



Standard Specification for Round Timber Piles¹

This standard is issued under the fixed designation D 25; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the physical characteristics of unused round timber piles to be used either treated or untreated.

1.2 This specification is not intended for preused piles unless the piles have the quality specified by this specification and design stresses equal to or greater than those derived from Method D 2899.

1.3 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 ASTM Standards:

D 9 Terminology Relating to Wood²

D 2555 Test Methods for Establishing Clear Wood Strength Values²

D 2899 Method for Establishing Design Stresses for Round Timber Piles²

3. Species of Wood

3.1 Piles shall be of any species of wood for which clear wood strength values are given in Test Methods D 2555.

4. Classification

4.1 Timber piles are commonly used to transfer structural loads to sub surface soil bearing strata by way of friction or tip end bearing forces, or both.

4.2 Method D 2899 provides a basis for specifying the pile size. This standard gives a procedure for estimating the design stress at any location along the pile length. As design stress must always exceed that imposed under service conditions, the quotient of the structural loads divided by the design stress gives an estimate of the minimum section property required at any location.

4.3 Under this specification, pile size requirements estimated at a critical location are extrapolated to either the tip or butt end assuming a linear taper. For this specification, piles are classified by nominal circumference and length.

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² Annual Book of ASTM Standards, Vol 04.10.

5. Quality Requirement (All Piles)

5.1 Piles shall be of sound wood, free of decay, insect attack, marine borer attack, and *Limnoria* damage, except as herein allowed in 13.2 and 14.1.

5.2 Piles shall be cut above the ground swell and have a taper from butt to tip.

5.3 Piles shall have an average rate of growth measured in the outer 50 % of the radius at the pile tip of not less than 6 rings per inch and shall have an average summerwood content of not less than 33.3 % in the outer 50 % of the tip radius. Exception: Piles with less than 6 rings per inch are acceptable if the average is 50 % or more summerwood present in the outer 50 % of the pile tip radius.

5.4 Piles that cannot be adequately inspected for the physical requirements specified in this specification due to adhering barnacles or other material shall not be permitted.

6. Lengths

6.1 All piles shall be furnished in lengths specified, except that tolerances shall be allowed as follows:

6.1.1 Piles 40 ft (12.2 m) and shorter—plus 1 ft (0.3 m), minus 6 in. (152 mm).

6.1.2 Piles 41 ft (12.5 m) or longer—plus 2 ft (0.6 m), minus 6 in. (152 mm).

7. Sizes

7.1 Pile sizes are specified according to nominal circumference 3 ft from the butt or at the tip. Tables are provided in Appendix X1.1 to facilitate the selection of pile dimensions.

7.2 The “out-of-round” ratio (maximum to minimum diameter) at the butt or the tip shall not exceed 1.2.

7.3 All circumference measurements shall be taken under the bark.

7.4 Circumference at the butt shall not exceed circumference 3 ft (0.9 m) from the butt by more than 8 in. (203 mm).

7.5 Circumferences given in Table X1.2 and Table X1.4 are minimum values except that not more than 10 % of the piles in any shipment may have circumferences up to 2 in. less than the tabulated minimum values.

8. Sapwood

8.1 Wood piles for preservative treatment shall have sufficient sapwood to meet minimum penetration requirements.

9. Cutting and Trimming

9.1 Butts and tips of piles shall be sawed square with the axis of the piles and shall not be out of square by more than 1/10 in./in. (100 mm/m) of diameter.

9.2 All knots and limbs shall be cut flush with the surface of the pile, except that knots may be hand-trimmed flush with the surface of the swell surrounding the knot.

10. Peeling (Shaving)

10.1 Piles are classified according to the extent of bark removal as clean-peeled, rough-peeled, or unpeeled.

10.1.1 Clean-peeled piles require the removal of all outer bark. In addition, at least 80 % of the inner bark, well-distributed over the surface of the pile, shall be removed. Piles for preservative treatment shall have no strip of inner bark larger than 1 by 6 in. (25 by 152 mm).

10.1.2 Rough-peeled piles require the complete removal of all outer bark.

10.1.3 Unpeeled piles require no bark removal.

11. Straightness

11.1 A straight line from the center of the butt to the center of the tip shall lie entirely within the body of the pile.

11.2 Piles shall be free from short crooks that deviate more than 2 1/2 in. (64 mm) from straightness in any 5-ft (1.5-m) length (see Fig. 1).

12. Twist of Grain

12.1 Spiral grain shall not exceed 180 deg of twist when measured over any 20-ft (6.1-m) section of the pile.

13. Knots

13.1 Sound knots shall be no larger than one sixth the

circumference of the pile located where the knot occurs. Cluster knots shall be considered as a single knot, and the entire cluster cannot be greater in size than permitted for a single knot. The sum of knot diameters in any 1-ft (304-mm) length of pile shall not exceed one third of the circumference at the point where they occur. Knots shall be measured in accordance with Terminology D 9, and at a right angle to the length of the pile.

13.2 Piles may have unsound knots not exceeding half the permitted size of a sound knot, provided that the unsoundness extends to not more than a 1 1/2-in. (38-mm) depth, and that the adjacent areas of the trunk are not affected.

14. Holes and Scars

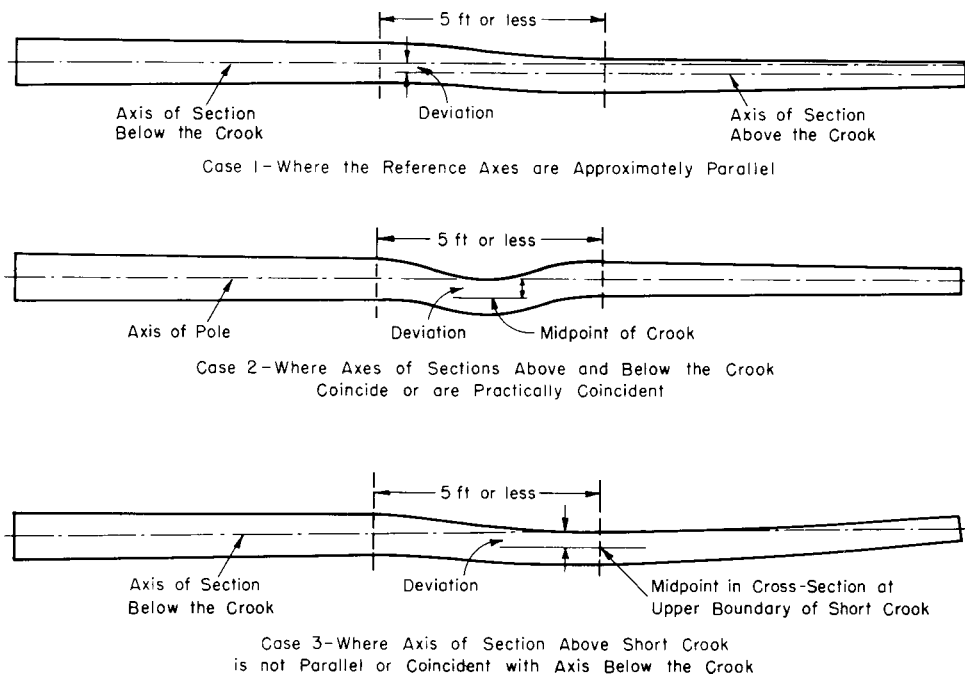
14.1 Holes less than 1/2 in. (12.7 mm) in average diameter shall be permitted in the external tangential surface of piles, provided that the sum of the average diameters of all holes in any square foot of pile surface does not exceed 1 1/2 in. (38 mm), and the depth of any hole does not extend to more than 1 1/2 in. (38 mm) and provided that the holes are not caused by decay, marine borer attack, or *Limnoria* damage.

14.2 Internal holes or damage to the cross-section (bearing) surfaces caused by decay, marine borers (shipworms or pholads), or insects are not permitted.

14.3 Piles having sound turpentine scars undamaged by insects shall be permitted.

15. Checks, Shakes, and Splits

15.1 A check shall not extend any deeper than to the pith. There shall not be any two or more checks extending to the pith which become contiguous at the pith, except as modified by 15.3. A check is defined as a lengthwise separation of the wood across the rings of normal growth, extending from the surface



The three cases shown are typical, and are intended to establish the principle of measuring shorty crooks. There may be other cases not exactly like those illustrated.

NOTE 1—5 ft = 1.5 m

FIG. 1 Measurement of Short Crook

toward the pith, but not extending through the piece.

15.2 The length of any shake or combination of shakes in the outer one half of the radius of the butt of the pile, when measured along the curve of the annual ring, shall not exceed one third of the circumference of the butt of the pile. A shake is defined as a circumferential separation of the rings of normal growth.

15.3 Splits shall not be longer than the butt diameter. A split is defined as a lengthwise separation of the wood across the rings of normal growth, extending from one surface through the piece to the opposite surface.

16. Keywords

16.1 piles; round timber piles; timber

APPENDIX

(Nonmandatory Information)

X1. PILE SIZE OPTIONS

X1.1 Two pile classification systems have evolved along with Specification D 25 since its adoption in 1937. The original version of the standard referenced three pile “Classes” (A, B and C). These classes targeted different end uses: “A” was designated for use in railway trestles and bridges, “B” was for use in docks, wharves and highway work and “C” was for use in submerged foundations, cofferdams falsework and temporary structures. The main difference between classes A and B was in the size cap they would support (minimum of 14 in. for class A and 12 in. for class B). Class C was of lower quality. In 1970 the 3-Class system table of sizes was replaced with two tables giving common round timber dimensions arranged to facilitate the selection of piles according to a required minimum butt dimension (“friction” piles) or a required minimum tip dimension (“end-bearing” piles). In 1991, the two table system was replaced with four tables, reflecting the difference in shape of southern pine piles and Class A and B were referenced in a footnote to the required minimum butt tables.

X1.1.1 In 1998, it was voted to place greater emphasis on class A and B pile sizes and add an “eight inch tip, natural taper” classification. The class A and B sizes shown in Table X1.1 are the same as those presented in the original 1937 edition of Specification D 25. The “8 inch tip” class adopted by New York City in the 1960s is a replacement for class C and applies for piles up to 40 ft in length.

X1.2 Tables X1.2-X1.5 provide options for major pile species specified according to either a minimum nominal butt or a minimum nominal tip circumference. When the butt circumference is specified, the tip circumference shall not be less than that shown in Tables X1.2 and X1.3. When the top circumference is specified, the butt circumference shall not be less than that shown in Tables X1.4 and X1.5. The differences

TABLE X1.1 Specified Minimum Butt and Tip Sizes for Class A and Class B Piles

Length (ft)	Pile Circumference (in.) Diameter (in.) given in brackets						8 in. tip
	Class A			Class B ^A			
	3 ft from butt min	max	min tip	3 ft from butt min	max	min tip	
Douglas Fir, Southern Pine							
Under 40		57	28	38		25	25
40-54, incl.		[18]	[9]	[12]		[8]	[8]
55-74, incl.	44	57	25		63	22	[7]
75-90, incl.	[14]	[20]	[8]	41	[20]	19	[6]
Over 90		63	[7]	[13]		16	[6]
		[20]	19			[6]	[6]
			[6]				
Oak							
Under 30		28	38	57	22		
30-40, incl.	44	57	[9]	[12]	[18]	[7]	
	[14]	[18]		41	63	19	
				[13]	[20]	[6]	
Over 40			25			16	
			[8]			[5]	

^A For Class B piles a minimum circumference of 34 in. (864 mm) or a diameter of 11 in. (279 mm) at a point 3 ft (1 m) from the butt may be specified for lengths of 25 ft (7.6 m) and under.

between Tables X1.2 and X1.3 and Tables X1.4 and X1.5 reflect the difference between southern pine and the predominant west coast species. Southern pine generally has a linear taper of roughly 0.2 in./ft from the butt to the tip. The predominant west coast pile species exhibit a smaller taper below 20 ft from the butt, giving them larger tips for a given butt size.

TABLE X1.2 Specified Butt Circumferences with Corresponding Minimum Tip Circumferences for Coast Douglas Fir Piles and Other Species, Except Southern Yellow Pine^{A,B}
 [Approximate Diameters in Brackets]

Required Minimum Circumference, in. 3 ft from Butts	22 [7]	25 [8]	28 [9]	31 [10]	35 [11]	38 [12]	41 [13]	44 [14]	47 [15]	50 [16]	57 [18]
Length (ft)	Minimum Tip Circumferences, in.										
20	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	18.0 [5.7]	22.0 [7.0]	25.0 [8.0]	28.0 [8.9]	...	...	...	...
25	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	17.0 [5.4]	20.5 [6.5]	23.5 [7.5]	26.5 [8.4]	29.5 [9.4]	...	...	...
30	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	19.0 [6.0]	22.0 [7.0]	25.0 [8.0]	28.0 [8.9]	...	...	...
35	16.0 [5.1]	18.0 [5.7]	21.0 [6.7]	24.0 [7.6]	27.0 [8.6]	30.0 [9.5]	...	...
40	16.0 [5.1]	17.0 [5.4]	20.0 [6.4]	23.0 [7.3]	26.0 [8.3]	29.0 [9.2]	...	...
45	16.5 [5.3]	18.5 [5.9]	21.0 [6.7]	24.0 [7.6]	27.0 [8.6]	30.0 [9.5]	...
50	16.0 [5.1]	17.0 [5.4]	19.0 [6.0]	22.0 [7.0]	25.0 [8.0]	28.0 [8.9]	...
55	16.5 [5.3]	17.5 [5.6]	20.3 [6.5]	23.3 [7.4]	26.3 [8.4]	31.3 [10.0]
60	16.0 [5.1]	16.0 [5.1]	18.6 [5.9]	21.6 [6.9]	24.6 [7.8]	31.6 [10.0]
65	16.0 [5.1]	16.0 [5.1]	17.3 [5.5]	18.9 [6.0]	21.9 [7.0]	28.9 [9.2]
70	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.2 [5.2]	19.2 [6.1]	26.2 [8.3]
75	16.0 [5.1]	16.0 [5.1]	16.1 [5.1]	17.6 [5.6]	24.0 [7.6]
80	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	21.8 [6.9]
85	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	20.6 [6.6]
90	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	19.5 [6.2]
95	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	18.8 [6.0]
100	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	16.0 [5.1]	18.0 [5.7]
105	16.0 [5.1]	17.0 [5.4]
110	16.0 [5.1]	16.0 [5.1]
115	16.0 [5.1]
120	16.0 [5.1]

^A Where the taper applied to the butt circumferences calculate to a circumference at the tip of less than 16 in., the individual values have been increased to 16 in. to ensure a minimum of 5-in. tip for purposes of driving.

^B To convert to metric dimensions, 1 in. = 25.4 mm.

TABLE X1.3 Specified Butt Circumferences with Corresponding Minimum Tip Circumferences for Southern Yellow Pine Piles^{A,B,C,D,E}

Required Minimum Circumference, in. 3 ft from Butts	22 [7]	25 [8]	28 [9]	31 [10]	35 [11]	38 [12]	41 [13]	44 [14]	47 [15]	50 [16]	57 [18]
Length (ft)	Minimum Tip Circumferences, in.										
20	16 [5.1]	16 [5.1]	18 [5.7]	21 [6.7]	25 [8.0]	28 [8.9]	31 [9.9]	34 [10.8]	37 [11.8]	40 [12.7]	47 [15.0]
25	16 [5.1]	16 [5.1]	17 [5.4]	20 [6.4]	24 [7.6]	27 [8.6]	30 [9.5]	33 [10.5]	36 [11.4]	39 [12.4]	46 [14.6]
30	16 [5.1]	16 [5.1]	16 [5.1]	19 [6.0]	23 [7.3]	26 [8.3]	29 [9.2]	32 [10.2]	35 [11.1]	38 [12.1]	45 [14.3]
35	...	...	...	18 [5.7]	22 [7.0]	25 [8.0]	28 [8.9]	31 [9.9]	34 [10.8]	37 [11.8]	44 [14.0]
40	...	...	...	17 [5.4]	21 [6.7]	24 [7.6]	27 [8.6]	30 [9.5]	33 [10.5]	36 [11.4]	43 [13.7]
45	...	...	...	...	20 [6.4]	23 [7.3]	26 [8.3]	29 [9.2]	32 [10.2]	35 [11.1]	42 [13.4]
50	...	...	...	...	19 [6.0]	22 [7.0]	25 [8.0]	28 [8.9]	31 [9.9]	34 [10.8]	41 [13.0]
55	...	...	...	...	...	21 [6.7]	24 [7.6]	27 [8.6]	30 [9.5]	33 [10.5]	40 [12.7]
60	...	...	...	...	...	20 [6.4]	23 [7.3]	26 [8.3]	29 [9.2]	32 [10.2]	39 [12.4]
65	...	...	...	...	...	19 [6.0]	22 [7.0]	25 [8.0]	28 [8.9]	31 [9.9]	38 [12.1]
70	...	...	...	...	...	18 [5.7]	21 [6.7]	24 [7.6]	27 [8.6]	30 [9.5]	37 [11.8]
75	...	...	...	...	...	...	20 [6.4]	23 [7.3]	26 [8.3]	29 [9.2]	36 [11.4]
80	...	...	...	...	...	...	19 [6.0]	22 [7.0]	25 [8.0]	28 [8.9]	35 [11.1]
85	...	...	...	...	...	...	18 [5.7]	21 [6.7]	24 [7.6]	27 [8.6]	34 [10.8]

^A Where the taper applied to the butt circumferences calculate to a circumference at the tip of less than 16 in., the individual values have been increased to 16 in. to ensure a minimum of 5-in. tip for purposes of driving.

^B To convert to metric dimensions, 1 in. = 25.4 mm.

^C Class A piles are all those listed with a specified required minimum circumference of 44 in. at 3 ft from butt.

^D Class B piles are those listed with a specified required minimum circumference at 3 ft from butt of 35 in. and lengths of 20 to 25 ft minimum circumference at 3 ft from butt of 38 in. and lengths of 20 to 50 ft, and minimum circumference at 3 ft from butt of 41 in. and lengths of 55 to 80 ft.

^E Southern Yellow Pine piles are generally available in lengths shorter than 70 ft or girth of less than 50 in. at 3 ft from butt. A dark horizontal line in each column designates pile sizes (above the line) which are generally available. The purchaser should inquire as to availability of sizes below the lines.

TABLE X1.4 Specified Tip Circumferences with Corresponding Minimum Butt Circumferences for Piles of Coast Douglas Fir and Other Species Except Southern Yellow Pine^{A,B}
 [Approximate Diameters in Brackets]

Required Minimum Tip Circumference, in.	16 [5]	19 [6]	22 [7]	25 [8]	28 [9]	31 [10]	35 [11]	38 [12]
Length, ft	Circumferences 3 ft from Butt, in.							
20	21.0 [6.7]	24.0 [7.6]	27.0 [8.6]	30.0 [9.5]	33.0 [10.5]	36.0 [11.5]	40.0 [12.7]	43.0 [13.7]
25	22.8 [7.1]	25.3 [8.1]	28.3 [9.0]	31.3 [10.0]	34.3 [10.9]	37.3 [11.9]	41.3 [13.1]	44.3 [14.1]
30	23.5 [7.5]	26.5 [8.4]	29.5 [9.4]	32.5 [10.3]	35.5 [11.3]	38.5 [12.3]	42.5 [13.5]	45.5 [14.5]
35	24.8 [7.9]	27.8 [8.8]	30.8 [9.8]	33.8 [10.8]	36.8 [11.7]	39.8 [12.7]	43.8 [13.9]	46.8 [14.9]
40	26.0 [8.3]	29.0 [9.2]	32.0 [10.2]	35.0 [11.1]	38.0 [12.1]	41.0 [13.0]	45.0 [14.3]	48.0 [15.3]
45	27.3 [8.7]	30.3 [9.6]	33.3 [10.6]	36.3 [11.6]	39.3 [12.5]	42.3 [13.5]	46.3 [14.7]	49.3 [15.7]
50	28.5 [9.1]	31.5 [10.0]	34.5 [11.0]	37.5 [11.9]	40.5 [12.9]	43.5 [13.8]	47.5 [15.1]	50.5 [16.1]
55	29.8 [9.5]	32.8 [10.4]	35.8 [11.4]	38.8 [12.4]	41.8 [13.3]	44.8 [14.3]	48.8 [15.5]	51.8 [16.5]
60	31.0 [9.9]	34.0 [10.8]	37.0 [11.8]	40.0 [12.7]	43.0 [13.7]	46.0 [14.6]	50.0 [15.9]	53.0 [16.9]
65	32.3 [10.3]	35.3 [11.2]	38.3 [12.2]	41.3 [13.1]	44.3 [14.1]	47.3 [15.1]	51.3 [16.3]	54.3 [17.3]
70	33.5 [10.7]	36.5 [11.6]	39.5 [12.6]	42.5 [13.5]	45.5 [14.5]	48.5 [15.4]	52.5 [16.7]	55.5 [17.7]
75	34.8 [11.1]	37.8 [12.0]	40.8 [13.0]	43.8 [13.9]	46.8 [14.9]	49.8 [15.9]	53.8 [17.1]	56.8 [18.1]
80	36.0 [11.5]	39.0 [12.4]	42.0 [13.4]	45.0 [14.3]	48.0 [15.3]	51.0 [16.2]	55.0 [17.5]	58.0 [18.5]
85	37.3 [11.9]	40.3 [12.8]	43.3 [13.8]	46.3 [14.7]	49.3 [15.7]	52.3 [16.6]	56.3 [17.9]	59.3 [18.9]
90	38.5 [12.3]	41.5 [13.2]	44.5 [14.2]	47.5 [15.1]	50.5 [16.1]	53.5 [17.0]	57.5 [18.3]	60.5 [19.3]
95	39.8 [12.7]	42.8 [13.6]	45.8 [14.6]	48.8 [15.5]	51.8 [16.5]	54.8 [17.4]	58.8 [18.7]	61.8 [19.7]
100	41.0 [13.0]	44.0 [14.0]	47.0 [15.0]	50.0 [15.9]	53.0 [16.9]	56.0 [17.8]	60.0 [19.1]	...
105	42.3 [13.5]	45.3 [14.4]	48.3 [15.4]	51.3 [16.3]	54.3 [17.3]	57.3 [18.2]	...	...
110	43.5 [13.8]	46.5 [14.8]	49.5 [15.8]	52.5 [16.7]	55.5 [17.7]	58.5 [18.6]	...	...
115	44.8 [14.3]	47.8 [15.2]	50.8 [16.2]	53.8 [17.1]	56.8 [18.1]	...	...	...
120	46.0 [14.6]	49.0 [15.6]	52.0 [16.6]	55.0 [17.5]	58.0 [18.5]	...	...	...

^A To convert to metric dimensions, 1 in. = 25.4 mm.

^B Piles purchased as "8-in. and natural taper" have a required minimum tip circumference of 25 in. and are available in lengths of 20 to 45 ft.

TABLE X1.5 Specified Tip Circumferences with Corresponding Minimum Butt Circumferences for Southern Yellow Pine Piles^{A,B,C}
 [Approximate Diameters in Brackets]

Required Minimum Tip Circumference, in. Length, ft	16	19	22	25	28	31	35	38
	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Minimum Circumferences 3 ft from Butt, in.								
20	19 [6.0]	22 [7.0]	25 [8.0]	28 [8.9]	31 [9.9]	34 [10.8]	38 [12.1]	41 [13.0]
25	20 [6.4]	23 [7.3]	26 [8.3]	29 [9.2]	32 [10.2]	35 [11.1]	39 [12.4]	42 [13.4]
30	21 [6.7]	24 [7.6]	27 [8.6]	30 [9.5]	33 [10.5]	36 [11.4]	40 [12.7]	43 [13.7]
35	22 [7.0]	25 [8.0]	28 [8.9]	31 [9.9]	34 [10.8]	37 [11.8]	41 [13.0]	44 [14.0]
40	...	26 [8.3]	29 [9.2]	32 [10.2]	35 [11.1]	38 [12.1]	42 [13.4]	45 [14.3]
45	...	27 [8.6]	30 [9.5]	33 [10.5]	36 [11.4]	39 [12.4]	43 [13.7]	46 [14.6]
50	...	...	31 [9.9]	34 [10.8]	37 [11.8]	40 [12.7]	44 [14.0]	47 [15.0]
55	...	...	32 [10.2]	35 [11.1]	38 [12.1]	41 [13.0]	45 [14.3]	48 [15.3]
60	...	...	33 [10.5]	36 [11.4]	39 [12.4]	42 [13.4]	46 [14.6]	49 [15.6]
65	...	...	34 [10.8]	37 [11.8]	40 [12.7]	43 [13.7]	47 [15.0]	50 [15.9]
70	...	...	35 [11.1]	38 [12.1]	41 [13.6]	44 [14.0]	48 [15.3]	51 [16.2]
75	...	...	36 [11.4]	39 [12.4]	42 [13.4]	45 [14.3]	49 [15.6]	52 [16.6]
80	...	...	37 [11.8]	40 [12.7]	43 [13.7]	46 [14.6]	50 [15.9]	53 [16.9]
85	...	...	38 [12.1]	41 [13.0]	44 [14.0]	47 [15.0]	51 [16.2]	54 [17.2]
90	...	...	39 [12.4]	42 [13.4]	45 [14.3]	48 [15.3]	52 [16.6]	55 [17.5]

^A To convert to metric dimensions, 1 in. = 25.4 mm.

^B Piles purchased as "8-in. and natural taper" have a required minimum tip circumference of 25 in. and are available in lengths of 20 to 45 ft.

^C Southern Yellow Pine piles are generally available in lengths shorter than 70 ft. or girth of less than 50 in. at 3 ft. from butt. A dark horizontal line in each column designates pile sizes (above the line) which are generally available. The purchaser should inquire as to availability of sizes below the lines.

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