Designation: D 2899 – 95

Standard Practice for Establishing Design Stresses for Round Timber Piles[1]

This standard is issued under the fixed designation D 2899; 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 covers basic principles for establishing recommended design stress values for round timber piles.

1.2 This practice is intended for use by associations, technical societies, and other groups responsible for establishing standards for design and use of round timber piles.

1.3 Stresses derived by this practice are applicable to pile quality described in Specification D 25.

1.4 *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 25 Specification for Round Timber Piles[2]

D 2555 Test Methods for Establishing Clear-Wood Strength Values[2]

3. Significance and Use

3.1 This practice is intended to establish design stresses (working stresses or allowable stresses) for timber pile material.

3.2 Safe and reliable design stresses are necessary in order to achieve economical and dependable designs, fully utilizing the physical properties of round timber piles. In using these stresses, the engineer must also consider other factors, such as the location of the critical section, the soil bearing capacity, the ability of the pile to withstand driving stresses, and service conditions which may affect the design of the pile system.

3.3 Maximum economy is achieved when all piles are stressed to the full allowable strength.

PRINCIPLES AFFECTING STRENGTH PROPERTIES

4. Clear Wood Strength

4.1 The strength of timber piles is dependent upon the average clear wood strength. Values of clear wood strength are presented in Test Methods D 2555.

5. Variability

5.1 There is a variation in the strength of clear wood within each species resulting from the normal differences in the growth of individual trees. The variability of clear wood strength properties is composed of variations between trees, variations along the length of a tree, and variations between different locations within a cross section of a tree. Variability is presented in the form of standard deviations for clear wood strength of small specimens in Test Methods D 2555.

5.2 The variation in pile strength is mostly due to differences between trees. Thus, the standard deviations for pile strength are less than for clear wood strength of small specimens.

6. Density

6.1 The specific gravity of the solid wood substance of all clear wood is practically the same, regardless of species. Clear wood is porous and its strength depends upon the amount of wood substance present. Specific gravity provides an excellent index of the wood substance a piece of dry wood contains, and is therefore an index of its strength properties.

7. Decay

7.1 Ordinarily, the extent of decay in wood is difficult to determine, and its effect on strength and shock resistance is greater than visual observation would indicate. Decay in piles in any form is severely restricted or prohibited in accordance with Specification D 25.

8. Heartwood and Sapwood

8.1 Heartwood and sapwood have been found to be of equal strength and no requirement of heartwood need be made when strength alone is the governing factor.

9. Moisture Content

9.1 When timber is seasoned, the direct effect of the loss of moisture is the stiffening and strengthening of the wood fibers.

9.2 The effect of reduction of moisture content assumes importance only when piles protrude above ground for some distance, as in the case of piers and wharves or bridge construction. Piles are usually continuously wet for at least a major portion of their length.

[1] This practice is under the jurisdiction of ASTM Committee D-7 on Wood and is the direct responsibility of Subcommittee D07.04 on Pole and Pile Products.

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This revision includes changes only to the design stresses for oak piles calculated from 14.1.1 and a change to 13.3 to make an exception for oak piles.

[2] *Annual Book of ASTM Standards*, Vol 04.10.