Designation: F1575 – 17

Standard Test Method for Determining Bending Yield Moment of Nails[1]

This standard is issued under the fixed designation F1575; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers procedures for determining the bending yield moment of nails when subjected to static loading. It is intended only for nails used in engineered connection applications, in which a required connection capacity is specified by the designer.

1.2 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E4 Practices for Force Verification of Testing Machines

F1667 Specification for Driven Fasteners: Nails, Spikes, and Staples

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *bending yield moment*—the moment determined from the load-deformation curve that is intermediate between the proportional limit load and maximum load for the nail. It is calculated by the intersection of the load-deformation curve with a line represented by the initial tangent modulus offset 5 % of the fastener diameter.

3.1.2 *deformed shank*—a nail shank that has been mechanically deformed with annular rings, barbs, helical flutes, etc. for the purpose of improved withdrawal capacity.

3.1.2.1 *fully deformed shank*—a nail shank that has deformation along the entire length.

3.1.2.2 *partially deformed shank*—a nail shank that that has both smooth and deformed sections along the length.

3.1.3 *proportional limit load*—is the load at which the load-deformation curve deviates from a straight line fitted to the initial portion of the load-deformation curve. (See Fig. 1)

3.1.4 *transition zone*—the location of the transition from smooth shank to deformed shank on a partially deformed-shank nail.

3.1.5 *yield theory*—the model for lateral load design values for dowel-type fasteners that specifically accounts for the different ways these connections behave under load. The capacity of the connection under each yield mode is determined by the bearing strength of the material under the fastener and the bending strength of the fastener, with the lowest capacity calculated for the various yield modes being taken as the design load for the connection.

4. Summary of Test Method

4.1 Test specimens are evaluated to determine capacity to resist lateral bending loads applied at a constant rate of deformation with a suitable testing machine. The load on the test specimen at various intervals of deformation is measured. Supplementary physical properties of the test specimen are also determined.

5. Significance and Use

5.1 Nails are a common mechanical fastener in wood structures. Engineering design procedures used to determine the capacities of laterally-loaded nailed connections currently use a yield theory to establish the nominal resistance for laterally-loaded nailed connections that are engineered. In order to develop the nominal resistance for laterally-loaded nailed connections, the bending yield moment must be known.

[1] This test method is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.05 on Driven and Other Fasteners.

Current edition approved March 15, 2017. Published April 2017. Originally approved in 1995. Last previous edition approved in 2013 as F1575 – 03(2013). DOI: 10.1520/F1575-17.

[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.

***A Summary of Changes section appears at the end of this standard**

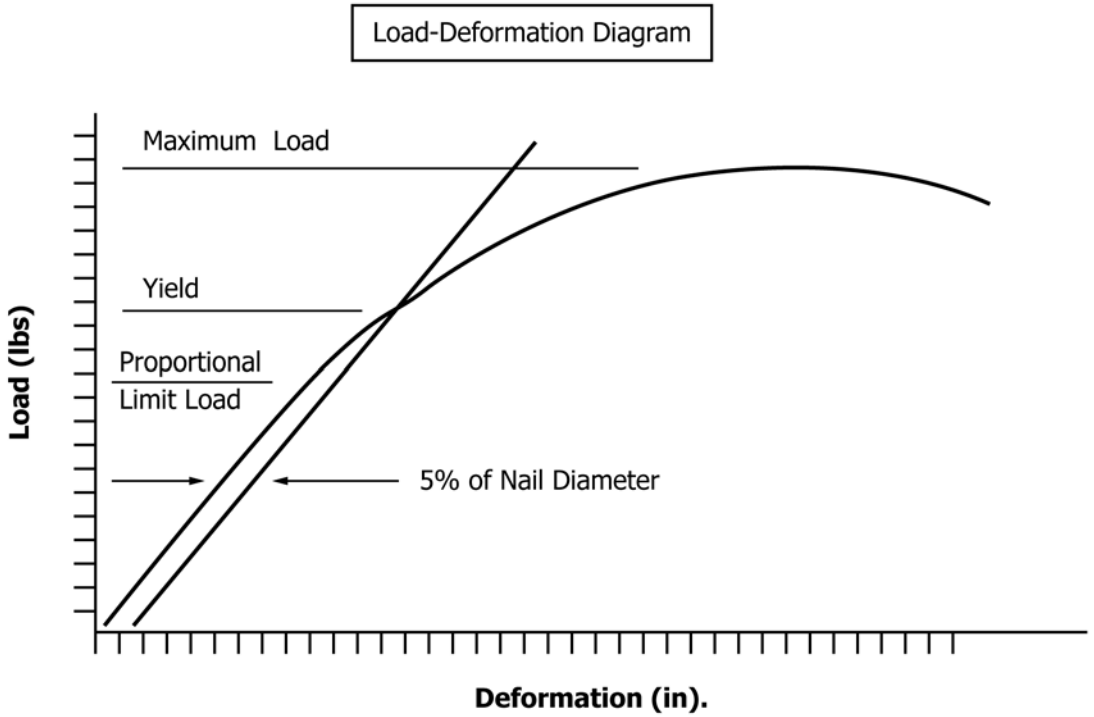

FIG. 1 Example of Typical Load-Deformation Diagram from Nail Bending Test

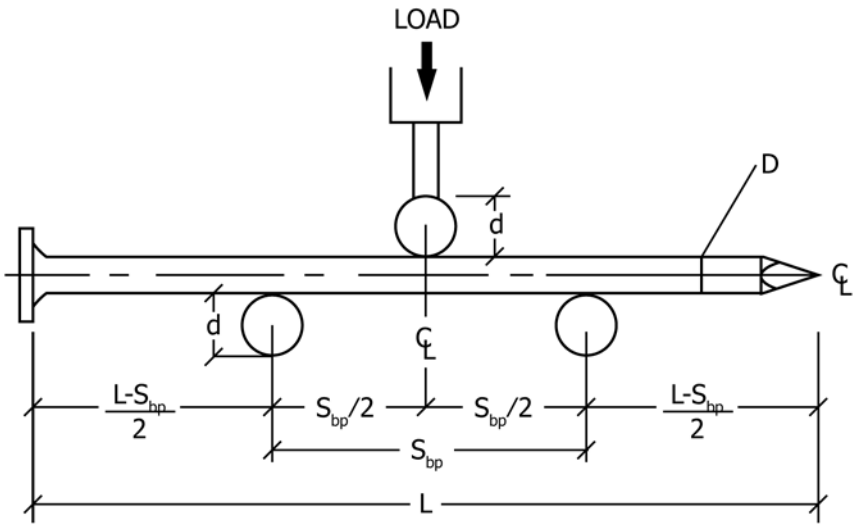

FIG. 2 Load and Bearing Point Locations for Smooth Shank and Fully Deformed Shank Nails

6. Apparatus

6.1 *Testing Machine*—Any suitable testing machine capable of operation at a constant rate of motion of its movable head and having an accuracy of ±1 % when calibrated in accordance with Practices E4.

6.2 *Cylindrical Bearing Points*—Any cylindrical metal member capable of supporting the test specimen during loading without deforming, as shown in Fig. 3, and having diameter (*d*) = 0.375 in.

6.2.1 Cylindrical bearing points shall be free to rotate as the test specimen deforms.

6.3 *Cylindrical Load Point*—Any cylindrical metal member capable of loading the test specimen without deforming, as shown in Figs. 2-4, and having diameter (*d*) = 0.375 in.

6.4 *Recording Device*—Any device with at least a reading of 0.001 in. and any suitable device for measuring the load on the test specimen during deformation.