



DSC TECHNICAL BULLETIN 08-02

Subject: Cracking of Glued Laminated Timber

Discussion:

Cracking of glued-laminated (glulam) timber is typically a result of either checking or delamination.

Checking of glulam timber typically appears as an opening or “crack” running longitudinally along a portion of the length of the member, and is defined as the separation of wood fibers due to seasoning (drying) of the wood. It can be identified by the presence of torn wood fibers.

Delamination is sometimes confused with checking. Delamination of a glulam member is separation of the individual laminations due to inadequate glue bond. In cases of delamination, the surfaces of the lamination along the separation will be smooth and free of torn wood fibers.

Checking is caused by moisture loss in the outer fibers of a glulam member. As these fibers lose moisture, they begin to shrink, resulting in stresses perpendicular to the grain of the lamination. It is these stresses that typically cause checking.

Although checking typically has a minimal effect on the strength of glulam members, its presence should be evaluated by a qualified Structural Engineer. This normally involves a field investigation in which detailed measurements are taken, followed with an engineering analysis to determine the structural effects of the checking (if any).

One possible procedure for performing the engineering analysis is described in “Evaluation of Check Size in Glued Laminated Timber Beams,” Number EWS R475E, APA–The Engineered Wood Society, May, 2007. This technical paper is available for download from <http://www.apawood.org/>.

There are several precautionary steps that can be taken to minimize the checking of glulam members and these are outlined in AITC 111-2005, “Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage, and Erection.” This document is available for download from <https://www.aitc-glulam.org/index.asp>.

Delamination of a glulam is often a much more serious condition than checking, and can have a significant effect on the strength of the member. Delamination can be minimized if the glulams are manufactured in accordance with AITC 117 “Standard Specifications for Structural Glued Laminated Timber of Softwood Species.” This document is available for download from <https://www.aitc-glulam.org/index.asp>. As with checking, whenever delamination is observed the conditions should be evaluated by a qualified Structural Engineer.

In extreme cases, repairs may be required. The appropriate type of repair for each situation should be evaluated and designed by a qualified Structural Engineer.

Repair options include:

- shear dowel reinforcing in which holes are drilled through the glulam member, and then high strength threaded rods are installed to “knit” the glulam back together
- steel “stitch” plates bolted directly to each side of the glulam member
- an external post-tensioning system
- application of reinforced polymers applied directly to the face of the glulam

Recommendations:

All specifications for glued-laminated timber products should require that glulams be manufactured in accordance with AITC 117 “Standard Specifications for Structural Glued Laminated Timber of Softwood Species.”

In addition, to minimize checking, specifications for glued-laminated timber products should also require that the recommendations of AITC 111-2005, “Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage, and Erection” are implemented.

Whenever cracking in a glulam structural member is observed, the services of a qualified Structural Engineer should be engaged.