



Designation: D 245 – 00

Standard Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber¹

This standard is issued under the fixed designation D 245; 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 practice (1,2)² covers the basic principles for establishing related unit stresses and stiffness values for design with visually-graded solid sawn structural lumber. This practice starts with property values from clear wood specimens and includes necessary procedures for the formulation of structural grades of any desired strength ratio.

1.2 The grading provisions used as illustrations herein are not intended to establish grades for purchase, but rather to show how stress-grading principles are applied. Detailed grading rules for commercial stress grades which serve as purchase specifications are established and published by agencies which formulate and maintain such rules and operate inspection facilities covering the various species.

1.3 The material covered in this practice appears in the following order:

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Estimation and Limitation of Growth Characteristics	5
Allowable Properties for Timber Design	6
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1.4 The values given in parentheses are provided for information purposes only.

1.5 *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:

D 9 Terminology Relating to Wood³

D 143 Methods of Testing Small Clear Specimens of Timber³

D 2555 Test Methods for Establishing Clear-Wood Strength Values³

E 105 Practice for Probability Sampling of Materials⁴

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)⁵

3. Significance and Use

3.1 Need for Lumber Grading:

3.1.1 Individual pieces of lumber, as they come from the saw, represent a wide range in quality and appearance with respect to freedom from knots, cross grain, shakes, and other characteristics. Such random pieces likewise represent a wide range in strength, utility, serviceability, and value. One of the obvious requirements for the orderly marketing of lumber is the establishment of grades that permit the procurement of any required quality of lumber in any desired quantity. Maximum economy of material is obtained when the range of quality-determining characteristics in a grade is limited and all pieces are utilized to their full potential. Many of the grades are established on the basis of appearance and physical characteristics of the piece, but without regard for mechanical properties. Other grades, called structural or stress grades, are established on the basis of features that relate to mechanical properties. The latter designate near-minimum strength and near-average stiffness properties on which to base structural design.

3.1.2 The development of this practice is based on extensive research covering tests of small clear specimens and of full-sized structural members. Detailed studies have included the strength and variability of clear wood, and the effect on strength from various factors such as density, knots (See Terminology D 9), and other defects, seasoning, duration of stress, and temperature.

3.2 *How Visual Grading is Accomplished*— Visual grading is accomplished from an examination of all four faces and the ends of the piece, in which the location as well as the size and nature of the knots and other features appearing on the surfaces are evaluated over the entire length. Basic principles of structural grading have been established that permit the evaluation of any piece of stress-graded lumber in terms of a strength ratio for each property being evaluated. The strength

¹ This practice is under the jurisdiction of ASTM Committee D-7 on Wood and is the direct responsibility of Subcommittee D07.02 on Lumber and Engineered Wood Products.

Current edition approved April 10, 1999. Published June 1999. Originally published as D 245 – 26. Last previous edition D 245 – 99.

² The boldface numbers in parentheses refer to references at the end of this practice.

³ *Annual Book of ASTM Standards*, Vol 04.10.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.

⁵ *Annual Book of ASTM Standards*, Vol 14.02 (excerpts in Vol 04.10).