

TEMPERATURE EFFECTS ON TIMBER



by **ADAM DENNAOUI**
Senior State Engineer,
MiTek Australia Limited

Climatic variations within Australia affect the standards of building practice from State to State in many ways.

One such example is the degree to which the strength of timber may be reduced if held at high temperatures for long periods of time.

This is particularly noticeable for some of the more northern reaches of the country.

To address this issue, an allowance has been made in the Australian Standard, Timber Structures AS1720.1 - 1997 Part 1 Design Method.

This standard requires a reduction of 10 per cent in allowable stresses for seasoned timber used in structures built in the coastal regions of Queensland north of latitude 25 degrees South and all other regions of Australia north of latitude 16 degrees South.

This temperature factor also makes a provision for humid conditions, which can directly affect the moisture content of timber, which in turn can affect strength.

A facility to compensate for this reduction when designing trusses should be included in truss programs provided by your nailplate supplier.

Note that no reduction in allowable stresses is required by AS1720 for covered timber structures under ambient conditions in other areas of Australia.

Apart from climatic conditions, timber

can be subjected to high temperatures in many other ways.

One example that comes to mind was where a number of trusses used in a hospital roof supported a heat exchange unit.

The unit was fixed with steel angles, which were in direct contact with timber chords.

Heat transferred by the steel support angels from the exchange unit to the truss chord caused a charring of the timber with the result of a possible reduction in strength.

Research by the CSIRO and others has concluded that temperatures as low as 100 degrees when applied to timber for prolonged periods of time can lead to deterioration in the strength of the timber member.

The timber turns brown, becomes brittle, slowly losing weight and strength. However spontaneous combustion is unlikely unless temperatures exceed 200 degrees Celsius for prolonged periods.

While there are many circumstances that would cause timber to lose strength or burn due to high temperatures, it is wise to avoid placing timber and trusses at risk where at all possible.

If you are supplying trusses to the northern parts of Australia or other tropical areas such as Papua New Guinea and some parts of South East Asia, be aware of the temperature factor when designing and detailing timber trusses.



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Similarly, when detailing trusses for commercial, industrial or institutional buildings, be on the look out for heat exchangers or similar where trusses may be subject to much higher temperatures than normal ambient temperature.

In such circumstances alert the builder or building designer to take steps necessary to avoid placing trusses or timber members near or in contact with the heat source.

References:

- 1 Fundamentals of Timber Engineering Part 2 - RH Leicester.
- 2 Fire Protection Handbook 18th Edition - National Fire Protection Authority.
- 3 Wood in Australia - K R Bootle
- 4 Timber Structures Part 1 Design Methods - Australian Standards AS1720.1 - 1997.

