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THE RIGHT CONNECTIONS

Truss connections and tiedowns are vital for ensuring the structural integrity of a roof. The strongest truss will be inadequate if it is not correctly attached to its supporting elements, whether that is the top of a wall or beam or to another truss.

Wind uplift and downward gravity forces at these support points make up the main considerations. Normally, only uplift is required to choose a tiedown anchor.

However, for the selection of brackets and hangers to connect one truss to another or to the face of a beam or wall, both force directions need to be taken into account.

Also the calculation of forces to be resisted becomes much more complex as roofs become more involved with support systems that are spaced further and further apart.

All structural anchors, brackets and hangers must be certified to achieve their purported capacities, dependent on their use.

Responsible bracket manufacturers determine these load carrying capacities by physical testing before being certified by professional engineers as part of ongoing quality assurance schemes.

These design values are dependent on the timber jointgroup of the components, which is a classification of its ability to “hang on” to a fixing.

Regular on-going testing is essential as there are many types of timber as well as new engineered wood products such as LVLs entering the marketplace.

Due to this range of variables (loads, materials and fixing methods), the majority of tiedown and truss connections are more conveniently designed by the truss software.

These are then shown on the fabricator’s truss layout to become building instructions for the installer and a checking tool for the certifier.

Since design capacities are based on testing, it is an implicit assumption that the fixings that were used in testing (nails, screws and bolts) will also be the same fixings eventually used in construction.

Photo 1 - Undersized bolt fixing

Photo 2 - Colour coded screws fixing a Girder Bracket

Of course it follows that incorrectly using fixings that were not part of the testing or certification will negate any warranted capacities given by the manufacturer.

Some incorrect fixings can be readily spotted – the wrong bolt size for instance – see photo 1.

Other fixings are unfortunately much harder to differentiate after they have been installed. The diameter, length and type of nails and screws are invisible once they are embedded in timber; but, these are the very features (which are now hard to verify) that govern their capacities.

By nail type, the connection of the nailhead to the shank is of utmost importance.

A ‘clout’ commonly refers to a nail type where the head is spot welded to the shank – these must never be used in brackets and hangers. Only nails formed from a single piece of steel wire are acceptable.

By screw type, there is a surprising variety of cutting tips at the ends of screws. Some are simply pointed, others have cutting slashes in the tip to self-tap their way into timber while others have patented cutting tips that can cut through steel and deeply bite into timber without pre-drilling or splitting.

The same bracket suppliers that test and certify their hangers also specify the necessary fixings to achieve their maximum capacities.

They also make the post-installation identification process as easy as possible for all concerned by colour coding the heads of their nails and screws according to their size, length and type (see photo 2).

To be sure that the entire trussed roof system is structurally sound and engineer certified, all components, right down to the smallest nut, bolt, screw and nail, must be as specified by the manufacturer.

If they have been substituted, the inherent warranty is lost and the responsibility thereafter for any substandard performance falls on the individual(s) responsible for mixing and matching.

Is it really worth the risk? TTN