ANSI/ASAE EP559.1 W/Corr. 1 AUG2010 (R2014)
Design Requirements and Bending Properties for Mechanically Laminated Wood Assemblies

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Developed by the ASAE Mechanically Laminated Post Design Subcommittee of the Structures Group; approved by the Structures and Environment Division Standards Committee; adopted by ASAE December 1996; approved as an American National Standard February 1997; reaffirmed by ANSI February 2003; reaffirmed by ASAE February 2003; reaffirmed by ASABE and ANSI February 2008; revised and approved by ANSI August 2010; corrigenda 1 issued March 2011; reaffirmed by ASABE December 2014; reaffirmed by ANSI January 2015.

Corrigenda 1 corrected publication errors in equation 3 (7.3.1).

Keywords: Beams, Columns, Girders, Laminated Lumber, Laminating, Lumber, Wood Design, Wood Structures

1 Purpose and Scope

1.1 The purpose of this Engineering Practice is to establish guidelines for designing and calculating allowable bending properties of mechanically laminated wood assemblies used as structural members.

1.2 The scope of this Engineering Practice is limited to mechanically laminated assemblies with three or four wood laminations that have the following characteristics:

1.2.1 The actual thickness of each lamination is between 38 and 51 mm (1.5 and 2.0 in.).

1.2.2 All laminations have the same depth (face width), d.

1.2.3 Faces of adjacent laminations are in contact.

1.2.4 The centroid of each lamination is located on the centroidal axis of the assembly (axis Y-Y in Figure 1a), that is, no laminations are offset.

1.2.5 Concentrated loads are distributed to the individual laminations by a load distributing element.

1.2.6 All laminations are of the same grade and species of lumber or structural composite lumber.

1.2.7 There is no more than one common end joint per lamination within a splice region.

1.3 The provisions of this Engineering Practice do not apply to assemblies designed for biaxial bending. The design requirements in clause 4, and allowable bending properties in clauses 5 and 6, are only for uniaxial bending about axis Y-Y (Figure 1a). Spliced assemblies with butt joints shall have sufficient lateral support to prevent out-of-plane (lateral) movement or buckling, and/or delamination in the splice region.

1.4 This Engineering Practice does not preclude the use of assembly designs not meeting the criteria in clauses 1.2 and 1.3.

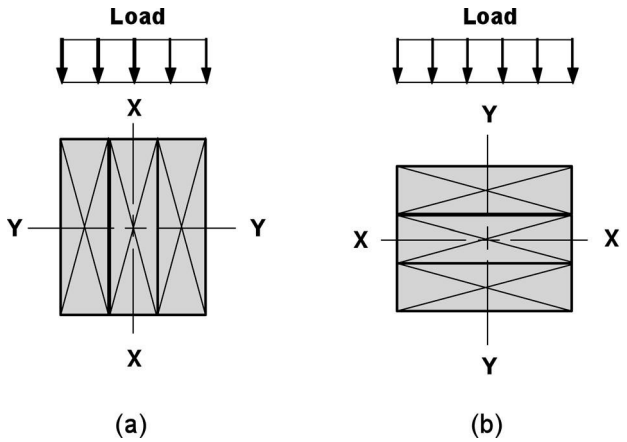

Figure 1 – (a) Vertically laminated, (b) horizontal laminated assemblies

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this Engineering Practice. At the time of publication, the editions were valid. All standards are subject to revision, and parties to agreements based on this Engineering Practice are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Standards organizations maintain registers of currently valid standards.

AF&PA (2005), National Design Specification (NDS) for Wood Construction

AITC Test T110-2007, Cyclic Delamination Test

ANSI/TPI 1-2007, National Design Standard for Metal Plate Connected Wood Truss Construction

ANSI/AITC 405-2008, Standard for Adhesives for Use in Structural Glued Laminated Timber

ASTM A153/A153M-05, Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 653/A 653M-09, Standard Specification for Steel Sheet, Zinc-Coated (galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

ASTM B 695, Standard Specification for Coating of Zinc Mechanically Deposited on Iron and Steel

ASTM D 198-08, Standard Methods of Static Testing of Timbers in Structural Sizes

ASTM D 245-06, Standard Methods for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber

ASTM D 3737-08, Standard Methods for Establishing Stresses for Structural Glued-Laminated Timber (Glulam)

ASTM D 7469-08, Standard Test Methods for End Joints in Structural Wood Products

AWPA U1-09, Use Category System: User Specification for Treated Wood

NIST PS20-05, American Softwood Lumber Standard