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"TO BE DETERMINED BY THE FABRICATOR"

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Following on from my previous Guidelines (No. 48) which addressed the subject of designing a roof structure to provide lateral stability to the building, some readers have expressed uncertainty about the extent to which AS1684 can be used before specific design is required to provide adequate lateral stability.

It is important for all building designers to be familiar with clause 8.3.6 in AS1684 Parts 2 & 3 and clause 8.3.2 in Part 4.

This states that with standard roof bracing and directly fixed or battened ceilings, the maximum distance braced walls can be spaced apart is 9.0m.

This spacing limit may be even less depending on wind speed, roof pitch and ceiling depth.

The onus is on the building designer, not the fabricator, to highlight and address this issue in the planning stage.

If it is likely the braced walls will exceed the spacing limit, then the plans should either provide a solution or clearly state that an engineer has to be involved in the design of an appropriate ceiling diaphragm alternative.

In addition to the issues raised in Guidelines No. 48 "To be Designed by the Fabricator", there are a two other matters building designers have inappropriately left to the fabricator to resolve.

To be or not to be? "Not to be determined by the fabricator" might have been a better title for this article.

The first issue which is all too often left to the fabricator is the "Design gust wind speed".

Although most plans provide an ultimate design gust wind speed and/or wind classification (such as N3), a disturbing number of plans only provide basic wind speeds and other bits of information about multipliers such as terrain category, shielding, topography and structural importance.

Some spell out a whole gamut of wind speed types labelled as V_s, V_p, V_u, V_z and other combinations with those cryptic abbreviations. This can be extremely confusing to non-engineers.

For the fabricators' information, the ultimate limit state design gust wind speed used in all truss programs is calculated from the formula -

$$V_{zu} = V_u \, M_{(z,cat)} \, M_s \, M_t \, M_i$$

The value of $M_{(z,cat)}$ has to be determined from a table in AS1170.2 depending on terrain category, building height and regional location.

It is the engineers or building designers responsibility to specify the ultimate design gust wind speed in their plans for direct use by truss fabricators, instead of a series of core data for their calculation.

It is unreasonable to expect truss detailers to have a comprehensive knowledge of AS1170.2 in order to derive the appropriate wind speed for truss design.

Furthermore, permissible design wind speeds are no longer in use by any current Australian standard for building design, and should be dispensed with in all future drawings.

The second issue is the determination of "Application of structural members". This is related to the "Consequence of Failure" (see Guidelines No. 25). The timber design code assigns different design strength capacities to timber members depending on the application of structural members.

For example, a 90x35 MGP10 member is permitted a higher strength capacity against an applied load when used in a house than compared with a similar situation when it is used in a hospital.

In other words, a higher factor of safety applies to more essential structures.

The code gives three general building application categories, namely

* Houses, eg. domestic buildings;

* Structures other than houses, eg. commercial and industrial buildings; and

* Structures intended to fulfil an essential or post disaster function, eg. hospital, fire station, etc.

The building examples given above are not explicitly listed in the code but are my own personal interpretations.

Neither the builder nor the fabricator should be drawn into making such interpretations. The application category should be clearly noted in the project specifications and drawings by the designers.

Presently, designs and tenders are inconsistent depending on the interpretation of the supplier, who is forced to guess the application category. It does not bode well for any supplier who prices under a higher category when the plans are unspecific.

For example, a school building may or may not have to be designed for post disaster function.

The choice of building application category should be settled by the architect/engineer, owner and council. Unless the plans clearly specify the application category in the notes for timber framing and trusses, the project manager cannot rightly reject the supply of trusses designed only for housing applications.

Nevertheless I would not like any fabricator to be challenged on this issue. To indemnify yourself, I would advise every fabricator to tag all their quotes according to the application category used.

DESIGN CRITERIA

DC1 The structural elements have been designed for the following superimposed live loads in accordance with AS1170 Part 1. Live load reductions are not applicable.

ELEMENT	LIVE LOAD (kPa)
Roofs	0.25
Bridal Centre (General)	3.00
Balcony & Stairs	4.00
Chapel	3.00

DC2 Wind loading has been determined in accordance with AS1170 Part 2 based on:

Ultimate Wind Speed (Vu)	= 60 m/s
Basic Wind Speed (Vp)	= 49 m/s
Terrain Category	= 3
Shielding Multiplier (Ms)	= 1.0
Structural Importance Multiplier (Mi)	= 1.0
Topographic Multiplier (Mt)	= 1.0
Internal Pressure Coefficients (Cpi)	= +0.2 or -0.3
Internal Wall Pressure (Differential)	= 0.35 kPa

DC3 Earthquake loading has been determined in accordance with AS1170 Part 4 based on:

Acceleration Coefficient	= 18.06
Site Factor	= 1.0
Importance Factor	= B
Structure Type	= II