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DESIGN VALUES FOR GLULAM STOCK BEAM CUTOFFS

One of the most common uses of glulam beams is as so-called "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 feet 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 with typical lengths being relatively short as compared to the length of the original "stock" beam. 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 use in the cross-sectional size as originally supplied. However, there is a market for these shorter length "cutoffs" as window and door headers or other short span beam applications if sawn into more conventional lumber sizes.

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 some southern pine stock beams are a 30F layup. To assess the residual strength and stiffness of stock beam cutoffs, Engineered Wood Systems undertook a laboratory beam testing program.

Three EWS glulam manufacturers each shipped 10 Douglas-fir beams manufactured as a 24F-V4 layup to the APA Research Center in Tacoma, WA for testing. These beams, supplied as 5-1/8" x 16-1/2" x 26 feet members were then ripped into smaller sections to simulate cuts that might be made at a distribution yard. The net sizes tested were:

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

These sections were then tested as simple span bending members in various configurations, ranging from having the original 302-24 tension lamination positioned as the outermost tension face of the test beams to having a ripped L3 lamination positioned as the outermost tension face of the test beam.

The results of this test program indicated that a minimum design F_b value of 1100 psi with a corresponding minimum design MOE of 1,700,000 psi could be assigned to these Douglas-fir cutoff sections. These test results were also confirmed using the EWS computer simulation model, which is recognized in National Evaluation Service Report No. NER-486.

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 must be visually regraded by an ALSC approved grading agency after ripping to confirm that the cut section meets the requirements for a No. 1 grade sawn timber. They can then be gradestamped 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 regraded as a glued lumber product. However, even though 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 and is still the responsibility of the original glulam manufacturer.

When used as a bending member with the loads applied perpendicular to the wide face of the laminations, the resultant design values for Douglas-fir glulam beam cutoffs sawn from a 24F-V4 source beam are shown in Table 1 below.

While the test specimens were not evaluated for F_v and $F_{c\ perp.}$ 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. Also, 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. For further information, contact Engineered Wood Systems.

TABLE 1

	Grade	F_b (psi)	F_v (psi)	$F_{c\ perp}$ (psi)	MOE (psi)
Douglas-fir	No. 1	1000	95	625	1.7×10^6

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