



Standard Practice for Establishing Characteristic Values for Reinforced Glued Laminated Timber (Glulam) Beams Using Mechanics-Based Models¹

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1. Scope

1.1 This practice covers mechanics-based requirements for calculating characteristic values for the strength and stiffness of reinforced structural glued laminated timbers (glulam) manufactured in accordance with applicable provisions of ANSI/AITC A190.1, subjected to quasi-static loadings. It addresses methods to obtain bending properties parallel to grain, about the x-x axis (F_{bx} and E_x) for horizontally-laminated reinforced glulam beams. Secondary properties such as bending about the y-y axis (F_{by}), shear parallel to grain (F_{vx} and F_{vy}), tension parallel to grain (F_t), compression parallel to grain (F_c), and compression perpendicular to grain ($F_{c\perp}$) are beyond the scope of this practice. When determination of secondary properties is deemed necessary, testing according to other applicable methods, such as Test Methods [D143](#), [D198](#) or analysis in accordance with Practice [D3737](#), is required to establish these secondary properties. Reinforced glulam beams subjected to axial loads are outside the scope of this standard. This practice also provides minimum test requirements to validate the mechanics-based model.

1.2 The practice also describes a minimum set of performance-based durability test requirements for reinforced glulams, as specified in [Annex A1](#). Additional durability test requirements shall be considered in accordance with the specific end-use environment. [Appendix X1](#) provides an example of a mechanics-based methodology that satisfies the requirements set forth in this standard.

1.3 Characteristic strength and elastic properties obtained using this standard may be used as a basis for developing design values. However, the proper safety, serviceability and adjustment factors including duration of load, to be used in design are outside the scope of this standard.

1.4 This practice does not cover unbonded reinforcement, prestressed reinforcement, nor shear reinforcement.

1.5 The values stated in SI units are to be regarded as standard. The mechanics based model may be developed using SI or in.-lb units.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- [D9 Terminology Relating to Wood and Wood-Based Products](#)
- [D143 Test Methods for Small Clear Specimens of Timber](#)
- [D198 Test Methods of Static Tests of Lumber in Structural Sizes](#)
- [D905 Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading](#)
- [D1990 Practice for Establishing Allowable Properties for Visually-Graded Dimension Lumber from In-Grade Tests of Full-Size Specimens](#)
- [D2559 Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions](#)
- [D2915 Practice for Sampling and Data-Analysis for Structural Wood and Wood-Based Products](#)
- [D3039/D3039M Test Method for Tensile Properties of Polymer Matrix Composite Materials](#)
- [D3410/D3410M Test Method for Compressive Properties of Polymer Matrix Composite Materials with Unsupported Gage Section by Shear Loading](#)
- [D3737 Practice for Establishing Allowable Properties for Structural Glued Laminated Timber \(Glulam\)](#)
- [D4761 Test Methods for Mechanical Properties of Lumber and Wood-Base Structural Material](#)
- [D5124 Practice for Testing and Use of a Random Number](#)

¹ This practice is under the jurisdiction of ASTM Committee [D07](#) on Wood and is the direct responsibility of Subcommittee [D07.02](#) on Lumber and Engineered Wood Products.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.