

Design Values For Glulam Stock Beam Cutoffs

One of the most common uses of glulam beams is as “stock beams.” Stock beams are typically supplied to distribution yards by manufacturers in a variety of standard sizes and long lengths. Typical lengths range from 48 to 56 feet and sometimes longer. Pieces are then cut from these long beams at the distribution yard or wholesaler as required for a specific end-use application.

Most stock beams are used in residential construction applications that call for lengths that are shorter than the typical beam lengths produced by the glulam manufacturer. After cutting several pieces from the original “stock” beam, the distributor or wholesaler may be left with short lengths, typically less than 10 feet, with no specific intended end-use. If sawn to conventional lumber sizes, however, there is a market for these shorter-length “cutoffs” as window and door headers or other short-span beam applications.

The issue becomes, “what design stresses should be assigned to these resawn cutoff sections?” Most Douglas-fir and southern pine stock beams are supplied as an unbalanced 24F layup. Although not as common, some southern pine stock beams are a 30F layup. To assess the residual strength and stiffness of stock beam cutoffs, APA – *The Engineered Wood Association* undertook a laboratory beam-testing program of 30 Douglas-fir beams, all in a 24F-V4 layup, manufactured by three different glulam members.

These beams, supplied as 5-1/8 inches x 16-1/2 inches x 26 feet members, were ripped into smaller sections to simulate cuts that might be made at a distribution yard. The net sizes tested were:

- 2 1/2-inches x 16-1/2 inches x 26 feet specimens ripped vertically
- 5 1/8-inches x 8-1/4 inches x 13 feet specimens ripped horizontally
- 2 1/2-inches x 8-1/4 inches x 13 feet specimens ripped in both directions

These sections were tested as simple-span bending members in various configurations, which ranged from placing the original 302-24 tension lamination as the outermost tension face, to positioning a ripped L3 lamination as the outermost tension face.

The results of this test program indicated that a minimum allowable bending stress (F_b) value of 1,100 psi, with a corresponding minimum design modulus of elasticity (E) of 1,700,000 psi, could be assigned to these Douglas-fir cutoff sections, which are equal to or better than No. 1 solid-sawn lumber. These test results were also confirmed using the APA computer-simulation model, which is recognized in ICC-ES Report ESR-1940.

Based on this analysis, it is recommended that glulam stock-beam cutoffs be assigned the equivalent stress properties of a No. 1 lumber grade on a 3x12 size basis. These cutoff members shall be visually re-graded, after ripping, by an American Lumber Standard Committee approved grading agency to confirm that the cut section meets the requirements for a No. 1 grade sawn lumber. They can then be grade-stamped as a No. 1 glued-lumber product, provided the resawing is limited to a maximum of one cut in each cross-sectional dimension. The original APA EWS trademark must be removed when these are re-graded as a glued-lumber product. While it is necessary to remove the original trademark, it is important to understand that the integrity of the gluelines is not compromised by the resawing operation.

When used as a bending member with the loads applied perpendicular to the wide face of the laminations, Douglas-fir glulam beam cutoffs sawn from a 24F-V4 source beam have the following design values:

	Grade	F_b (psi)	F_v (psi)	F_{c⊥} (psi)	E (psi)	E_{min} (psi)
	Douglas-fir No. 1	1,000	180	625	1.7 x 10 ⁶	0.62 x 10 ⁶

While the test specimens were not evaluated for F_v and F_{c⊥} values, these values are typically higher for glulam of the same species. This would also be true for F_c and F_t values which are not tabulated. While other species were not tested, a similar glued-lumber grade could be assigned to cutoffs of other species depending on the grade of the source beam.

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