RAFTER FIXING REQUIREMENTS IN NZS 3604:2011

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RAFTER FIXING REQUIREMENTS for rafters in couple-close roof construction is fairly straightforward in NZS 3604:2011 Section 10 Roof framing.

However, finding the requirements for rafter fixings in skillion roofs, or for hip and valley rafters, is a little more circuitous.

Figures 1–5 show the fixing requirements for the various roof framing elements.

From NZS 3604:2011
When considering the fixings required (see Table 1), NZS 3604:2011 uses:
- fixing types E (or 4.7 kN equivalent) and F (or 7 kN equivalent) depending on the span and size of rafters (rafter spans may be increased by 10% where continuous over two or more spans)
- a default wind zone of extra high (EH) – a note within NZS 3604:2011 Table 10.1 indicates that rafter span lengths may be adjusted for other wind zones by multiplying factors of 1.3 for low and medium and 1.1 for high and very high wind zones.

Important connections
Connections that need to be considered are rafter (or jack rafter) to:
- ridge board for a couple-close roof (Figure 1a)
- top plate for a couple-close roof (Figure 1b)
- top plate for a skillion roof (Figures 2 and 3)
- ridge beam for a skillion roof (Figure 4).

Figure 5 covers the connection of the hip rafter to the top plate where the hip rafters brace the roof.

<table>
<thead>
<tr>
<th>FIXING TYPE</th>
<th>DESCRIPTION</th>
<th>ALTERNATIVE FIXING CAPACITY</th>
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</thead>
<tbody>
<tr>
<td>Type E</td>
<td>2/90 × 3.15 mm skew nails + 2 wire dogs</td>
<td>4.7 kN</td>
</tr>
<tr>
<td>Type F</td>
<td>2/90 × 3.15 mm skew nails + 2 strap fixings</td>
<td>7.0 kN</td>
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</table>

(a) Rafter to ridge board

No connections are given in NZS 3604:2011, use:
- 4/75 × 3.15 mm skew nails or
- 2/100 × 3.75 mm end nails

(b) Rafter to top plate

Type E: 2/90 × 3.15 mm skew nails + 2 wire dogs or 4.7 kN connectors
Type F: 2/90 × 3.15 mm skew nails + 2 strap fixings or 7.0 kN connectors
(Fixings from NZS 3604:2011, Table 10.1)

Figure 1 Couple-close roof.
7.0 kN fixing capacity: fixing straps to each side of rafter with:
- 4/30 × 3.15 mm nails to side of both top plates
- 4/30 × 3.15 mm nails fixing strap to rafter

**Figure 2**  Rafter to double top plate fixing – skillion roof.

7.0 kN fixing capacity: fixing straps to each side of rafter with:
- 2/30 × 3.15 mm nails to both side and bottom of top plate (4 total)
- 4/30 × 3.15 mm nails fixing strap to rafter

**Figure 3**  Rafter to single top plate fixing – skillion roof.
7 kN connection: fixing straps to each side of hip rafter with:
- 4/30 × 3.15 mm nails to both sides of top plate (as per alternatives for single and double top plates)
- 4/30 × 3.15 mm nails fixing strap to rafter

**Figure 4**
Rafter to ridge beam — skillion roof.

**Option A**
- 25 × 1 mm strap with 6/30 × 2.5 mm nails into each rafter when rafters support ceiling lining (6 kN connection)
- 32 mm rafter bearing on beam

**Option B**
- 25 × 1 mm strap with 6/30 × 2.5 mm nails into each rafter when rafters support ceiling lining
- 15 mm deep housing

**Figure 5**
Hip rafter as bracing member.