

Fire Performance



DATA SHEET

Overview

Fire Performance of Laminated Timber Beams

Laminated Timber is noted for its inherent ability to withstand the effect of fire. It has a superior fire resistance rating when compared to steel. This makes Glulam structures a safe choice for large public buildings. Safe evacuation of people is the most important aspect of fire safety. Because Glulam structures do not collapse under fire, safe evacuation is possible and fire fighters are able to gain access to the seat of fires, preventing further damage. Re-building after fire has often been achieved by removing the charcoal layer from the Glulam beams while they are still in position and replacing the burnt-out roof.

Factors That Give Glulam its Distinctive Performance

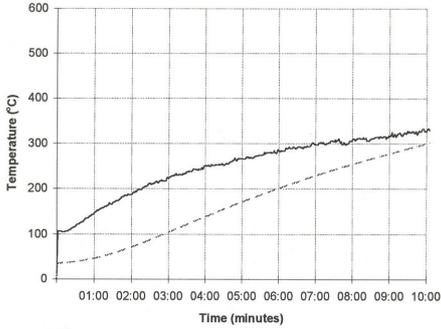
Timber has the unique property of forming a charcoal layer on the surface, which slows down the rate of burning. In this way, timber retains its strength and shape for some considerable time in a fire. Large section Glulam members will not burn out by themselves but need an external flame source to continue burning. Unprotected metals, while rated non-combustible, lose their strength quickly under fire and collapse suddenly.

- » The rate of charring for Glulam beams has been established by controlled testing and can be calculated at .65 mm per minute. Thus, in half an hour, a large section Glulam beam will sustain 20mm of char on surfaces exposed to flame.
- » The fire resistance of timber increases as the structural size increases and the exposed area ratio decreases.
- » When a fire is brought under control; before major damage occurs, Glulam members will frequently still be usable; subject to cosmetic repairs.
- » Even though timber does burn, any contribution from a burning structure to the fire is insignificant compared with the contribution of the building's contents which constitute the main fire load.
- » These factors clearly show that TimberLab Glulam structural systems provide fire-safe buildings. International building codes therefore provide calculation formulae for the design of fire-resistant Glulam members.

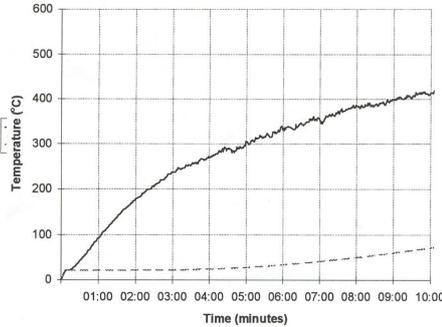
Comparative Results of Fire Test on Beams

Steel - Concrete - Glulam

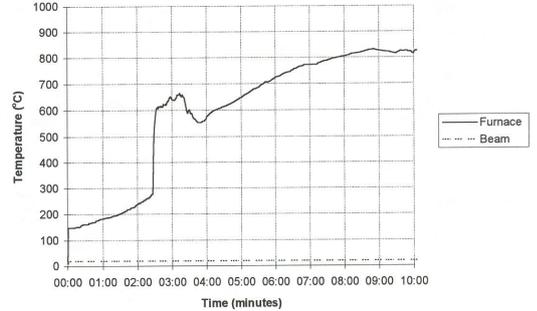
Thermocouple in members shows Glulam beam reached only 22 degrees and retained structural integrity. Steel becomes plastic at approx. 300 deg; Steel begins to expand in RC beam.



Results for **Steel** Beam in Furnace



Results for **Concrete** Beam in Furnace



Results for **Timber** Beam in Furnace

Glulam Fire Resistance in Action

After fire destroyed all roof structure; Glulam portals support remaining secondary members.



Portals retain structural integrity; block walls intact, machinery salvaged.



Char layer sand blasted off. Portals remained in place and new roof fixed to sand-blasted portals. Factory in operation 4 weeks after fire.



Fire Test Block

After 30 minutes in 800 deg. furnace

Original Size - 18mm char after 30 minutes fire test



After 30 minutes in furnace charring depth showed 18mm = 30 mins x .6mm per minute

800-degree furnace temperature - 22 degrees at centre of beam