



LICENSED BUILDING PRACTITIONERS



Top plate connections



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It can be difficult to understand the requirements for joints in top plates, but here are some pointers from NZS 3604:2011 for top plate connections.

SPECIFIC REQUIREMENTS for joints in top plates are set out in section 8.7.3 of NZS 3604:2011 *Timber-framed buildings*.

All joints in top plates must be made over a support, such as a stud or solid blocking between studs. Other criteria for joints depend on whether the wall:

- is braced (either in line or a wall intersecting it is braced)
- contains no bracing elements.

Each of these situations is covered below.

Many of the methods require a fixing of a certain strength or capacity, measured in kN (kilonewtons).

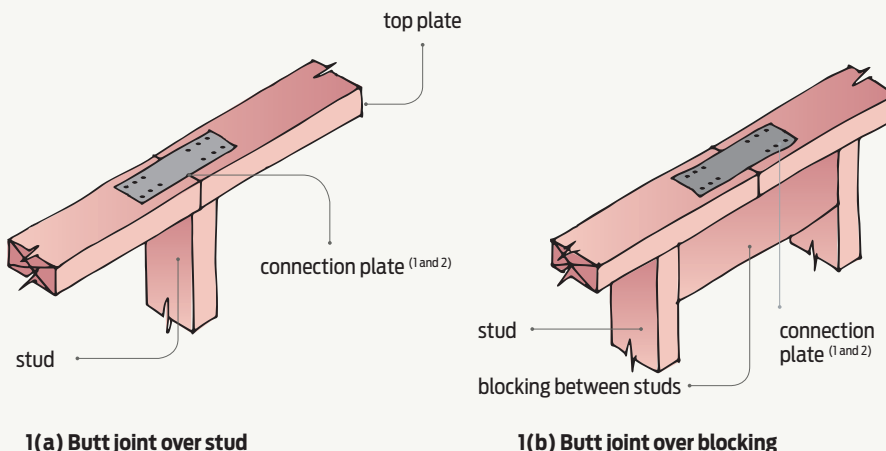
Walls with bracing – in-line connections

For single-storey buildings, the capacity of joint connections in top plates of walls with one or more bracing elements is based on the highest rated bracing element in the wall. The connections must be in both tension and compression along the plate and require the following capacities:

- 3 kN capacity connections for walls containing up to 100 bracing units (BUs).
- 6 kN capacity connections for walls containing more than 100 BUs.
- 6 kN capacity connections for walls with a ceiling diaphragm.

Figures 1(a) and (b) give further detail.

The 3 kN and 6 kN connections can be made using metal connection plates or nailed joints with fixings (see Table 1). However, if an extra top plate is used and the joints are not aligned with the lower top plate, the 3 kN or 6 kN capacity connections are not normally required as long as



Notes:

1. Connection plate capacity = 3 kN, where bracing capacity < 100 BUs.
Connection plate capacity = 6 kN, where bracing capacity > 100 BUs.
2. Connection plate not required when extra top plate is used and joints in plates are staggered.

Figure 1 Connecting top plates in line in walls containing bracing.

there is at least a 3 kN/6 kN nailed joint connection (as appropriate) between top plate pairs.

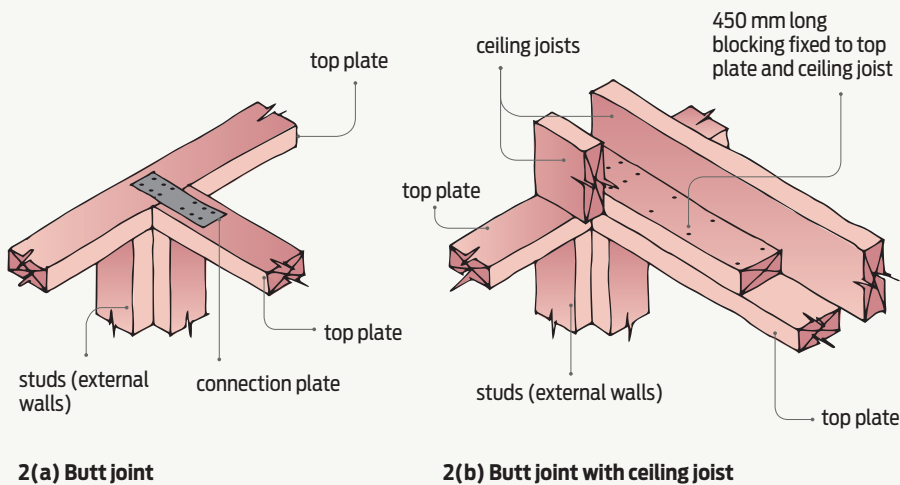
Walls with bracing – right angle connections

Internal walls containing one or more bracing elements must be connected to external walls that are at right angles to them at the top plate level. Connections in tension and compression along the line of the wall bracing element may be

direct (Figure 2(a)) or through framing members (such as truss bottom chords, ceiling joists or ceiling battens) that are in line with the braced wall (Figure 2(b)).

Each internal wall must have the following connection capacity. A wall with:

- up to 125 BUs requires a 6 kN connection to at least one external wall
- up to 250 BUs requires 6 kN connections to at least two external walls



2(a) Butt joint

2(b) Butt joint with ceiling joist

Capacities of nailed joints:

- Up to 3 kN: 3/100 × 3.75 mm nails per side.
- Up to 6 kN: 6/100 × 3.75 mm nails per side.

Notes:

Connection plate fixing capacity for each wall with:

- maximum 125 BUs: 6 kN to at least one external wall
- maximum 250 BUs: 6 kN to at least two external walls
- more than 250 BUs: 2.4 kN/100 BUs to at least two external walls.

Figure 2

Connecting top plates of external walls at right angles to other walls containing bracing.

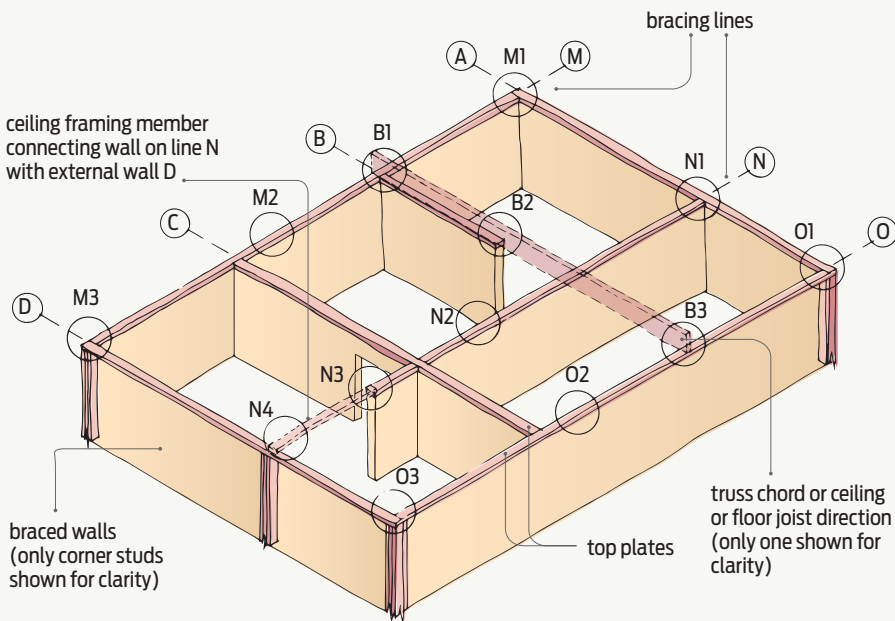


Figure 3

Top plate connections.

- more than 250 BUs requires minimum connection capacities of 2.4 kN per 100 BUs to at least two external walls.

Worked example

Figure 3 demonstrates the various options.

In-line connections in top plates

For the in-line connections at M2, N2, N3 and O2 in Figure 3, if the total BUs in the bracing lines M, N or O are:

- less than 100 BUs, use 3 kN capacity connections
- more than 100 BUs, use 6 kN capacity connections. ➤

Table 1

COMMON FIXING DETAILS FOR 3 kN AND 6 kN CONNECTIONS

FIXING FOR METAL CONNECTION PLATES	
Up to 3 kN	3/30 × 3.15 mm nails per side
Up to 6 kN	6/30 × 3.15 mm nails per side
FIXING FOR NAILED JOINTS	
Up to 3 kN	3/100 × 3.75 mm nails per side
Up to 6 kN	6/100 × 3.75 mm nails per side

If a double top plate is used and joints in the top plates are staggered, neither the 3 kN or 6 kN capacity connections are required according to NZS 3604:2011.

Right angle connections in top plates

For the right angle connections at M1 and O1 in Figure 3, if the wall on bracing line A has:

- up to 250 BUs, 6 kN connections are required at each end of line A
- more than 250 BUs, connections at each end of line A must have a capacity of at least 2.4 kN per 100 BUs.

For connections at N1 and N4, if the wall on bracing line N has:

- up to 125 BUs, 6 kN connection to an external wall is required
- up to 250 BUs, 6 kN connections to each end of the wall at both external walls are required
- more than 250 BUs, a fixing capacity of 2.4 kN per 100 BUs of the wall at both external walls is required.

Right angle walls that are laterally supported

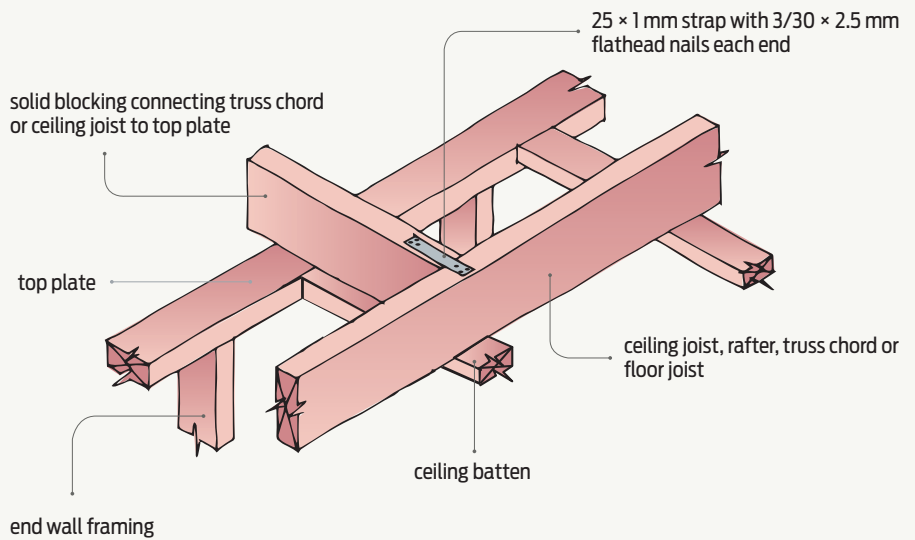
The connection requirements of the wall on bracing line B to the external wall in Figure 3 depends on the amount of bracing in wall B:

- If there is no bracing in wall B, a 3 kN connection or a halved joint or a butt joint over a stud or blocking may be used at B1.
- If the bracing does not exceed 125 BUs, use a 6 kN connection at B1.
- If there are between 125 and 250 BUs, a 6 kN connection is required at B1 and the wall must be connected to external wall O with the bottom chord of a truss or with a ceiling joist between B2 and B3 using a 6 kN connection.
- If there are more than 250 BUs, the connection at B1 must be 2.4 kN per 100 BUs and the wall must be connected to external wall O with the bottom chord of a truss or with a ceiling joist between B2 and B3 using a connection of 2.4 kN per 100 BUs.

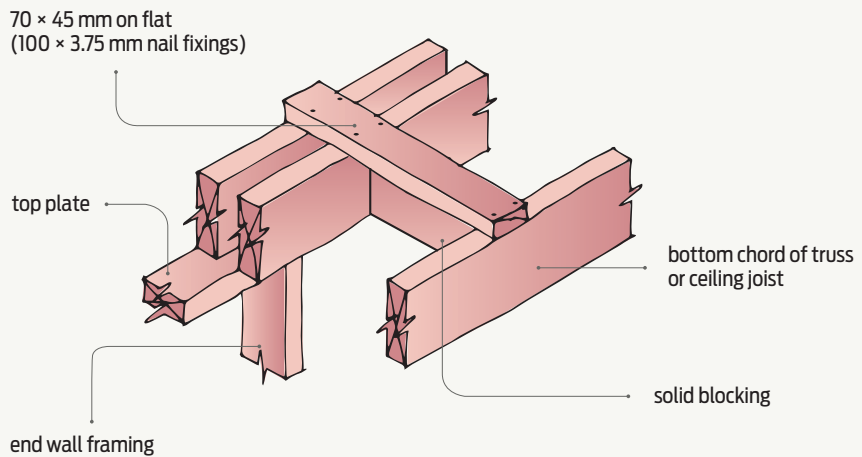
Lateral support for top plates

Top plates must be laterally supported by any one of the following:

- A sheet ceiling lining with a minimum density of 600 kg/m³.

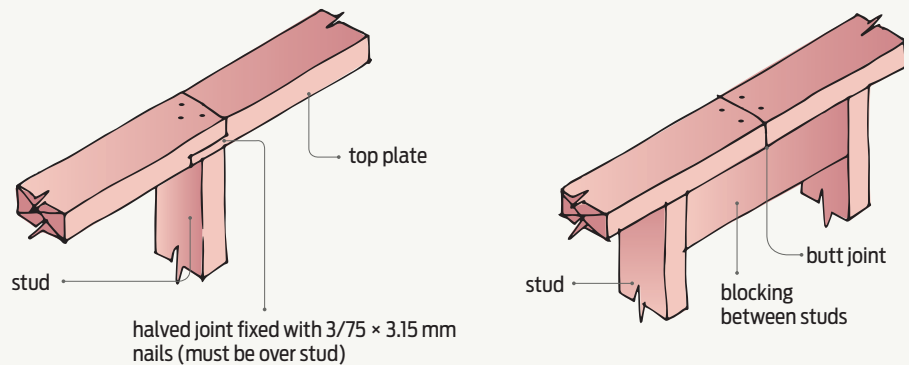


4(a) Solid blocking and ceiling batten connection



4(b) 70 x 45 mm connection to truss chords or ceiling joists

Figure 4 Connecting members providing lateral support to top plates.



5(a) Halved and nailed joint

5(b) Butt joint

Figure 5 Connecting top plates in walls with no bracing.

- Intersecting blocking (Figure 4(a)), ceiling joists, rafters or trusses.
 - Framing members at maximum 2.5 m spacings.
 - 70 × 45 mm connecting members (Figure 4(b)).
- If the ceiling has a density of less than 600 kg/m³ (such as softboard) and the distance between bracing lines is between 5–6 m, a 90 × 45 mm top plate must have an additional 140 × 35 mm top plate.

Walls with no bracing elements

A joint made in the top plate of a wall that contains no bracing elements, in line or at a wall intersection, can be any one of the following:

- A halved and nailed joint (Figure 5(a)).
- A butted and nailed joint over blocking (Figure 5(b)).
- A joint with an alternative fixing with at least 3 kN capacity in compression or tension (see Table 1). ◀

Quiz

1. Which of the following is not correct?
Walls with no bracing elements may have top plate connections made by:
 - a. a halved and nailed joint
 - a. a butted and nailed joint over blocking
 - a. a minimum of 3 kN capacity alternative fixing
 - a. a minimum of 6 kN capacity alternative fixing.
2. Which of the following is correct?
 - a. Joints in top plates may be made anywhere in the top plate.
 - b. Joints in top plates must be made over a support such as a stud or solid blocking.
3. True or false? In-line wall connections of 3–6 kN capacity are not required under NZS 3604:2011 if an extra top plate is used.
 - a. True.
 - b. False.
4. In Figure 3, if the wall on bracing line D has less than 250 BUs, connections at M3 and O3 must be:
 - a. 3 kN capacity
 - b. 6 kN capacity
 - c. 2.4 kN/100 BU capacity.

Answers: 1. d 2. b 3. a 4. b