

technical information sheet

Fire resistance using e-beam LVL

Design for FRL

The NCC provides a unit of measure to which all structural building materials and systems must conform called the Fire Resistance Level (FRL). The FRL is the period in minutes for three criteria: structural adequacy, integrity and insulation:

- Structural adequacy means the ability of a structure to maintain its stability and loadbearing capacity
- Integrity means the ability of a structure to resist the passage of flames and hot gases
- Insulation means the ability of a structure to maintain a temperature below specified limits on the surface not exposed to fire

FRL is expressed in this order – for example, the FRL requirement for a wall of 90/60/30 means that the wall must maintain structural adequacy for 90 minutes, integrity for 60 minutes and insulation for 30 minutes (as tested in accordance with the relevant Australian Standards).

The structural considerations required to achieve an appropriate Fire Resistance Level in timber construction can be met in several ways:

- 1 Protecting timber by covering it with a good insulator such as fire-rated plasterboard – this means that the timber takes longer to reach its ignition temperature and it can remain functional for a longer period while the fire is burning.
- 2 Using oversized timber – this will allow for loss of material charring throughout the burn period ensuring that sufficient timber remains in the cross-section to maintain its required strength.

Wesbeam e-beam Char Rate

Char rates can be determined by one of two methods, either through calculation, as per AS 1720.4, or through testing by a registered testing laboratory.

The char rate formulae, as provided by Equation 2.1 of AS 1720.4, is:

$$c = 0.4 + \left(\frac{280}{\delta} \right)^2$$

Where:

c = Notional charring rate, in millimetres per minute

δ = Timber density at a moisture content of 12%, in kilograms per cubic metre

AS 1720.4 dictates that char must be calculated on the density of the parent species, which in Wesbeam's case, is considered to be Pinaster pine. Pinaster pine's density, according to AS 1720.2, is 600kg/m³, therefore according to this method, Wesbeam's char rate must be assumed to be **0.61mm/minute**.

For more information on designing Wesbeam e-beam LVL for FRL applications, contact Wesbeam's engineering team.

Use of LVL in bushfire prone areas

Australian Standard AS 3959 Construction of buildings in bushfire-prone areas is a primary referenced document in the National Construction Code; it is a consensus based Standard developed in accordance with the key principles of transparency, and broad-based and balanced expert committee representation.

AS 3959 provides an extensive guide to building homes to minimise risk for different levels of potential bushfire attack. The intention of the provisions of AS 3959 is to:

- Improve the ability of a building to withstand attack from bushfire;
- Provide the building with a level of protection while the fire-front passes;
- Give occupants that cannot escape the approaching fire a level of protection while the fire-front passes.

Where e-beam LVL can be used in BAL construction

The following table is a summary of the requirements, extracted from AS 3959. This table does not cover all aspects of AS 3959 (e.g. external cladding, roofing, sarking, post clearances via stirrups, etc), which should be referred to when designing and specifying to this Standards.

Although AS 3959 is a primary reference document in the NCC, some Australian State and Territories have some variation to these requirements. Refer to the NCC for State or Territory variations and any relevant Local/ State Planning provisions prior to specification

Building Element		BAL-LOW	BAL-12.5	BAL-19	BAL-29	BAL-40	BAL-FZ
Roof	Framing members	✓	✓	✓	✓	✓	✓
Walls (external and internal)	Framing members	✓	✓	✓	✓	✓	✓
Floors (bearers, joists)	Enclosed ¹	✓	✓	✓	✓	✓	✓
	Unenclosed ²	✓	✓	✓	✓	✓ (With framing members lined on the underside with fibre-cement sheeting)	✓ (With framing members lined on the underside with 1 x 16 mm fire-grade plasterboard)
Veranda, carport and awning roofs	Framing members – Forming part of the main roof space	✓	✓	✓	✓	✓	✓
	Framing members – Separated from the main roof space by a compliant wall	✓	✓	✓	✓ (With rafters lined on the underside with minimum 6 mm fibre-cement sheeting)	✓ (With rafters lined on the underside with minimum 6 mm fibre-cement sheeting)	✓ (With rafters lined on the underside with minimum 6 mm fibre-cement sheeting)
Framing for: decks, steps, ramps and landings	Enclosed ¹	✓	✓	✓	✓	✓	✓
	Unenclosed ²	✓	✓	✓	Bushfire-resisting timber or System complying with AS 1530.8.1	System complying with AS 1530.8.1	System complying with AS 1530.8.2

✓ All Wesbeam LVL products.

¹ Wall enclosing sub-floor space to be of the same construction as for external walls – refer AS 3959.

² Floor bearers and joist minimum 400 mm above finished ground level.



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