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WHY DO WE BRACE ROOF TRUSSES?

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If you want to form a roof profile with an 'S' shape, as shown in the photograph, simply don't brace the roof trusses correctly.

The only disadvantage with this procedure is that the roof may not remain in place for the design life of the building.

The most common reason for roof truss failures is missing or incorrectly installed bracing.

Most people in the building industry probably assume that roof truss bracing is only necessary to prevent the trusses from being blown over.

However, roof bracing is actually required to resist three different types of force, which could all be acting in combination. These are:

- Those resulting from external forces such as wind blowing on a gable end, which tries to push the trusses over.
- Overturning forces which occur when the roof trusses are not erected perfectly vertical.
- Lateral forces from the roof battens that, apart from supporting the roof material, are also preventing the truss top chords from buckling.

Varying roof truss profiles, building shapes, roof materials and design wind velocities affect how a roof needs to be braced.

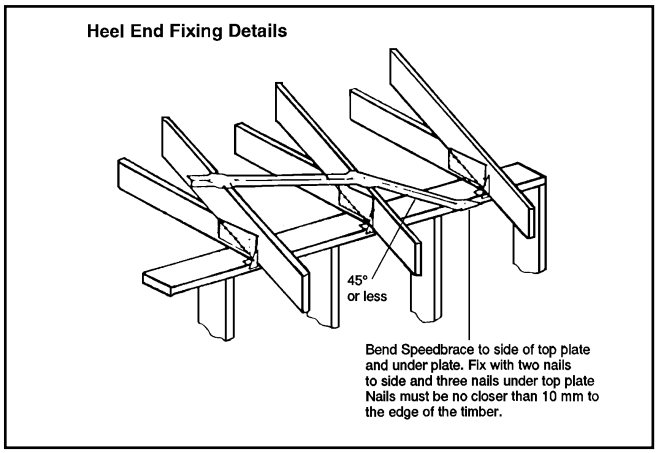
For example, a 45-degree pitch roof in a 41m/s wind area will have a significantly higher wind force on the gable end than the same span roof with a 15-degree pitch, in a 33m/s wind area.

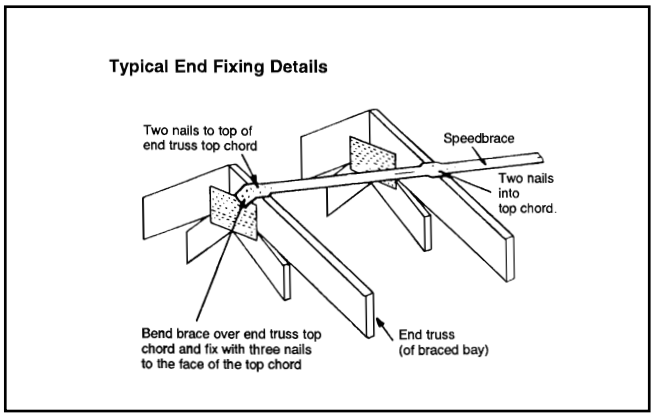
This is due to both the larger gable end area and also the increased wind pressure.

Similarly, large span concrete tile roofs produce higher lateral forces in the battens than small span steel deck roofs, as the axial compression forces in the truss top chords are greater.

Also note that bracing calculations have been based on the assumption that trusses are erected such that no part of the truss is out of plumb by the lesser of [height at any section]/50 and 50mm. If this tolerance is exceeded, the force required to prevent the trusses overturning is significantly increased.

Similarly, the bow in any chord shall not exceed the lesser of [chord length]/200 and 50mm.





Lateral force in the battens is increased when this limit is exceeded.

You need more than a few pieces of 'Speedbrace' in a roof to adequately brace it. The brace must also be properly fixed at the ends.

That way the forces in the roof can be transferred into the wall bracing, then down to the footings.

Steel-brace is required to have a minimum end fixing capacity of 5.5kN (which is a force of over half a tonne).

I'm sure that you would not be surprised to hear that using one or two nails to fix the steel-brace to the top of the top plate does not achieve this requirement.

Unfortunately, this seems to occur fairly frequently on site, and could lead to roof failures in the long term.

The preferred method of fixing at the heel end, is to bend the steel-brace to the side of the top plate then under the top plate, fixing with five nails.

Fixing of the steel-brace at the apex end should also be with five nails.

Section 4 of AS4440-1997 "Installation of nailplated timber trusses" shows these end fixing details, and provides many other guidelines and details for the bracing of roof trusses.

Note that cantilevered trusses and trusses with end depth (such as cut-off and half trusses) require special brace fixing details to ensure that the force in the roof bracing is transferred into the wall bracing.

Just because a roof is standing today, does not mean it will still be standing tomorrow.

Houses are generally designed to withstand the worst wind speed that is expected every 50 years. This wind speed could occur in 100 years time, or tomorrow.

Remember, as you would have heard many times before, a "chain is only as strong as its weakest link".

Why bother having a steel-brace capable of supporting a working load in tension of over 500kg, if its end fixing can take less than 100kg?