Design Note TB8 2025

CLAY BRICK & PAVER
MANUFACTURER'S ASSOCIATION

Supporting Brick Veneer Across Openings

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Contents

Introduction 3
- Scope 3
- Disclaimer 3
- Selecting method of support 4

Traditional Lintel Support 5
- Angle vs. Flat Bar 5
- Cavity Width 5
- Sizing Angles 5
- Good Practice 5

Fixed-to-Framing Lintel Support 7
- Steel Thickness 7
- Installation and Length 7
- Raked head or sloping lower roof: 9
- Head flashing 11
- Garage doors 11

Alternative Options 11

General Comments 12
- Cutting Steel Angles 12
- Brick Ties 13
- Lintel Placement 12
- Design Note TB1, Table 5.0: 12
- Avoid ‘Pistol Joints’ 12

Durability Zone standard 13
- Microclimatic considerations 13
- Exposure Zones 14

Related Documents 15

Introduction

The NZ Clay Brick and Paver Manufacturers Association has developed these guidelines for supporting brick veneer across openings. Please refer to Related Documents for additional information.

SCOPE

The information in this document is intended for buildings within the scope of NZS 3604 section 1.1. Building outside this scope will require Specific Engineering Design.

This document details the comparison of support methods over openings:

- Traditional/Floating Lintel which is included in the NZBC E2/AS1
- Lintel Fixed to framing SED in Design note TB1 by BRANZ
- Durability requirements as per NZS3604:2011 section 4.2.4

DISCLAIMER

Always review and follow local building codes and standards, as they take precedence over this document.

Industry “good practice” also forms part of this document and is to be used as a guide not superseding professional advice, Specific Engineered Design or Building Code Regulations.

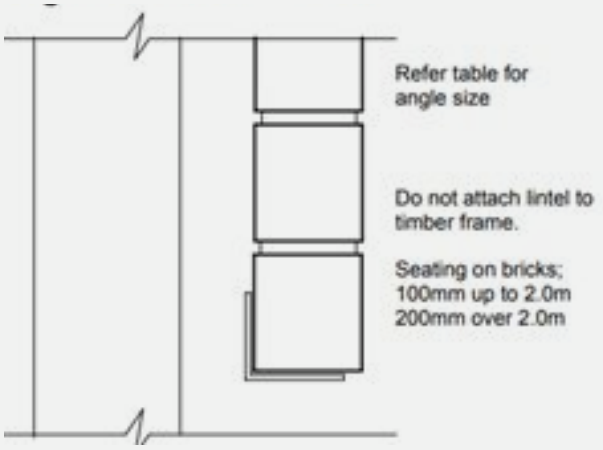
The information contained herein is, to the best of our knowledge, accurate and relevant. However, due to the nature of codes and standards, information in this document is subject to change.

Selecting method of support

When it comes to supporting lintel openings in brick veneer construction, there are two main methods: traditional lintel support and fixed-to-framing lintel support.

TRADITIONAL LINTEL SUPPORT

As included in NZBC E2/AS1 Masonry Guidelines.

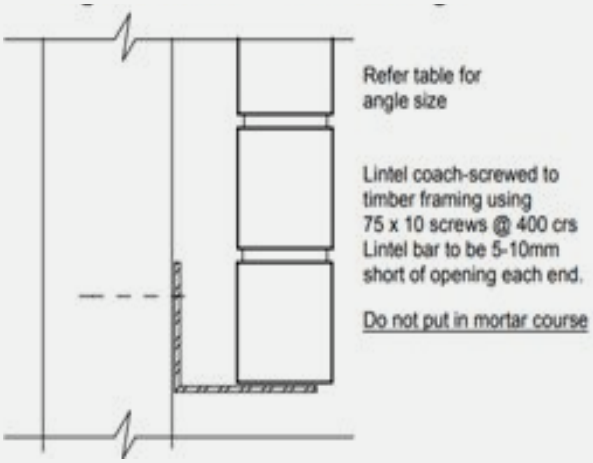


ADVANTAGES

- Simplicity:
  Straightforward to install and do not require complex engineering.
- Load Distribution:
  They effectively distribute the load from the brick veneer to the adjacent masonry, reducing the risk of step cracking.
- Versatility:
  Suitable for various types of openings and can be used with different materials like steel, concrete, or timber.

FIXED-TO-FRAMING LINTEL SUPPORT

A popular Alternative Solution covered by Design Note TB1 under specific engineering design by BRANZ.



ADVANTAGES

- Simplicity:
  Provides a more stable connection between the brick veneer and the timber frame, reducing the risk of differential movement with large openings.
- Load Distribution:
  They can handle higher loads and are less likely to deform under pressure.
- Versatility:
  These lintels are often more durable and require less maintenance over time.

DISADVANTAGES

- Complexity:
  Installation is more complex and may require specific engineering design for the extra loading on the framing.
- Cost:
  Generally, more expensive due to the additional materials (packers and galvanised mesh) and labour required.
- Flexibility:
  Less flexible in terms of accommodating movement between the veneer and the frame, which can be an issue in areas with significant temperature or moisture changes.

Traditional Lintel Support

ANGLE VS. FLAT BAR

Always use an angle rather than a flat bar for shorter openings. Structurally angle iron is more resistant to deflection than flat bar. To avoid onsite errors, try to specify the same size for most openings.

CAVITY WIDTH

E2/AS1 specifies minimum cavity width of 40mm and a maximum of 75mm.

Designers should detail this so the weather step, brick ties and lintels (fixed to framing) can be determined prior to installation. View the E2/AS1 claude online.

SIZING ANGLES

Use Table 5.0 of Design Note TB1 for sizing angles.
View TB1 online.

"The following table may be used for 70mm and 90mm bricks, and the height of the veneer is not important."

TABLE 5.0 of Design Note TB1 –
LINTEL BARS SUPPORTING VENEER OVER OPENINGS

Max.Span (mm)	Size of Angle
3000 mm	80 x 80 x 6
3500 mm	100 x 100 x 6 or 125 x 75 x 6
4500 mm	125 x 75 x 8
4800 mm	125 x 75 x 10

Note: This table has been specifically engineered design and can be used on all clay veneers associated with these companies.

GOOD PRACTICE

Bricklayer should identify the size of the shelf angles before starting and adjust their set out accordingly.

Installation Orientation
For unequal angles, position the longer leg vertically when using the 'Traditional' method.

Resting Angles
For openings up to 2.0m, the angle should rest a minimum of 100mm on each side. For openings over 2.0m, it should rest 200mm on each side.

Propping Angles
Always prop the angle in the middle of the span for larger (2m+) openings for at least 7 days.

Brick Module and Mortar Joint

RECOMMENDED PRACTICE

When designing a building, consider the height of windows and doors in relation to the brick module plus a 10mm mortar joint. Aim to align the mortar joint across an opening so the lintel bar fits into a standard mortar joint.

Consider laying a soldier course of bricks across openings to address horizontal alignment issues. Soldier bricks can be cut lengthwise to match the mortar courses. Extending the soldier course on each side of the opening is also recommended.

TO BE AVOIDED

When walls heights are not designed to accommodate the brick module, slots that are cut into brickwork for the lintel to bear. These situations create a weak point on the brick and tend to crack with the slightest movement and should be avoided if possible.

Avoid thin slithers of bricks.

Fixed-to-Framing Lintel Support

Fixing the steel lintel bar to the timber lintel or framing is a widely used method. Although it falls outside E2/AS1 Masonry guidelines, it is covered by Design Note TB1 under specific engineering design by BRANZ. View TB1 online.

STEEL THICKNESS

If fixing steel lintels to the framing, 6mm thickness is sufficient. For traditional installation.

TABLE 6.0 of Design Note TB1 –
SIZE OF LINTEL ANGLE – SCREW FIXED

Cavity Width	Angle Size	
	70 mm Brick	Up to 90 mm Brick
40 mm	100x75x6 100x100x6	120x100x6
45 mm	100x75x6	120x100x6
50 mm	100x75x6	120x100x6
55 mm	120x100x6	125x75x6
60 mm	120x100x6	125x75x6

INSTALLATION AND LENGTH

The angle must not touch the brickwork on either side of the opening. It should be 5mm – 10mm shorter than the brick opening width to allow for movement of the timber framing without contacting the brick veneer or plaster.

Good practice is to install galvanised mesh in two courses above the lintel, extending 200mm each side. This assists with the tension that occurs with differential movement between the framing and brickwork and reduces step cracking that can occur from the corners.

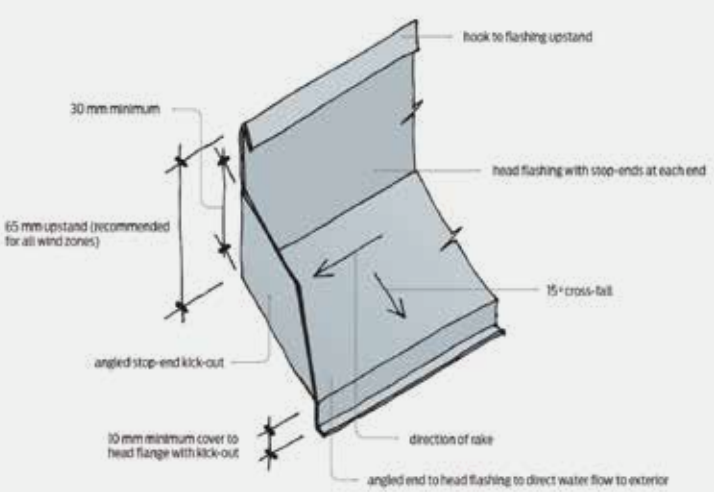
HOLE POSITIONING

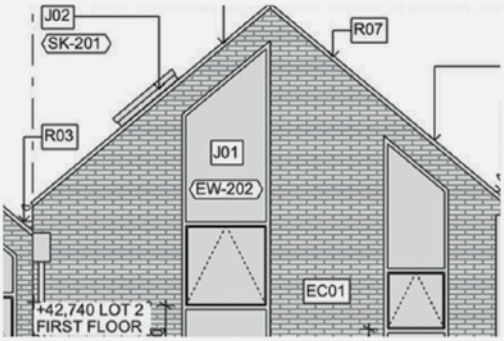
The 11mm holes for the 10mm coach screws should be positioned 25mm down from the top of the vertical leg to optimize the overturning moment.

FIXING THE ANGLE

Fix the angle at a maximum of 450mm centres using 75x10mm coach screws or 12mm galvanized bolts. This strengthens the timber lintel, and the steel angle thickness does not need to exceed 6mm, regardless of the span.

Raked Head or Sloping Lower Roof





Head flashing shaped to deflect water

POINTERS WHEN DETAILING A RAKED WINDOW HEAD

The key elements to the detailing of a raked aluminium head that overlaps the cladding are:

• getting water off the flashing at the bottom of the rake

• stopping water getting in at the top of the rake

Key elements of Acceptable Solution E2/AS1 that can be applied to the raked flashing installation are the interaction of the flashing upstands (suggested increase in height), cladding cover and cover to the window flange.

OPTION 1 – HEAD AS APRON FLASHING

The preferred option is to consider the raked head flashing as an apron flashing with a stop-end kick-out (see Figure above) at the bottom of the rake. This will discharge water to the outside for both cavity and direct-fixed claddings (having a cavity is preferred). A flashing stop-end as detailed in E2/AS1 is designed to prevent water being driven past the end of the flashing into a cavity. When applied to a raked window, it has two flaws:

• It does not deflect water to the outside face of the cladding as it terminates at the back face of the cladding.

• It is not of sufficient size to deflect the amount of water that may be present.

Key requirements include:

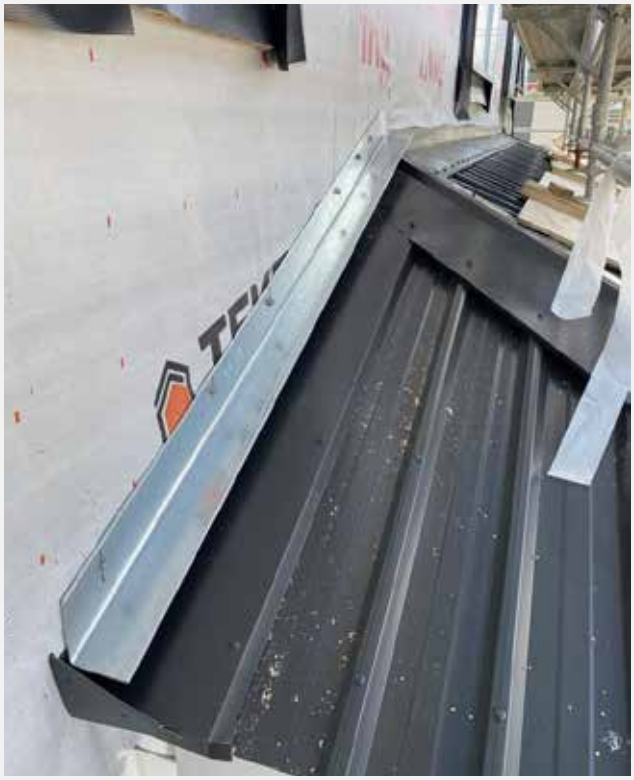
• Sealing any cut in the cladding to allow the installation of the kick-out flashing

• Sealing the top of the scriber to the underside of the head flashing.

OPTION 2 – TIMBER BEAD

A second option where the top of the window fits directly under a flat sheet soffit is to protect the junction at the raked head with a timber bead that is sealed to both the window flange and the soffit.

Extracted from BRANZ Build 162 Oct/Nov 2017.
Click to view full document online.



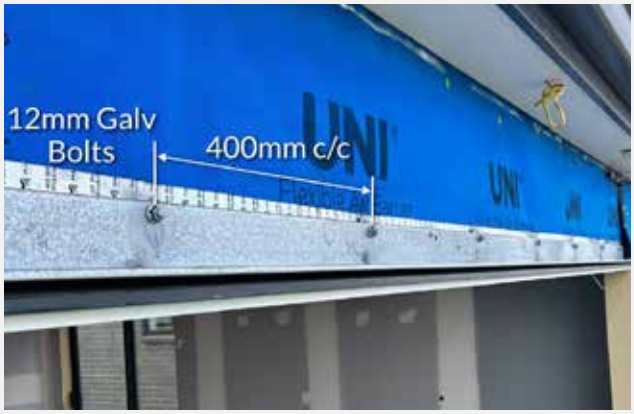
Flat bar can also we welded to the bottom end of the lintel to form a “kick out or stop end” to divert the water.

HEAD FLASHING

Some details require head flashings to be fixed by screws. When the screw heads interfere with the lintel, packers are installed to keep the lintel horizontal.

GARAGE DOORS

For larger openings generally, lintels are bolted to steel U channels with 12mm diameter bolts at 400 c/c. This requires SED.



Alternative Options

While the two methods mentioned are common practices in the brick industry, there are other alternatives that require specific design:

STEEL-LESS LINTEL SYSTEM

Suited for aesthetical reasons and durable in Sea Spray Zones, that is, within 500m of the coast.
Click to view Method 3 from the Think Brick 2 Storey Clay Brick Veneer Construction Made Easy.

PRECAST CONCRETE BEAMS

These beams offer a strong, durable alternative.

NATURAL STONE BEAMS

Another option that provides an aesthetic alternative.

General Comments

CUTTING STEEL ANGLES

If cutting or drilling holes is required, spray with a suitable 'Cold Galvanizing' (95% Zinc) to reduce the exposure of moisture to combat rust.

BRICK TIES

Modern screw-fixed brick ties can support the total dead load of a properly installed brick veneer, making steel lintels primarily act as formwork.

LINTEL PLACEMENT

Position the steel lintel 15mm-20mm back from the face of the brick veneer to make it less visible.

DESIGN NOTE TB1, TABLE 5.0:

This table is applicable to both single and two-storey dwellings. It simplifies the process by eliminating the height of brick supported by the steel lintel. Use this table instead of E2/AS1 Table 18E (Click here to View Table 5.0 TB1). Interestingly, the more brick veneer above an opening, the less weight on the supporting angle due to modern screw-fixed brick tie systems and the natural arching of the brickwork, which directs the dead load to each side of the opening.

AVOID 'PISTOL JOINTS'

Avoid where possible as these can crack if the lip is too small. If required, suggest minimum of 10-15mm remaining of brick after cut to avoid damage.

Durability Zone Standard

Determine the 'Durability Zone' for your build. Steel lintels must meet NZBC requirements for the zone. Generally, galvanizing is sufficient, but in 'Sea Spray' zones (within 500m of the high-water mark), an epoxy coating or 316 Stainless Steel is necessary.

MICROCLIMATIC CONSIDERATIONS

Significant acceleration of the corrosion rate of structural fasteners and fixings beyond what could be expected from the geographical location can occur in the following circumstances:

A. Industrial contamination and corrosive atmospheres

B. Contamination from agricultural chemicals or fertilisers

C. Geothermal hot spots. Hot spots are defined as being within 50m of a bore, mud pool, steam vent, or other source

Microclimatic conditions (A) and (C) require SED. (NZS3604:2011 Durability 4.2.4)

Table 18D: Corrosion protection to lintels Paragraph 9.2.9, Table 18E

	316 or 316L or 304(2) stainless steel or **600 g/m² galvanising on mild steel plus duplex coating(1)**	**600 g/m² galvanising on mild steel(1)** or **300 g/m² galvanising on mild steel plus Duplex coating(1)**
Zone B	Yes	Yes
Zone C	Yes	Yes
Zone D	Yes	

1) To AS/NZS 2699.3
2) 304 stainless steel will exhibit greater levels of surface rusting than 316 stainless steel, especially where not exposed to rain washing.

Exposure Zones

ZONE B
Low risk of corrosion.

ZONE C
Medium risk of corrosion.

ZONE D
High risk of corrosion, also known as the sea spray zone12. This zone includes all offshore islands, areas within 500 meters of the coastline, and areas within 100 meters of tidal estuaries and sheltered inlets13.In these areas, the atmospheric corrosivity is very high due to the heavy deposition of airborne sea salt particles2

Related Documents

- NZS3604:2011
- MBIE NZ Building code E2 Building code
- AS/NZS 2699.3.2000 part 3 Lintels and shelf angles (durability requirements)
- Think Brick New Zealand 2 Storey Clay Brick Veneer Construction Made Easy
- BRANZ Design Note TB1
- Raking window head detail by Alide Elkink. BRANZ build 162 2017
- BRANZ Maps zone information

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