

SPECIFICATION FOR THE STACK BONDED BRICK VENEER SYSTEM

DESIGN NOTE TB2

CLAY BRICK AND PAVERS MANUFACTURERS ASSOCIATION

PRELIMINARY

A brick veneer that has been half-bonded, or stretcher bonded as it is referred to, is considerably stronger than a brick veneer where one brick has been laid on top of another, in other words, stack-bonded.

What is important in any veneer is its security in a major seismic event. The second consideration is to reduce the risk of cracks occurring in the mortar joints of the veneer, although should this happen to occur, provided this specification has been adhered to, there would be no risk of moisture ingress and minimal effect on the stability of the brick veneer.

This document is a 'Specific Design' bricklaying specification used for the construction of single storey, stack-bonded brick veneers. It is an 'Alternative Solution' to E2/AS1 Masonry applicable only when clay bricks, as mentioned in this document, are used to construct a brick veneer. This specification is supplementary to, and must be read in conjunction with, the General Bricklaying Specification Design Note TB-8 on CB&PMA website www.bricksnz.co.nz. If any aspect of design has not been specifically addressed, then Design Note TB-8, E2/AS1 Masonry, and NZS 4210 shall apply.

DESIGNER

The 'Architectural Designer' is responsible for ensuring that the brick veneer, as detailed on the Building Consent Plans and Specification, complies with all aspects of this 'Specific Design'.

It is essential that the builder, bricklayer and designer are familiar with all the requirements of the system as detailed in this document and the pre-requisite document – Design Note TB8. Where conflicting information arises, Design Note TB2, Stack-bonding, shall apply.

The designer must clearly mark on the plans submitted for Building Consent – *'SPECIFICATION FOR STACK-BONDING – DESIGN NOTE TB2 – no substitution'*.

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RELEVANT DOCUMENTATION

The following NZ standards and provisions of the NZ building code must be met in conjunction with this 'Specific Design'. Where conflicting information arises, this design specification is to be adhered to.

- Design Note – TB 8, General Bricklaying Specification
- NZS 4210 – Masonry Construction – Materials and Workmanship
- NZS HB 4236 – Masonry Veneer Wall Cladding (Summary code)
- NZBC Acceptable Solution E2/AS1 Section 9.2 Masonry Veneer

The above standards are the most relevant to the construction of masonry brick veneers. All other NZ design codes in their latest revisions are applicable where relevant.

BUILDING REGULATIONS

If designed, used, installed and maintained in accordance with the statements and conditions of this technical specification the Stack Bonded Brick Veneer System will meet the following provisions of the New Zealand Building Code:

Clause B1 STRUCTURE: Performance B1.3.1, B1.3.2, B1.3.3 (a), (f), (h), (j) and (q) and B1.3.4.

Clause B2 DURABILITY: Performance B2.3.1(a), not less than 50 years. The structural support elements and reinforcing meet this requirement. Performance B2.3.1 (b), 15 years The brick veneer wall cladding meets this requirement and B2.3.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1.

DESIGN LIMITATIONS

In addition to the NZ design codes above, the Stack-bonded brick veneer shall be limited to the following:

- Maximum veneer height of 4m for straight vertical panels and 5.5m to the apex of a gable or a pier as defined in this document (*Refer to figure 1*).
- The fundamentals outlined in this design specification may be adopted when building using steel studs and framing, however, 'Specific Engineering Design' would be required from a suitably qualified engineer knowledgeable with this form of construction.
- Should the design of the building fall outside the scope and requirements of this design specification, then additional 'Specific Engineering Design' would be required.
- The vertical alignment of the bricks is not to exceed ± 5 mm.
- For further design limitations, see design note TB8.

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SPECIFICATION

Bricks

This specification is only applicable to clay bricks manufactured by those companies who are members of the clay brick and pavers association. (CB&PMA) The bricks applicable to this document must conform to the requirements as outlined below:

- **Total cladding weight $\leq 220\text{kg/m}^2$.**
- **Maximum individual brick height of 200mm**
- **Minimum brick veneer thickness of 70mm**
- **Maximum brick veneer thickness of 110mm**

Maximum Veneer Heights

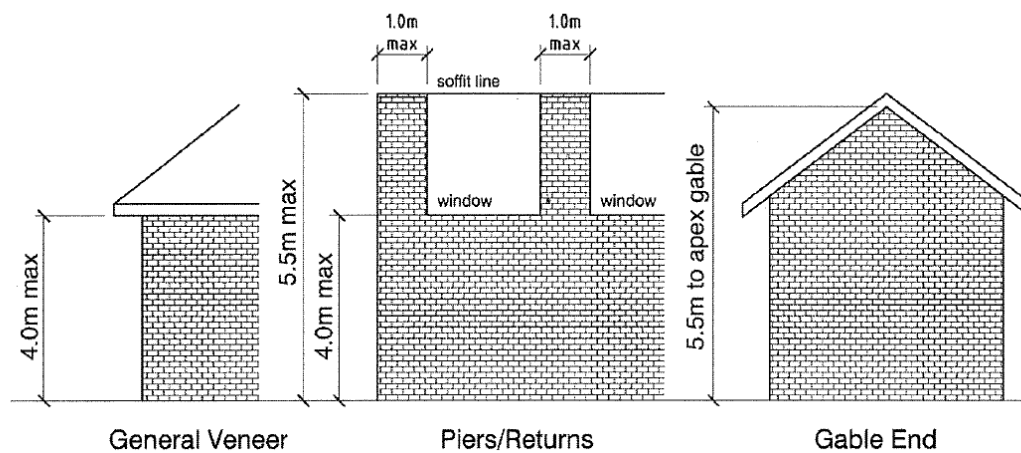


Figure 1 – Maximum veneer heights for single storey, stack-bonded construction

Panels

The bricks may be laid in one panel to a maximum height of 4m. No slip joints or shelf angles are necessary.

Gable Ends and Piers

A gable end or pier may extend to 5.5m in height as per figure 1 above. A pier is defined as a brick panel not exceeding 1.0m in width.

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Supporting structure

Timber Framing

If the brick veneer is supported by timber framing, the framing must be constructed in accordance with NZS 3604 to a maximum stud spacing of 400mm crs.

Concrete/Pre-cast Panels

If the brick veneer is supported by concrete or pre-cast panels, these must be constructed in accordance with NZS 4229.

Bracing

Bracing requirements of walls may be calculated using the prescribed tables in NZS 3604 using Heavy wall cladding.

Brick cavity

The brick cavity is to be 40-60mm, with 50mm recommended.

Mortar

The mortar used for construction must be either manufactured and bagged, or alternatively site mixed to a ratio of 4 sand to 1 cement (3 sand to 1 cement required for sea spray zones and NZS 3604 corrosion zones 1 and 4), and adhere to the requirements of NZS 4210. The same mortar must be used throughout the entire build. The mortar mix should be as wet as practically possible to achieve good bond strength. A multi-bond agent to the manufacturers' specifications is to be added to the mortar mix, to improve bond-strength.

Mortar Joints

Mortar joints shall be 10mm with a maximum permitted tolerance of ± 2 mm.

Unless otherwise specified, all mortar joints are to be raked to a depth of 4mm and tooled smooth. The maximum permitted raked depth is 6mm.

All bed and perpend joints are to contain a full spread of mortar; any holes in the finished veneer are to be minimal and filled on completion.

Control Joints

Control joints are generally not required as they introduce a weakness to the veneer and compromise the brick joint reinforcement. Should a crack occur, it is likely to be a vertical hairline crack that can simply be repaired should this be considered necessary. There are

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always exceptions to this rule, depending on the layout of the veneer, and so the responsibility of whether to install control joints is on the designer and the client.

Brick Ties and Joint Reinforcement

Brick joint reinforcement should be located in the course halfway between the courses above and below where brick ties are located. I.e, If brick ties and brick joint reinforcement are both required every fourth course. The ties would be located in courses 2, 6 and 10 and the reinforcement in courses 4, 8 and 12.

Brick ties

- Brick ties are to be EH (Heavy Duty Earthquake) ties conforming to the requirements of NZS 2699.1.
- The durability requirements of the ties are to comply with NZBC Acceptable Solution E2/AS1 Paragraph 9.2.7 and selected based on the building sites Exposure Zone from Table 18C.
- Brick tie length is dependent on the cavity width and veneer thickness. The ties must be seated on at least 50% of the thickness of the veneer and must have at least 10mm cover from the face of the mortar.

Note: If rigid wall underlays are installed, increase the length of the brick tie screw, and cavity width to ensure a minimum 40mm cavity is achieved.

Brick tie spacing

Brick ties are to be fixed horizontally to studs at a maximum spacing of 400mm crs, and vertically depending on the height of the brick as per table below.

Ensure that a row of brick ties is placed within the bottom 300mm, and the top 200mm of the veneer.

Where bricks are laid on a steel lintel, ensure the first row of ties is within 200mm of the steel lintel.

Brick joint reinforcing steel

Galvanised or stainless reinforcing steel must be selected based on the site exposure zone as from NZBC Acceptable Solution E2/AS1 Table 18D.

Brick joint reinforcing steel consisting of two parallel rows of 4.0mm wire spaced at 36mm centres with 2mm welded wire ties at 160mm centres and formed into straight and corner sections.

Brick joint reinforcing spacing

Straight and corner sections of brick joint reinforcing must be lapped a minimum of 200mm to form a continuous reinforcement in the brick course. Brick joint reinforcement is to be bedded into the horizontal mortar joint at maximum 400crs vertically. See Table 1

Table 1 – Brick tie and joint reinforcement spacing

| Placement of Brick ties and joint reinforcement in Mortar Courses | | |
|--|--|--|
| Height of Brick (mm) | Brick tie Spacing (400mm Maximum Spacing) | Brick joint reinforcing spacing (400mm Maximum Spacing) |
| <50mm | First brick tie in 3 rd course from the bottom, then every 6 th course | In the 6 th course from the bottom, then every 6 th course |
| 51mm to 90mm | First brick tie in 2 nd course from the bottom, then every 4 th course | In the 4 th course from the bottom, then every 4 th course |
| 91mm to 120mm | First brick tie in 2 nd course from the bottom, then every 3 rd course | In the 3 rd course from the bottom, then every 3 rd course |
| 121mm to 190mm | First brick tie in the 1 st course, then every 2 nd course | In the 2 nd course from the bottom, then every 2 nd course |

TECHNICAL SUPPORT

Should you require any technical support on the CB&PMA stack-bonded Brick Veneer System, please use the contact information as shown below:

Telephone:

| | |
|-------------------------------|----------------------|
| Canterbury Clay Bricks | (03) 318 8203 |
| Clay Bricks Ltd | (07) 828 9919 |
| Midland Brick NZ | 0800 643 526 |
| The Brickery | 0800 507 600 |

Contact: <http://bricksnz.co.nz/contact-administration/>

Website: www.bricksnz.co.nz

