FTMA TECH TALK

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BEYOND NAILS: WHY CREEPER CONNECTORS ARE ESSENTIAL FOR CODE COMPLIANCE

When it comes to truss connections and hold downs, everyone accepts that, in accordance with AS1684, the minimum connector for a truss-to-support is classified as one framing anchor.

Whilst truss design software might indicate that fewer connectors (e.g., two skew nails) could suffice based on actual bearing reactions, the minimum framing anchor is still adopted. Why? Because AS1684 sets this as the minimum tie-down requirement for trusses and rafters.

Nailplated timber roof trusses are governed by two key Australian Standards: AS1720.5-2015, which addresses design considerations and AS4440-2004, which outlines installation requirements. According to AS4440-2004, the scope specifies that:

1.1 Scope: *This Standard specifies requirements for the bracing, connections and installation of nailplated timber roof structures in typical applications.*

Whilst most aspects of the installation and bracing requirements are generally adhered to, the connectors - particularly those associated with hip end construction - are often not installed according to the standards.

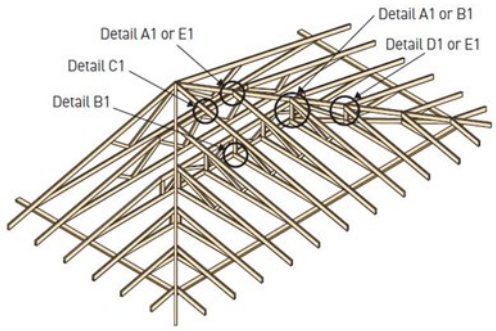
Section 5.1 of AS4440-2004 states that *"This Section specifies the minimum requirements for truss-to-truss connection."* If these Standards set the minimum requirements, why do we often see inadequate application of these minimum connections or the substitution of non-conforming products? These substitutes often lack compliance with any Australian Standard or a Performance Solution Certification from a Professional Engineer.

Although design software might suggest lighter (nailed) connectors could be sufficient, this should not undermine the Australian Standards that set the minimum requirements for these connections, especially within hip ends - just as they do for truss-to-support connections.

CODE COMPLIANCE

Figure 1 from AS4440-2004, Section 5 outlines the various connections within a hip end and links them to the required minimum connectors. For instance, when isolating the Creeper Jack to Hip connection (D1 and E1), creepers with a span of up to 1800mm can be nailed with three effective 65mm flat-head nails for wind speeds up to N3/C1 classifications.

FIGURE 1: Typical trussed hip end connection for Wind Classification N1, N2, N3 or C1



Once the span of the creeper trusses exceeds 1800mm, the nail connection to the bottom chord remains, however the top chord connection must use a minimum of a Creeper Connector with six 30 x 2.8mm dia reinforced-head nails per chord (Figure 2). If the wind speed exceeds N3/C1 classifications, all creeper trusses up to a 2400mm span require a creeper connector for both the top and bottom chords, with an additional 30x0.8mm GI strap required for spans up to 3000mm (Figure 3).

FIGURE 2: Detail D1 - Jack Truss to Hip Truss (maximum jack station 1800 mm)

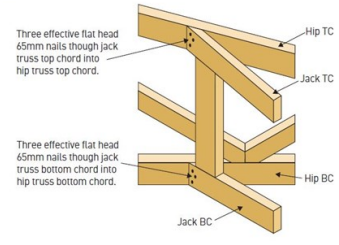
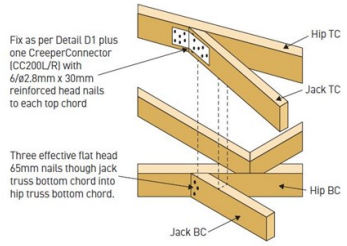


FIGURE 3: Detail E1 - Jack Truss to Hip Truss (maximum jack station 3000 mm)



Performance Solution

The use of screws for various truss and frame applications has increased over recent years as a Performance Solution, supported by test data that allows them to be used in place of framing anchors in truss-to-support connections. The screw manufacturer typically provides certification and a datasheet outlining the screw's capacity and the conditions under which it can be used. Without these documents, the screw should not be used for any other purpose not specified.

Non-Compliant

The common 14g "batten screw" is suitable for many purposes on building sites, offering quick and easy installation with good capacity. However, it is not specified in any Australian Standard as a truss-to-truss connector, despite its widespread use in the industry, particularly for various hip end connections.

Australian Standard AS1720.1 specifies that a 14g (6.3mm dia) screw requires a 10D end distance for timber connections. Achieving the required 63mm end distance is challenging when fixing two pieces of timber at a 45-degree angle. If the screw is positioned too close to the end, the timber may split; if the minimum edge distances are met, this might result in inadequate embedment into the hip truss, leaving the shank exposed and vulnerable to bending (Figure 4). Furthermore, since creepers are usually installed in pairs on opposite sides of the hip, screw spacing requirements into the hip truss must also be considered.

Figure 4: Screws in use with inadequate edge distance or embedment

Laboratory testing of batten screws and creeper connectors has shown that the screws cannot be used as a substitute because their capacities do not match. Figure 5 demonstrates that the published values for the creeper connector are met through testing, whilst the batten screw falls considerably short.

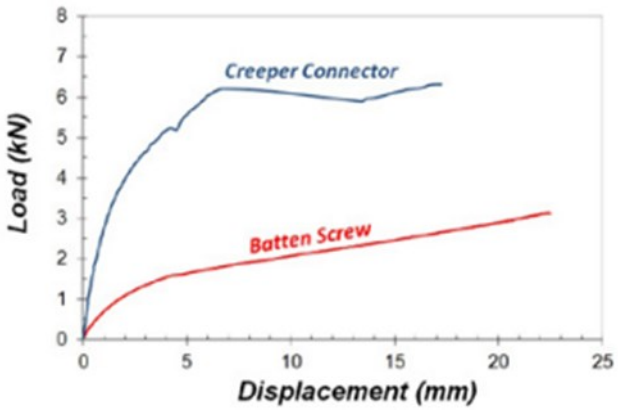


Figure 5 – Test comparison of creeper connector v batten screw

A properly constructed hip end contributes to a rigid roof element, however the transfer of forces through the structure to supporting elements relies heavily on the connectors. The minimum connectors specified within the Australian Standards, particularly AS4440 for hip end construction, are critical for maintaining the roof structure's integrity.

So, on your next job with creeper trusses, ensure that creeper connectors are supplied and installed to maintain compliance with Australian Standards. Click here to access MiTek's 2024 Roof Truss Installation Guide.