Code followed wider consultation by the Department of Building and Housing (DBH).

CCANZ Chief Executive Rob Gaimster is delighted with the Code of Practice and said it would bring real benefits to builders and home owners.

"The development of this document and its inclusion as an Acceptable Solution in the New Zealand Building Code will alleviate the current uncertainty amongst consent authorities in the area of weathertight concrete and concrete masonry design and construction.

"It will also allow builders, designers and their clients to choose from a wider range of building materials, and in turn enable the weathertight advantages of concrete and concrete masonry systems to enhance New Zealand's building stock."

For further information about this key change to the NZBC External Moisture documents, go to the Department of Building and Housing website - www.dbh.govt.nz

Download the Code of Practice for Weathertight Concrete and Concrete Masonry Construction

Information Bulletin

Issue Date: June 2011

DESIGNING BRACING UPGRADES

Following the earthquake events in Christchurch homeowners may be looking for additional bracing performance. As the New Zealand Building Code is based on a minimum requirement, customers may decide to specify above this level. This bulletin has been created to assist designers with upgrading bracing resistance using GIB EzyBrace® 2011, for buildings that fall within the design scope of NZS 3604:2011.

Probability of Exceedance and Bracing Resistance

The New Zealand Building Code requirements for Earthquake Bracing design are based on the probability that a certain design event is exceeded, as illustrated below.

Annual Probability of Exceedance	Return Period Factor for Specific Design[1]
Once in 500 years or 1/500	1.0
Once in 1000 years or 1/1000	1.3
Once in 2500 years or 1/2500	1.8

[1] *Equivalent Static Method of NZS1170.5:2004 compared with the GIB EzyBrace® 2011 software*

An earthquake with a probability of being exceeded once in 2500 years is much more severe than one with a 1/500 year probability of exceedance. Most residential buildings, such as those constructed in accordance with NZS 3604:2011, are required to meet a minimum 1/500 annual probability of exceedance, assuming a 50 year life expectancy.

When a residential home is designed for a 100 year life expectancy, the required earthquake design period is 1/1000. Multi-tenanted and public buildings such as hotels, apartments, offices, schools, medical centres, etc. can often be built to NZS 3604:2011 but commonly need to be designed for a different annual probability of exceedance ranging from 1/500 to 1/2500, depending on importance level and design working life.

To place some perspective, analysis of the information from the 22nd February Christchurch earthquake indicates that this event was close to the 1/2500 annual probability of exceedance.

Upgrading Bracing Resistance using GIB EzyBrace® 2011

GIB EzyBrace® systems 2011 have been tested and appraised to meet the requirements of the New Zealand Building Code using New Zealand Standard NZS 3604:2011 and the default setting for earthquake design is an annual probability of exceedance of 1/500.

The GIB EzyBrace® 2011 software now incorporates an easy way to design for increased bracing resistance by selecting an increased annual probability of exceedance level.

Simply select the annual probability of exceedance using the drop down box in the demand sheet. For a 1/1000 probability, the bracing requirement (demand) increases by 30% and for a 1/2500 probability, bracing demand increases by 80% when compared with the default 1/500 minimum annual probability of exceedance.

Building Location

Wind Zone	***High***	**Earthquake Zone**	**Soil Type**
Select by Building Consent Authority Map		3 ▼	D&E (deep to very soft) ▼
or Preference	High ▼	**Annual exceedance probability**	
Wind Region	Preference selected ▼	1/1000 (NZS3604:2011 x 1.3) ▼	
Lee Zone	Preference selected ▼	This design has been upgraded to resist	
Ground Roughness	Preference selected ▼	an annual earthquake exceedance	
Site Exposure	Preference selected ▼	probability of	1/1000
Topographic Class	Preference selected ▼		

Options include the default setting of 1/500, or increased annual probabilities of exceedance of 1/1000 or 1/2500

When designing for increased bracing resistance a statement, similar to that below, should be highlighted on all bracing plans and associated information;

"The bracing design of this building has been upgraded at the clients request to exceed the requirements of a 1/ [*select*] **annual probability. This design must not be modified or substituted as this will affect the specified bracing performance of this building"**

Design Across the Whole Building

As a general rule of thumb it is recommended to exceed the minimum bracing requirements by 10 to 20%. This means a target bracing resistance value of between 110 and 120%.

As is reflected in NZS 3604:2011 bracing should ideally be distributed evenly across the whole building and not just isolated to the external walls or building ends.

External walls generally only account for around 1/3 of the total bracing performance of a house. Therefore if bracing on the external walls is increased by say 30%, the actual improvement over the whole building is likely to be only 10% or less.

Also modifying plasterboard linings alone will often deliver limited improvement. To achieve a higher overall building performance, full bracing system specifications must be installed which often includes additional hardware such as panel hold-downs.

Information Bulletin

June 2011

Page 1 of 2

EFFICIENT BRACING DESIGN GUIDELINES

This updated bulletin reflect the changes made to NZS 3604:2011 and GIB EzyBrace® 2011 systems.

There are many examples of bracing calculations where designers have not specified GIB EzyBrace® Systems efficiently. GIB EzyBrace® Systems and the GIB EzyBrace® software are tools that facilitate effective and economical design but in themselves do not deliver these efficiencies without proper application and understanding the *"art of bracing design"*.

The following are tips are offered to ensure **better design efficiency**.

Exceeding Demand

Demand calculation using the GIB EzyBrace® software is tailored to the particular building design.

The bracing resistance values derived from testing a bracing element under strict laboratory conditions often are not replicated exactly on site.

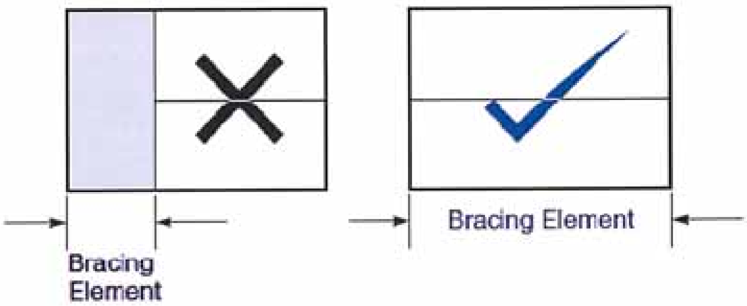
Allowing for site variations and workmanship it is prudent to incorporate a degree of over-capacity in a bracing design. The GIB EzyBrace® software automatically provides information on the ratio of resistance over demand. A ratio of between 110% - 120% is recommended.

However, there are still many inefficient designs where ratios are 150% or more.

NB: Given the earthquake events in Christchurch some clients may want higher bracing performance. To deliver an effective design refer to the Information Bulletin "Designing Bracing Upgrades"

Always use the full length of wall available for a designated bracing element

There are still many designs where shorter or part sections of a wall are selected to be a bracing element. Often designers use multiples of 1.2m sheet width or 0.6m stud spacing. If, for example, a wall between bedrooms is 3.4 metres *use that full length as a bracing element and apply the 150mm centres bracing fastener pattern to the perimeter of the entire wall available.* This results in the maximum BUs achieved and the best possible quality of finish.



The Financial Assistance Package (FAP) to repair and rebuild your property

Use GS elements where possible and BL where needed

Start by using GS elements where possible. Use GS1-N elements on external walls lined on one side only and also on internal walls lined on both sides. Using GS1-N elements as much as possible means bracing elements need the bracing fastener pattern on one side only. No other special requirements are needed for GS1-N bracing elements.

When this does not achieve the totals required *change internal walls lined on both sides to GS2-N elements.*

Should this still not achieve the Bracing Units required, *use BL1-H elements on the building perimeter, in the corners of external walls first.* Extend the use of BL1-H elements if needed and specify GSP-H, BLP-H and BLG-H elements only when necessary.

Note that it is not always required but *sensible to use BL1-H or BLP-H elements on short walls adjacent to significant openings with heavy lintels* such as near bay windows, ranch sliders or garage doors.

Specifying GIB EzyBrace® Elements (minimum wall length 400 mm)	
Inside lining External Walls	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required. If the other side of the frame is lined with plywood consider GSP-H or BLP-H elements.
Internal Walls (only one side available for bracing)	Nominate available lengths of wall as GS1-N elements. Use BL1-H if higher ratings are required.
Internal Walls (both sides available for bracing)	Nominate available lengths of wall as GS1-N elements. Change to GS2-N if higher ratings are required. Change to BLG-H for even higher ratings. Consider GSP-H or BLP-H if the opposite side is lined with plywood.

Distribution

The NZS3604:2011 guidelines for bracing distribution have changed from the 1999 version. The standard now states that no bracing line shall have a capacity less than the greater of 100 bracing units, 15 x L bracing units for external walls, or 50% of the total bracing demand divided by the number of bracing lines in the direction being considered. Designers must check that bracing lines are relatively evenly spaced and that the total number of bracing units on each line is "similar". For example if demand is 1200 bracing units in the Along direction and 4 bracing lines are used, the best distribution is achieved if each line has at least 1200/4 = 300 bracing units, but as a minimum each line must not have less than 50% of 1200/4 = 150 bracing units.

Efficient design *more often than not means* ***simple design, effective and responsible use of materials*** *and* ***less chance for construction error on site.***

GIB®

Information Bulletin

June 2011

INSTALLING GIB EZYBRACE® 2009 USING GIB EZYBRACE® 2011 SYSTEMS

In February this year Standards New Zealand released *NZS 3604:2011 'Timber-framed buildings'*. *NZS 3604:2011* calls up *BRANZ Technical Paper P21 (2010) 'Wall bracing test and evaluation procedure'*, which includes a number of changes to bring it in-line with loadings standard *AS/NZS 1170*.

GIB EzyBrace® Systems 2011 comply with NZS 3604:2011 and *BRANZ Technical Paper P21 (2010)*.

During the transitional period where *NZS 3604:1999* and *NZS 3604:2011*, as well as *GIB EzyBrace® Systems 2009* and *GIB EzyBrace® Systems 2011*, will be used in the market simultaneously some confusion could eventuate.

To limit the confusion the **recommendation** of Winstone Wallboards is that plans consented in accordance with *NZS3604:1999 and GIB EzyBrace® systems 2009* are constructed using the bracing elements and construction methods specified in *GIB EzyBrace® Systems 2009*.

Plans consented in accordance with *NZS3604:2011 and GIB EzyBrace® systems 2011* **must** use bracing elements and construction methods specified in *GIB EzyBrace® Systems 2011*.

Given that inevitably some plans designed using GIB EzyBrace® 2009 will be installed using the GIB EzyBrace® 2011 installation methods we have determined the bracing performance of elements contained in *GIB EzyBrace® Systems 2011* in accordance with both the 2010 and previous version of the BRANZ P21 procedures.

Provided the *NZS3604:1999* and *GIB EzyBrace® 2009* design follows our recommendation of resistance exceeding demand by 10%, it is acceptable to adopt *GIB EzyBrace® 2011* bracing systems and installation methods, including using minimum 32mm x 6g GIB® Grabber® high thread screws and the new GIB EzyBrace® 2011 fastener pattern across the whole building, as follows;

Specified Bracing System from *GIB EzyBrace® 2009*	**Brief description**	**Permitted alternative Bracing System from *GIB EzyBrace® 2011***
GS1	GIB® Standard plasterboard one side	GS1-N
GS2	GIB® Standard plasterboard two sides	GS2-N
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

When GIB EzyBrace® Systems 2011 installations methods are adopted, all GS and BL elements must be installed using the GIB EzyBrace® 2011 fastener pattern throughout the whole building.

Refer to GIB® technical literature for complete specification and installation information. For further information or specific advice call the GIB® Helpline on 0800 100 442 or visit gib.co.nz

GIB®

DBH Update

The Department and IPENZ have jointly published guidance about how fire design should be communicated and documented, including providing evidence of design methodology.

The guidance is now available on the Department's website – dbh.govt.nz.

One of the main concerns with fire design practice in New Zealand has been the lack of explanation and poor justification of how proposed designs comply with the Building Code for Fire Safety.

This guidance:

- Describes the regulatory requirements as they apply to fire design.
- Recommends the type of fire design documentation required.
- Identifies who is responsible for providing plans and specifications for building consent.

Good quality design documentation makes building consent processes easier for both designers and Building Consent Authorities (BCAs).

The Department of Building and Housing recommend that BCAs, designers and others become familiar with the guidance which is relevant to both acceptable solutions and specific design.

The guidance document is published as Practice Note No 22 by the Institute of Professional Engineers New Zealand and published by the Department of Building and Housing as guidance under Section 175 of the Building Act 2004.

Guidance of Documentation of Fire Designs

Lack of explanation and proper justification of how the proposed design complies with the requirements of the Building Code is one of the most common failures of consent applications involving fire safety requirements.

The enclosed IPENZ practice note "Guidelines for Documenting Fire Safety Designs" has been jointly published by IPENZ and the Department. In the latter case it is published as guidance in accordance with S175 of the Building Act. The Department of Building and Housing, Society of Fire Protection Engineers (NZ) (SFPE) IPENZ and others have worked together to prepare this document.

The guidance describes the regulatory requirements as they apply specifically to fire design and the recommended content of a fire design is presented in the form of table which includes, for the benefit of the design sector, which member of the design team would normally be expected to provide the information for the application.

We recommend that BCA staff become familiar with the content and encourage applicants for consent to follow the guidance, which is relevant whether the path taken to achieving compliance with the requirements of the Building Code is acceptable solution or via a specific design.

The guidance is also available for download from the Department's website at http://www.dbh.govt.nz/building-technical-guidance.

Members of both IPENZ and SFPE have also been made aware of this guidance, though others may not be familiar with it.

If you would like to clarify any aspect of fire design documentation, or the publication of this guidance generally, please contact Nick Saunders on 04 817 4833.

IPENZ ENGINEERS NEW ZEALAND

Practice Note 22

ISSN 1176-0907

Guidelines for Documenting Fire Safety Designs

VERSION 1 - SEPTEMBER 2011

FPA NEW ZEALAND

EST. 1918

SFPE

NEW ZEALAND FIRE SERVICE

Department of Building and Housing
Te Tari Kaupapa Whare

The normal use of a grab rail by an accessible toilet is to use the rail to either get on or off the toilet.

A Council inspection found this new use as an umbrella stand quite innovative but of course this innovation renders the grab rail almost impossible to use.

QUIZ ON ARTICLES IN THIS NEWS SHEET

1. BRANZ Appraisals are for the product/system assessed under that appraisal.

   (a) True
   (b) False

2. Only the BRANZ appraisal holder can use their appraisal to demonstrate compliance of their product or system with the New Zealand Building Code.

   (a) True
   (b) False

3. BRANZ appraisals are issued by:

   (a) Department of Building and Housing
   (b) The local Council
   (c) BRANZ

4. All current BRANZ appraisals are available to be viewed on:

   (a) www.dbh.govt.nz
   (b) www.branz.co.nz/appraisals

5. Trade-seal is a two piece non-adhesive collar for sealing around pipe and conduit.

   (a) True
   (b) False

6. Trade-seal comes in sizes to fit 8mm to ______mm diameter pipe or conduit.

   (a) 50mm
   (b) 150mm
   (c) 220mm

7. Trade-seal must be adhered to a clean and dry surface.

   (a) True
   (b) False

8. Trade-seal should be fitted to ______º.

   (a) 0º
   (b) 15º
   (c) 45º

9. Trade-flash 2.7 incorporates a return on the outer edge of the flashing to contain any moisture.

   (a) True
   (b) False

10. Retrofitting wall insulation requires a building consent unless a Council specifically exempts it.

    (a) True
    (b) False

11. Schedule 1 of the Building Act 2004 exempts underfloor and ____________ insulation retrofits from building consent.

    (a) Subfloor
    (b) Wall
    (c) Roof

12. Retrofitting insulation into a wall involves more work than simply placing or injecting insulation in walls.

    (a) True
    (b) False

13. Retrofitting wall insulation may affect moisture transfer inside timber framed walls.

    (a) True
    (b) False

14. Is there an acceptable solution for retrofitting insulation into a wall?

    (a) Yes
    (b) No

15. The greatest risk when retrofitting insulation into a wall is.

    (a) Colder house
    (b) Effect on moisture transfer within walls and potentially affect fungal growth in a wall.
    (c) Effect of insulation on electrical wiring.

16. Retrofitted insulation in a wall may effect the structural performance of an existing building if moisture were to accumulate in a wall.

    (a) True
    (b) False

17. The Code of Practice for Weathertight concrete and concrete masonry construction is cited as a means of compliance with the New Zealand Building Code Clause ____ External Moisture.

    (a) B1
    (b) E1
    (c) E2

18. Gib Ezybrace® Systems 2011 have been tested and appraised to meet the requirements of the New Zealand Building Code using New Zealand Standard NZS____ 2011.

    (a) 4229
    (b) 5263
    (c) 3604

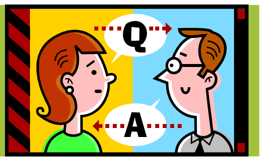
19. Bracing for a building using gib ezybrace should be distributed evenly across the whole building.

(a) True
(b) False

20. External walls generally account for around ______ of the total bracing performance of a house.

(a) ¼
(b) ⅓
(c) ¾

ANSWERS TO QUIZ



1.	a	11.	c
2.	a	12.	a
3.	c	13.	a
4.	b	14.	b
5.	b	15.	b
6.	c	16.	a
7.	a	17.	c
8.	c	18.	c
9.	a	19.	a
10.	a	20.	b