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## RESTRAINTS ARE KEY TO TRUSS PERFORMANCE

Some 13 years ago, in GN Guidelines No. 29, I wrote about the importance of installing trusses straight and plumb.

What I saw during a number of recent inspections make it apparent there is a need to reiterate this fundamental piece of information!

Take Photo 1 for example where the top chord is clearly outside the required limits of straightness.



Photo 1: Top chord outside the required limits of straightness.

The roof plane cannot tolerate this level of misalignment without exhibiting waves, which it did have.

In addition, it would also be difficult to install a level ceiling plane (thankfully not done at this time).

The acceptable tolerances are set out in the Australian Standard AS 4440 "Installation of nailplated timber roof trusses".

These limits have been reproduced in every nailplate manufacturers' installation guide, which are in turn provided with each set of trusses delivered to site.

For the record, the tolerances are:

**Plumb:** Trusses shall be so erected that no part of the truss is out of plumb with a tolerance exceeding the lesser of height/50 and 50 mm (Refer Figure A). For example, at a height of 1500mm

the truss must not be more than 30mm out of plumb.

**Bow:** Trusses shall be erected with minimal bow, in the truss and in any chord, with a tolerance not exceeding the lesser of L/200 and 50mm, where L is as defined in Figure B. For example, a chord

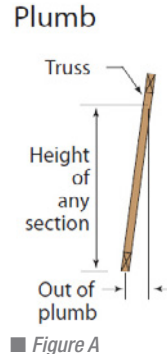


Figure A

**Bow**

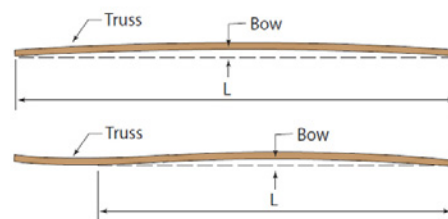


Figure B

of 2000mm in length must not have more than 10mm bow.

Judging by the straightness of the Speedbrace in Photo 1, it is apparent the trusses were installed in this buckled condition.

Notice the nog between the top chords which is located about where the buckling commences; it is likely that insufficient temporary ties were used to ensure these trusses remained straight while the tile battens were installed.

Temporary braces are required at 3m maximum centres along the slope of the top chord.

They may be either full length timbers or proprietary steel truss spacers but not nogs as seen here.

In another job which I inspected, the enquiry related to an excessive downward deflection in the ceiling about the middle of a truss.

No one noticed the severe buckling in the horizontal top chord (HTC) of the double truncated girder truss above!

It is extremely unlikely for it to have been installed in this condition.

The truncated girder in question may be viewed from both sides in Photos 2 and 3.

A dotted straight line is shown to



Photos 2 and 3: The buckled truss and truncated girder.



demonstrate how badly the truss had buckled sideways.

The issue in this case is that there was no positive connection between the over-flying rafters to the HTC to hold it plumb.

It is imperative for the installation instructions provided by the truss supplier to be followed in all instances.

In this instance, the framing anchor missing between the rafter and HTC is not so much for holding down the jack trusses; it is rather to restrain the HTC against lateral movement which is essential for the overall performance of the truncated girder.

In summary, trusses simply must be installed straight and plumb.

For them to stay that way after loading, they must be restrained against lateral movement with adequately close ties and proper connections.