

**BUILD
RIGHT**



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Fixing it right first time

THERE ARE A MYRIAD OF FIXING TYPES AND FINISHES AVAILABLE. SELECTING THE RIGHT FIXING FOR THE LOCATION IS CRITICAL TO THE ONGOING PERFORMANCE AND DURABILITY OF THE BUILDING.

FIXINGS PLAY A CRITICAL ROLE in construction.

They are the components that actually hold the building together, whether it's a nail, a screw or a structural fixing, such as a bolt or bracket.

Starting point

The two primary references are NZS 3604:2011 *Timber-framed buildings* Section 4.4. for timber connections and E2/AS1 Section 9 and Tables 20–22 for cladding and flashing compatibility (the tables make no mention of fixings for the cladding or flashing materials). Additional information is given in BRANZ Bulletin 519 *Fastener selection*.

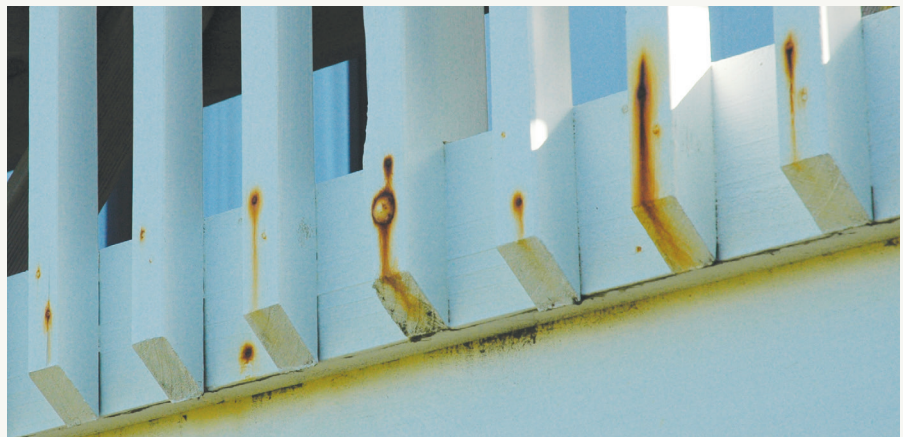
Factors that need to be taken into account when selecting a fixing include the:

- in-use environment – wet or dry (moisture is a key factor in all corrosion), benign or corrosive, hidden or closed, sheltered or exposed
- local micro-climatic conditions – these may be quite unique
- compatibility/suitability of the fixing with the materials being fixed:
 - for timber, its acidity – treated or untreated, type of treatment
 - for metals, the level of applied corrosion protection or the galvanic scale determines metal compatibility
- fixing type – zinc-plated steel, hot-dip galvanised steel, stainless steel, silicon bronze.

Poor fixing selection has consequences

Where the fixing selected is not suitable for the materials being fixed or the environment it is exposed to, the end result is premature deterioration of the fixing and loss of fixing performance. Typically this shows as:

- premature corrosion of the fixing leading to:
 - loss of metal thickness within the fastener and therefore loss of strength and performance



Rust staining after using an inappropriate fixing.

- deterioration of the timber around the corroding metal fixing
- rust staining of surface finishes where a cladding fixing corrodes
- corrosion of a metal cladding around the fixing point
- difficulty in extracting fixings due to the onset of corrosion binding the fixing into the substrate.

NZS 3604 and fixings

NZS 3604:2011 Section 4.4 covering the durability of steel fixings and fastenings used with timber framing has specific requirements in:

- Table 4.1 for the protection required for steel fixings and fastenings excluding nails and screws
- Table 4.2 for the galvanising of steel components other than nails and screws – the required galvanising coating rates are given
- Table 4.3 for steel items such as nails and screws used for framing and cladding.

The key aspect when selecting fixings and fastenings to meet the requirements of NZS 3604:2011 are:

- the exposure zone – in zone D, Table 4.1 requires all structural fixings in sheltered and exposed locations to be stainless steel (minimum grade 304)
 - the location of the fixing or fastening (Figures 4.3(a) and (b)):
 - closed (within the building envelope and not subject to airborne salts and rain wetting)
 - sheltered (open to airborne salts but not rainwashed)
 - exposed (open to airborne salts and rain washing)
 - for subfloor fixings, the amount of subfloor ventilation
 - how close any timber pile fixing is to the ground – structural fixings such as bolts within 600 mm of the ground must be stainless steel.
- The notes to the tables require:
- stainless steel or copper, silicon bronze fixings when copper quaternary and copper azole timber treatments have been used in exposed or sheltered situations and galvanised fixings in closed situations ➤

- hot-dip galvanised can be used with external CCA-treated timber in exposure zones B and C and in exposure zone D for claddings that have not more than 15-year durability
- a minimum 5 mm steel thickness for fabricated steel brackets that are hot-dip galvanised – these brackets must be hot-dip galvanised after manufacture and can only be used in a sheltered location in exposure zones B or C.

E2/AS1 tables

E2/AS1 clauses 4.2.2 and 4.3 state that metals that are in contact in locations where they will become wet, or where water can flow over metals or certain plastics onto another metal, shall be selected in accordance with:

- Table 20 for material selection – focuses primarily on metal claddings including fixings to these claddings
- Table 21 for compatibility of materials in contact
- Table 22 for compatibility of materials subject to run-off.

Tables 21 and 22 do not specifically mention cladding fixings, but they can give guidance

on compatibility of fixings with the cladding chosen.

Key factors around claddings in Table 21 are avoiding contact between:

- stainless steel and hot-dip galvanised steel, aluminium alloy/zinc-coated steel or zinc
- copper and hot-dip galvanised steel, aluminium alloy/zinc-coated steel or zinc
- acidic cladding timbers (redwood and western red cedar) and hot-dip galvanised or zinc-plated steel
- hot-dip galvanised steel, aluminium alloy/zinc-coated steel, zinc or anodised aluminium and copperazole and copper quaternary treatments
- aluminium and stainless steel in exposure zone D except where the stainless steel element is small relative to the aluminium (using aluminium with stainless steel is permitted in exposure zones B and C).

E2/AS1 guidance for flashings and claddings

E2/AS1 also has guidance on fixing selection in:

- 8.2.4 – materials for flashings, gutters and

fixings shall be selected from Table 20 to minimise corrosion used with concrete tiles

- 8.3.7 – fixings to metal tiles (50 × 2.8 mm hot-dip galvanised painted flathead annular-grooved nails)
- 8.4.8 – fixings for profiled metal roofing shall comply with class 4 of AS 3566 Part 2 as a minimum
- 8.4.11.1 – fixing flashings to profiled metal roofing or to the structure
- 9.1.10.8 – fixing in aluminium windows and doors (75 × 3.15 mm galvanised jolthead nails or 8 gauge × 65 mm stainless steel screws)
- 9.2.7 – brick veneer wall ties (12 gauge × 35 mm long hex washer face galvanised or stainless steel screws), see also E2/AS1 Table 18(c)
- 9.6.6 – fixings for profiled metal wall cladding (12 gauge hexagonal head screws complying with class 4 of AS 3566 Part 2 as a minimum)
- 9.6.7(e) – fixing of flashing junctions for corrugated and trapezoidal steel claddings
- 9.9.4.1 – fixings for EIFS to be hot-dip galvanised nails together with appropriate washers. ◀