

INFORMATION SHEET

STRUCTURAL MATERIALS



GLUE-LAMINATED TIMBER DURABILITY

The information provided below has been taken from the New Zealand Timber Design Guide 2007, published by the Timber Industry Federation and edited by Professor A H Buchanan. To purchase a copy of the Timber Design Guide, visit www.nztif.co.nz

WEATHER PROTECTION

It is most important to keep moisture out of the finished glulam timber. Glulam should be supplied to the site with a coat of water repellent sealer applied in the factory, to protect against moisture being picked up during construction. The specifier should discuss specific requirements with the supplier. If exposure during construction is likely to be longer than 6 weeks, further protective coating may be required. Any unprotected timber exposed by end cuts or drilling on site should be immediately coated to prevent ingress of moisture.

EXTERIOR EXPOSURE

Special attention needs to be given to members permanently exposed to the weather. Advice should be sought from coatings manufacturers or the glulam supplier. If coloured stain is required it is advisable to include this with the initial sealer coat to prevent any possible problems with over-staining. Clear finishes are difficult to maintain without a tinted UV inhibitor. Dark stains should be avoided as these attract heat retention and can cause timber to dry out excessively and initiate splitting. Laminated beams which are LOSP treated to H3 and exposed to exterior weather conditions must be painted to achieve the required durability level.

WRAPPING FOR DELIVERY

Some manufacturers wrap glulam members in waterproof paper for delivery. Wrapping is not primarily to provide a water resisting function because its main purpose is to keep the finished surface clean from site dirt and contamination during transit and erection. Patchy discolouration may occur if only part of the wrapping is removed during construction. It is important to ensure that no water is trapped inside the paper during delivery or erection.

STORAGE ON SITE

Glulam members must not be bulk stacked outside on the ground with no covering. Beams should be stacked clear of the ground, filleted and covered in such a way that rainwater is deflected and the timber can breathe. Black plastic covers are not recommended.

FIRE RESISTANCE

Large glulam members have excellent fire resistance on account of the slow and predictable charring rate when exposed to a severe fire. When members are required to have a fire resistance rating, this can be calculated by subtracting a char thickness from the original member size. Higher stresses can be used in combination with the reduced cross section. NZS 3603:1993 Section 9 specifies a charring rate of 0.65 mm per minute and also gives detailed requirements for fire-resisting design and construction of glulam beams, columns and floors.

CHEMICAL RESISTANCE

Timber is often used where chemical deterioration eliminates use of other structural materials. Since wood substance is relatively inert chemically, under normal conditions it is not subject to chemical change or deterioration. It is resistant to most acids, rust and other corrosive agents. Typical uses in corrosive situations include hide-curing complexes, fellmongeries, fertiliser storage, and swimming pools.

LOW MAINTENANCE

Glulam timber is a low maintenance material. Providing that the correct adhesive and preservative treatment is used, there is not likely to be any deterioration of structural integrity through the life of the laminated member. However, in exposed situations, natural aging may cause some deterioration of the architectural appearance. With the use of the correct surface coating the surface can be recoated to give a revitalised finish.

SERVICE CLASSES

The service class defines the environmental conditions in which glulam beams may be used. There are three service classes defined in Table 1.

Table 1: Definition of environmental conditions for glulam service classes, from AS/NZS1328

Service class	Description	Environmental conditions
1	Interior	Service class characterised by moisture content in the materials corresponding to a temperature of 20°C and relative humidity of the surrounding air exceeding 65% for only a few weeks per year. For example: Houses, commercial offices.
2	Exterior, under cover	Service class characterised by moisture content in the materials corresponding to a temperature of 20°C and relative humidity of the surrounding air exceeding 85% for only a few weeks per year. For example: Open sheds, exposed beams under soffits, porches, wool scouring plants, laundries.
3	Exterior, fully exposed	Service class characterised by climatic conditions leading to higher moisture content than Service Class 2, or where timber is directly exposed to sun and/or rain. For example: Marine structures, bridges.

PRESERVATIVE TREATMENT

Some form of preservative treatment is recommended for all glulam products. Required treatment levels are set out in Table 1 of NZS 3602:2003. For interior exposure the most suitable form of treatment is a surface sealer which contains some insecticide. This is applied to the finished product. If check-outs or site cuts are subsequently made, care should be taken to ensure these are resealed. Preservative treatment to prevent decay is not necessary if the glulam will remain dry in service. Radiata pine used as laminating stock can be successfully pressure or diffusion treated prior to beam manufacture. Douglas fir is not suitable for pressure treating.

Treatments from H1 to H4 retention detailed in NZS 3640 provide an excellent range of preservative options. Care must be taken to ensure that CCA treated timber is adequately kiln dried before laminating. Timber treated in this way should be glued within 72 hours of machining. It is not possible to use water-borne pressure treatments such as CCA on finished beams as this will cause dimensional instability during the seasoning process and lead to splits and shakes.

The treatment of finished beams is possible using an LOSP type system (Light Organic Solvent Preservative). Where LOSP treatment is used for exposed situations, members must be painted in order to comply with Note 4 of Table 1 in NZS 3602. There are some limitations to the dimensions of finished members that will fit into the pressure chambers, which prevents LOSP treatment of curved or very large glulam members.