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GN GUIDELINES No.210

ANOTHER MITEK ADVANTAGE – JANUARY 2015

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FASTENERS NEED THEIR SPACE!

Metal fixings have been successfully used for connecting timber members together for thousands of years. Along the way, we have come to understand that there are certain rules that must be followed to achieve an effective joint.

There are two basic categories of metal fixings: fasteners and connectors.

Fasteners are single fixing components like nails, screws and bolts.

Connectors are compound products like Trip-L-Grips, Joist Hangers and other brackets which require fasteners to fix them into timber. Products with in-built teeth like Tylok plates are also placed in this category.

To achieve the most out of fasteners, they must be adequately spaced apart. A nail fixed just a few millimetres from the edge of a piece of timber, or a screw fixed too close to the end isn't going to be very strong because the timber material surrounding it will just split away.

Likewise, two bolts located too closely beside each other will not be as strong as when they are further apart. Minimum timber edge/end distances and fastener-to-fastener spacing must be observed to achieve the best results.

So how close is 'too close'?

The Australian Timber Design Standard AS1720.1 specifies the minimum spacing and edge/end distances required to achieve the optimum capacities they prescribe.

These limits are based solely on the diameter and type of fastener, and apply to all common species of construction timber in Australia.

The spacing requirements for nails and screws are shown in Tables 1 and 2.

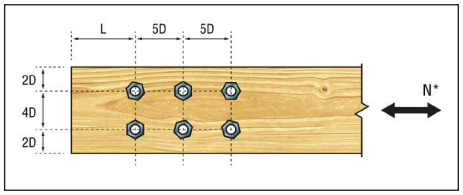
Bolt spacings are trickier to work out because their capacities vary according to the angle of load to timber grain. They also require additional variables "a" and "L" to be calculated (see diagrams).

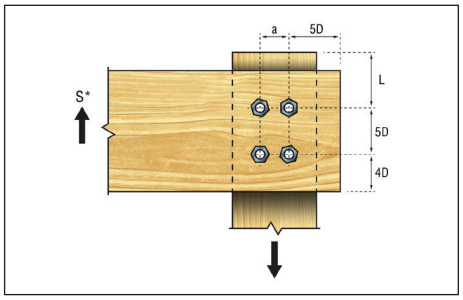
As an example, the dimensions "a, L, 2D, 4D and 5D" for an M12 bolt in 35mm seasoned timber are "35mm, 84mm, 24mm, 48mm and 60mm" respectively.

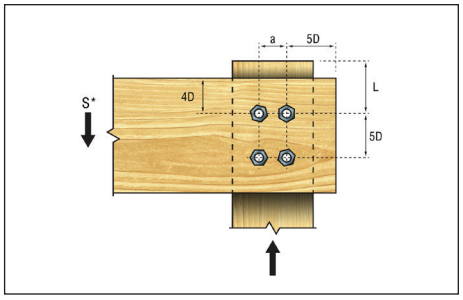
The need for adequate spacing of fasteners also explains why one can't "Just whack a couple of bolts in that mate, it'll be fine" or "Screw down through the top edge of the beam, surely that'd be easier?"

It also explains why rectification details often require larger than expected timber sizes – it's not always about timber strength but about providing enough room to fit the required number of fasteners in.

When it comes to connectors, similar rules apply. Nailplate teeth that are too close to timber ends or edges have to be regarded as ineffective. Brackets must not be hung too low or too high such that their fasteners will be too close to timber edges.







All a bit complicated? Well, that's what we engineers are here for.

The spacing of holes in brackets, and in fact the geometry of all engineered building products, has been carefully designed and tested so that they achieve their published capacities.

This level of confidence is made possible because holes are pre-punched into the brackets for accurate fastener spacing. It is much harder to accurately drive pneumatic nails into bare metal with adequate spacing and edge distances which is why they are not encouraged.

So the next time you're nailing a joist hanger or screwing on a bracket, be thankful that the manufacturer has set the nail holes in the right position so you don't have measure and mark every nail position to comply with Code requirements. You will also then be assured that the product will do exactly what it is guaranteed to do. TTN

Table 1: Minimum Nail Spacing

Spacing Location	Code Requirement (D = nail diameter)	e.g. 3.05mm dia. nail
End distance	20D	20 x 3.05 = 61mm
Edge distance	5D	5 x 3.05 = 15mm
Between nails along grain	20D	20 x 3.05 = 61mm
Between nails across grain	10D	10 x 3.05 = 31mm

Table 2: Minimum Screw Spacing

Spacing Location	Code Requirement (D = screw diameter)	e.g. 6.3mm dia. No.14 screw
End distance	10D	10 x 6.3 = 63mm
Edge distance	5D	5 x 6.3 = 32mm
Between screws along grain	10D	10 x 6.3 = 63mm
Between screws across grain	3D	3 x 6.3 = 19mm