

# Pole Price Sheet

SIZE	CUBES	Cub/prc	GREEN	SIZE	CUBES	cub/prc	GREEN
30/1	20.4	\$4.31	\$88.00	70/1	8.1	\$79.75	\$646.00
30/2	17.8	\$4.49	\$80.00	70/2	69.5	\$8.46	\$588.00
30/3	15.4	\$4.61	\$71.00	70/3	60.2	\$6.28	\$378.00
30/4	13.3	\$4.59	\$61.00	75/1	89.5	\$8.97	\$803.00
30/5	11.6	\$4.31	\$50.00	75/2	77.7	\$8.79	\$683.00
30/6	10.1	\$4.46	\$45.00	75/3	67.3	\$8.10	\$545.00
30/7	8.6	\$4.42	\$38.00	80/1	99.3	\$9.36	\$929.00
30/9	6.4	\$5.16	\$33.00	80/2	86.1	\$8.94	\$770.00
35/1	26.2	\$4.05	\$106.00	80/3	74.6	\$8.11	\$605.00
35/2	22.8	\$4.25	\$97.00	85/1	109.6	\$9.58	\$1,050.00
35/3	19.7	\$4.82	\$95.00	85/2	94.9	\$10.01	\$950.00
35/4	17.1	\$4.91	\$84.00	85/3	82.3	\$8.60	\$708.00
35/5	14.8	\$4.46	\$66.00				
35/6	12.8	\$4.30	\$55.00				
35/7	11.1	\$4.41	\$49.00				
40/1	32.6	\$4.36	\$142.00				
40/2	28.2	\$4.72	\$133.00				
40/3	24.5	\$4.73	\$116.00				
40/4	21.2	\$5.28	\$112.00				
40/5	18.4	\$5.16	\$95.00				
40/6	15.9	\$4.47	\$71.00				
45/1	39.3	\$4.22	\$166.00				
45/2	34.1	\$4.22	\$144.00				
45/3	29.5	\$4.51	\$133.00				
45/4	25.6	\$4.73	\$121.00				
45/5	22.2	\$4.86	\$108.00				
50/1	46.6	\$4.14	\$193.00				
50/2	40.4	\$4.13	\$167.00				
50/3	35	\$4.17	\$146.00				
50/4	30.4	\$4.54	\$138.00				
55/1	54.3	\$4.07	\$221.00				
55/2	47.1	\$4.31	\$203.00				
55/3	40.8	\$4.22	\$172.00				
55/4	35.4	\$4.49	\$159.00				
60/1	62.6	\$5.05	\$316.00				
60/2	54.2	\$5.07	\$275.00				
60/3	47	\$4.96	\$233.00				
60/4	40.7	\$4.50	\$183.00				
65/1	71.1	\$7.40	\$526.00				
65/2	61.6	\$7.11	\$438.00				
65/3	53.4	\$5.52	\$295.00				
65/4	46.4	\$4.18	\$194.00				

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Table 8 - Dimensions of Douglas-fir (both types) and Southern pine poles (Fiber Strength 8000 psi)

Class		H6	H5	H4	H3	H2	H1	1	2	3	4	5	6	7	9	10
Minimum circumference at top (in)		39	37	35	33	31	29	27	25	23	21	19	17	15	15	12
Length of pole (ft)	Approximate Groundline <sup>1)</sup> distance from butt (ft)	Minimum circumference at 6 ft from butt (ft)														
20	4	-	-	-	-	-	-	31.0	29.0	27.0	25.0	23.0	21.0	19.5	17.5	14.0
25	5	-	-	-	-	-	-	33.5	31.5	29.5	27.5	25.5	23.0	21.5	19.5	15.0
30	5.5	-	-	-	-	-	-	36.5	34.0	32.0	29.5	27.5	25.0	23.5	20.5	-
35	6	-	-	-	-	43.5	41.5	39.0	36.5	34.0	31.5	29.0	27.0	25.0	-	-
40	6	-	-	51.0	48.5	46.0	43.5	41.0	38.5	36.0	33.5	31.0	28.5	-	-	-
45	6.5	58.5	56.0	53.5	51.0	48.5	45.5	43.0	40.5	37.5	35.0	32.5	30.0	-	-	-
50	7	61.0	58.5	55.5	53.0	50.5	47.5	45.0	42.0	39.0	36.5	34.0	-	-	-	-
55	7.5	63.5	60.5	58.0	55.0	52.0	49.5	46.5	43.5	40.5	38.0	-	-	-	-	-
60	8	65.5	62.5	59.5	57.0	54.0	51.0	48.0	45.0	42.0	39.0	-	-	-	-	-
65	8.5	67.5	64.5	61.5	58.5	55.5	52.5	49.5	46.5	43.5	40.5	-	-	-	-	-
70	9	69.0	66.5	63.5	60.5	57.0	54.0	51.0	48.0	45.0	41.5	-	-	-	-	-
75	9.5	71.0	68.0	65.0	62.0	59.0	55.5	52.5	49.0	46.0	-	-	-	-	-	-
80	10	72.5	69.5	66.5	63.5	60.0	57.0	54.0	50.5	47.0	-	-	-	-	-	-
85	10.5	74.5	71.5	68.0	65.0	61.5	58.5	55.0	51.5	48.0	-	-	-	-	-	-
90	11	76.0	73.0	69.5	66.5	63.0	59.5	56.0	53.0	49.0	-	-	-	-	-	-
95	11	77.5	74.5	71.0	67.5	64.5	61.0	57.0	54.0	-	-	-	-	-	-	-
100	11	79.0	76.0	72.5	69.0	65.5	62.0	58.5	55.0	-	-	-	-	-	-	-
105	12	80.5	77.0	74.0	70.5	67.0	63.0	59.5	56.0	-	-	-	-	-	-	-
110	12	82.0	78.5	75.0	71.5	68.0	64.5	60.5	57.0	-	-	-	-	-	-	-
115	12	83.5	80.0	76.5	72.5	69.0	65.5	61.5	58.0	-	-	-	-	-	-	-
120	12	85.0	81.0	77.5	74.0	70.0	66.5	62.5	59.0	-	-	-	-	-	-	-
125	12	86.0	82.5	78.5	75.0	71.0	67.5	63.5	59.5	-	-	-	-	-	-	-

NOTE - Classes and lengths for which circumferences at 6 feet from the butt are listed in boldface type are the preferred standard sizes. Those shown in light type are included for engineering purposes only.

<sup>1)</sup> The figures in this column are not recommended embedment depths; rather, these values are intended for use only when a definition of groundline is necessary in order to apply requirements relating to scars, straightness, etc.

*\* NOTE: THESE ARE INSIDE BARK MEASUREMENTS TO GET OUTSIDE BARK MEASUREMENTS, ADD 5"*

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American National Standard for Wood Poles and Wood Products

## **SPECIFICATIONS & DIMENSIONS**

Secretariat

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### **Abstract**

Consists of specifications and dimensions for wood utility poles that are to be given preservative treatment as specified by the purchaser. The poles described are considered as simple cantilever members subject to transverse loads only. Requirements for the preservative treatment of poles are not included although the effects of conditioning are accounted for.

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American National Standard for Wood Poles and Wood Products –

## Specifications & Dimensions

### 1 SCOPE & GENERAL REQUIREMENTS

#### 1.1 Scope

This standard provides minimum specifications for the quality and dimensions of wood poles that are to be used as single-pole utility structures. The poles described herein are considered as simple cantilever members subject to transverse loads only. Fiber strength values, provided as a basis for determining pole class sizes, apply only to poles that meet or exceed the minimum quality specifications.

Requirements for the preservative treatment of poles are outside the scope of this standard. However, where such treatment or conditioning may affect strength, limitations are provided in section 5.1.2. [See also standards such as those published by American Wood Protection Association (AWPA) and ASTM].

#### 1.2 General requirements

The species, the length, and class of poles; the type of treatment (including seasoning details, if seasoning is desired); aids to penetration such as incising, groundline boring, or kerfing; and complete details for roofing, gaining, boring, and branding not included in this standard shall be given in purchase orders.

Complete detailed instructions shall be given to the supplier whenever the requirements of this standard are modified to meet special conditions.

### 2 NORMATIVE REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, therefore users of this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

ASC-C2-2007, *National electrical safety code*.<sup>1</sup>

AWPA Standard M6-07, *Brands used on forest products*.<sup>2</sup>

ASTM D9-05, *Standard terminology relating to wood*.<sup>3</sup>

*Wood Preservation Statistics*, Forest Service, U.S. Department of Agriculture, 1973.<sup>4</sup>

<sup>1</sup> Available from < <http://shop.ieee.org/store> >.

<sup>2</sup> Available from < <http://www.awpa.com> >.

<sup>3</sup> Available from < <http://www.astm.org> >.

### 3 DEFINITIONS

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The following definitions shall apply to the terms used in this standard:

- 3.1 air seasoning:** Drying by the use of air where the air temperature is not more than 140°F (60°C) either in the open or under cover.
- 3.2 Boulton drying:** Drying by heating in nonaqueous solution under vacuum.
- 3.3 check:** The lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stresses set up in wood during seasoning.
- 3.4 compression wood:** Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric; relatively large amount of summerwood, sometimes more than 50% of the width of the annual rings in which it occurs; and its lack of demarcation between springwood and summerwood in the same annual rings. Compression wood, compared with normal wood, shrinks excessively lengthwise.
- 3.5 cone hole:** A hole formed by the stalk of a pine cone during the radial growth of the main stem of several species of pine, principally *Radiata*. In *Radiata* pine, cone holes are typically less than 1/2 inch (13mm) in diameter, exist in the crown of the tree, and extend from the surface of the pole to the pith.
- 3.6 cross break:** A separation of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage or to external forces.
- 3.7 dead streak:** An area, devoid of bark, resulting from progressive destruction of the growth cells of wood and bark at the edges of the streak. On a pole, a dead streak is characterized by a discolored weathered appearance and by lack of evidence of overgrowth along the edges of the deadened surface.
- 3.8 decay:** The decomposition of wood substance by fungi.
- 3.9 decay, advanced (or typical):** The older stage of decay in which the destruction is readily recognized because the wood has become punky, soft and spongy, stringy, ring-shaked, pitted, crumbly, or -- in poles not stored or rafted in water -- is in a soggy condition. Decided discoloration or bleaching of the rotted wood is often apparent.
- 3.10 decay, incipient:** The early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood. Although the wood is invaded and some of its properties may have deteriorated, no visible change has occurred, with perhaps the exception of minor discoloration. Incipient decay can occur in living trees.
- 3.11 decayed knot:** A knot containing decay. Two types of decayed knot are recognized:
- ◆ *Type I:* Knots containing soft or loose fibers (decay) that may extend the full length of the knot into the pole and that are associated with heart rot;
  - ◆ *Type II:* Knots containing soft or loose fibers (decay) that are not associated with heart rot.
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<sup>4</sup> Available from the U.S. Government Printing Office, Washington, DC 20402.

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- 3.12 face of pole:** The concave side of greatest curvature in poles with sweep in one plane and one direction, or the side of greatest curvature between groundline and top in poles having reverse or double sweep.
- 3.13 groundline section:** That portion of a pole between 1 foot (30cm) above and 2 feet (61cm) below the groundline, as defined in the pole dimension Tables (see Tables 3 through 10, or Tables 3M through 10M).
- 3.14 hollow heart:** A void in the heartwood caused by decay or insect attack.
- 3.15 hollow pith center:** A small hole at the pith center of the trunk or of a knot caused by disintegration of the pith (small soft core occurring in the structural center of a tree or branch).
- 3.16 insect damage:** Damage resulting from the boring into the pole by insects or insect larvae. Scoring or channeling of the pole surface is not classed as insect damage.
- 3.17 kiln drying:** Drying by the use of heated air in batch or progressive-type kilns.
- 3.18 knot cluster:** Two or more knots grouped together as a unit, the fibers of the wood being deflected around the entire unit; distinct from a group of single knots in which each is a unit. A knot cluster shall be considered as a single knot.
- 3.19 knot diameter:** The diameter of a knot on the surface of the pole measured in a direction at right angles to the lengthwise axis of the pole. The sapwood as well as the heartwood portion of a knot shall be included in the measurement.
- NOTE – For a description of means for defining the limits of knots, see ASTM D9.
- 3.20 red heart:** A condition caused by a fungus, *Fomes pini*, which occurs in the living tree. It is characterized in the early stages of infection by a reddish or brownish color in the heartwood. This is known as "firm red heart." Later the wood of the living tree disintegrates (decays) in small, usually distinct, areas that develop into whitelined pockets.
- 3.21 sap stain:** A discoloration of the sapwood, caused by the action of certain molds and fungi, which is not accompanied by softening or other disintegration of the wood.
- 3.22 scar:** A depression in the surface of the pole resulting from a wound where healing has not reestablished the normal cross section of the pole.
- 3.23 scar, turpentine acid face:** An area in the lower portion of a southern pine pole where bark hack removal with acid applied has caused resin to flow. No removal of sapwood has occurred.
- 3.24 scar, turpentine cat face:** A depression in the surface of a southern pine pole resulting from a wood hack into the sapwood, where healing has not reestablished the normal cross section of the pole.
- 3.25 shake:** A separation along the grain, the greater part of which occurs between the rings of annual growth.

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**3.26 shelling:** Ring separation extending to the surface of round or sawn timber normally following the growth rings and often associated with limiting defects such as knots, compression wood or shake. Ring separation usually becomes more pronounced as the product dries and may be further aggravated by stress developed during horizontal lifting or loading.

**3.27 short crook:** A localized deviation from straightness that, within any section 5 feet (1.5m) or less in length, is more than 1/2 the mean diameter of the crooked section. (See Figure 1, Diagram 3.)

**3.28 spiral-grained (twist-grained) wood:** Wood in which the fibers take a spiral course about the trunk of a tree instead of a vertical course. The spiral may extend in a right-handed or left-handed direction around the tree trunk. Spiral grain is a form of cross grain.

**3.29 split:** A lengthwise separation of the wood extending completely through the piece from one surface to another.

**3.30 steam conditioning:** Subjecting poles in a closed vessel to steam prior to treatment.

**3.31 sweep:** Deviation of a pole from straightness. (See Figure 1, Diagrams 1 and 2.)

## 4 POLE CLASSES

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NOTE - See Annexes.

Poles meeting the requirements of this standard are grouped in the classes identified in Tables 3 through 10 (or Tables 3M through 10M), based on their circumference measured 6 feet (1.8m) from the butt, after bark removal and/or shaving. Poles of a given class and length are designed to have approximately the same load-carrying capacity, regardless of species. Annex B provides further information.

## 5 MATERIAL REQUIREMENTS

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### 5.1 General

#### 5.1.1 Species & designated fiber strength values

NOTE - See Table 1.

The designated fiber strength values are for the pole groundline locations given in Tables 3 through 10 (or Tables 3M through 10M).

#### 5.1.2 Conditioning, seasoning, & treatment limitations

Although preservative treatment of poles is outside the scope of this standard, where conditioning the wood for treatment or where the actual process of preservation could reduce the designated fiber strength values below those listed in 5.1.1, limitations on the processes are contained in this section. If the limitations in this section are exceeded, the minimum circumference 6 feet (1.8m) from the butt, as specified Tables 3 through 10 (or Tables 3M through 10M) must be adjusted to account for the reduced strength.

#### 5.1.2.1 Air seasoning

*Air seasoning* is required for poles of species listed in Treatment group A and not listed in any other group in Table 1. It is permitted for all other species. Such air seasoning shall be sufficient to ensure conformance with the user's specifications for preservative treatment. *Presteaming* or *aftersteaming* is permitted for species in Treatment group A. However, if such steaming is employed, the maximum temperature shall not exceed 240°F (115°C). The total steaming time from the time steam is introduced into the cylinder, including both initial and final steam, shall not exceed 4 hours duration (see exception in 5.1.2.5). Up to 6 hours steam at temperatures up to 240°F (115°C) may be employed for ponderosa pine poles, provided the moisture content (calibrated to the basis of oven dry weight moisture content) measured with a resistance-type moisture meter with insulated pins is not over 25 percent at 2.5 inches (60mm) from the surface at midlength when steaming commences. Otherwise, the maximum steaming time for ponderosa pine poles is 4 hours.

#### 5.1.2.2 Boulton drying temperature

The temperature employed in *Boulton drying* poles of species listed under Treatment group B of Table 1 shall not exceed 220°F (104°C). These poles may be steamed up to 240°F (115°C) for a maximum time of 4 hours, but such steaming shall be limited to steaming after treatment.

#### 5.1.2.3 Steam conditioning

The steam temperature employed in *steam conditioning* for poles of species in Treatment group C of Table 1 shall not exceed 245°F (118°C). The time duration for poles with specified circumferences 37.5 inches (95cm) or less at 6 feet (1.8m) from the butt shall not exceed 17 hours and for poles with specified circumferences larger than 37.5 inches (9.5m) at 6 feet (1.8m) from the butt shall not exceed 20 hours.

#### 5.1.2.4 Kiln drying

Where *kiln drying* is employed on southern pine, ponderosa pine, red pine, jack pine, lodgepole pine, Douglas-fir, and western larch, the maximum dry bulb temperature shall be increased gradually and shall not exceed 170°F (77°C), with an exception noted below. Where kiln drying is employed on western red cedar, the maximum dry bulb temperature shall be increased gradually and shall not exceed 160°F (71°C). Where kiln drying is employed on Chilean radiata pine, the maximum dry bulb temperature shall be increased gradually and shall not exceed 180° F (82° C). In compartment kilns operating at temperatures up to 170°F (77°C), the maximum wet bulb depressions shall not exceed 50°F (10°C) with the exception that during the first 24 hours there is no limitation on wet bulb depression. In progressive-type kilns operating at temperatures up to 170°F (77°C), the maximum wet bulb depression shall not exceed 50°F (10°C) in the body of the kiln and 90°F (32°C) at the entrance to the kiln.

*Exception:* Drying over 170°F (77°C) is permitted for southern pine, red pine, lodgepole pine, Douglas-fir, and western larch species. The maximum dry bulb temperature shall not exceed 230°F (110°C) for these species. For dry bulb temperatures over 200°F (93°C), the wet bulb depression shall be not less than 50°F (10°C) with the exception that during the first 24 hours there is no limitation on wet bulb depression.

#### 5.1.2.5 Steaming (Douglas-fir & western larch)

Douglas-fir and western larch poles that are to be treated with water-borne preservatives and that have not been Boulton dried may be *steamed* at a maximum temperature of 240°F (115°C). For poles in this category, the maximum duration starting with the time steam is introduced into the cylinder, including both initial and final steam, shall not exceed 8 hours, provided each pole before steaming has a maximum moisture content not exceeding 25 percent when measured with a resistance-type moisture meter (calibrated to the basis of oven dry weight moisture content) with insulated pins at 2.0 inches (50mm) from the surface at mid-height.

#### 5.1.2.6 Sterilization

When specified, suppliers shall provide the purchaser with certification that *sterilization* has occurred during the conditioning or treating process. To assure sterilization, heating times and temperatures shall be sufficient to obtain a temperature of at least 150°F (65°C) at the center of the entire pole for at least one hour.

#### 5.1.3 Solvent recovery

When poles of any species have been treated with a system using an organic solvent-based preservative solution, a *solvent recovery* cycle of not over 15 hours at a maximum temperature of 225°F (107°C) is permitted, provided each pole before treatment has a maximum moisture content of 25 percent when measured with a resistance-type moisture meter (calibrated to the basis of oven dry weight moisture content) with insulated pins at 2.0 inches (50mm) from the surface at mid-height.

#### 5.1.4 Rate of growth

The average *rate of growth* measured on the butt in the outer 2 inches (50mm) of poles having a circumference of 37.5 inches (95cm) or less at 6 feet (1.8m) from the butt, and in the outer 3 inches (8cm) of poles having a circumference of more than 37.5 inches (9.5m) at 6 feet (1.8m) from the butt, shall be not less than 6 rings per inch (25mm).

*Exception:* Poles with 4 and 5 rings per inch (25mm) are acceptable if 50% or more summerwood is present.

As an alternative, the ring count and summerwood measurements mentioned above may be made on an increment core taken at 6 feet (1.8m) from the butt directly above the place where the average rate of growth is indicated on the butt surface.

### 5.2 Prohibited defects

1. Cross breaks (cracks);
2. Decay, except as permitted for firm red heart in 5.3.1, defective butts in 5.4.4, and decayed knots in 5.4.6;
3. Dead streaks, except as permitted in 5.4.3;
4. Holes, open or plugged, except holes for test purposes, which shall be plugged;
5. Hollow butts or tops, except as permitted under hollow pith centers and defective butts;
6. Marine borer damage; and

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7. Nails, spikes, and other metal not specifically authorized by the purchaser.

### 5.3 Permitted defects

#### 5.3.1 Firm red heart

Firm red heart not accompanied by softening or other disintegration (decay) of the wood is permitted.

#### 5.3.2 Hollow pith centers

Hollow pith centers in the tops or butts and in knots are permitted in poles that are to be given full-length treatment.

#### 5.3.3 Sap stain

Sap stain that is not accompanied by softening or other disintegration (decay) of the wood is permitted.

#### 5.3.4 Scars

Turpentine acid face scars are permitted anywhere on the pole surface.

### 5.4 Limited defects

#### 5.4.1 Bark inclusions

Depressions containing bark inclusions shall be not more than 2 inches (5cm) in depth, measured from the surface of the pole.

#### 5.4.2 Compression wood

The outer 1-inch (25mm) of all poles shall be free from compression wood visible on either end.

#### 5.4.3 Dead streaks

A single, sound dead streak is permitted in western red cedar and northern white cedar, provided the greatest width of the streak is less than 1/4 of the circumference of the pole at the point of measurement.

#### 5.4.4 Defective butts

Hollowing in the butt caused by "splinter pulling" in felling the tree is permitted, provided that the area of such a hollow is less than 10% of the butt area. Hollow heart or decay, or both, is permitted in cedar poles only, provided the aggregate area of the hollow heart or decay, or both, does not exceed 10% of the entire butt area and does not occur closer than 2 inches (50mm) to the side surface and provided that the depth of the hollow does not exceed 2 feet (0.61m), as probed and measured from the butt surface.

#### 5.4.5 Insect damage

Insect damage, consisting of holes 1/16 inch (2mm) or less in diameter, or surface scoring or channeling is permitted. All other forms of insect damage are prohibited, except those associated with hollow heart in cedar poles.

#### 5.4.6 Knot

The diameter of any single knot and the sum of knot diameters in any 1-foot (31cm) section shall not exceed the limits of Table 2.

In determining the sum of the knot diameters in any 1-foot (0.31m) section, only those knots with diameters over 0.5 inch (13mm) whose pith centers fall within the section shall be included in the sum, and the 1-foot (0.31m) section shall be located so as to include the maximum number of knots (i.e., the most severe condition).

Type II "decayed knots" are permitted.

#### 5.4.7 Scars (cat face)

No pole shall have a scar or turpentine cat face (southern pine) located within 2 feet (0.61m) of the groundline. Turpentine scars need be trimmed only to the extent necessary for examination for evidence of fungus infection and insect damage. Other sound scars are permitted elsewhere on the pole surface, provided they are smoothly trimmed and do not interfere with the cutting of any gain, and provided that:

1. The circumference at any point on trimmed surfaces located between the butt and 2 feet (0.61m) below the groundline is not less than the minimum circumference specified at 6 feet (1.8m) from the butt for the class and length of the pole;
2. The depth of the trimmed scar is not more than 2 inches (50mm), if the diameter is 10 inches (0.25m) or less, or 1/5 the pole diameter at the location of the scar if the diameter is more than 10 inches (0.25m).

#### 5.4.8 Shakes

Shakes in the butt surface that are not closer than 2 inches (50mm) to the side surface of the pole are permitted, provided they do not extend to the groundline. Shakes or a combination of connected shakes that are closer than 2 inches (50mm) to the side surface of the pole are permitted, provided they do not extend farther than 2 feet (0.61m) from the butt surface and do not have an opening wider than 1/8 inch (3mm). Shakes in the top surface are permitted in poles that are to be given full-length preservative treatment, provided that the shake is not closer to the surface of the pole than the midpoint of a line extending from the pith to the surface (i.e., the shake is permitted if it is closer to the pith than to the surface of the pole).

#### 5.4.9 Shape

Poles shall be free from short crooks. A pole may have sweep subject to the following limitations:

1. *Where sweep is in one plane and one direction only:* For poles of all species, except northern white cedar, a straight line joining the surface of the pole at the groundline and the edge of the pole at the top shall not be distant from the surface of the pole at any point by more than 1 inch (25mm) for each 10 feet (3m) in length. The deviation for northern white cedar poles is 1 inch (25mm) for each 5 feet (1.5m) in length. (See Figure 1, Diagram 1.)

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2. Where sweep is in two planes (double sweep) or in two directions in one plane (reverse sweep): Except in northern white cedar poles<sup>5</sup>, a straight line connecting the midpoint at the groundline with the midpoint at the top shall not at any intermediate point pass through the surface of the pole. (See Figure 1, Diagram 2.)

**5.4.10 Spiral grain**

Spiral grain (twist grain) is permitted as follows:

Length of pole (feet)	Maximum twist of grain permitted
30 (9.1m) and shorter	1 complete twist in any 10 feet (3m)
35 (10.7m)-45 (13.7m), inclusive	1 complete twist in any 16 feet (5m)
50 (15.2m) and longer	1 complete twist in any 20 feet (6m)

**5.4.11 Splits & checks**

**5.4.11.1 In the top**

A split or a combination of two single checks (each check terminating at the pith center and separated by not less than 1/6 of the circumference) having one or both portions located in a vertical plane within 30 degrees of the top bolt hole shall not extend downward along the pole more than 6 inches (15cm). All other combinations of checks or a split shall not extend downward along the pole more than 12 inches (0.31m).

**5.4.11.2 In the butt**

A split or a combination of two single checks, as defined above, shall not extend upward along the pole more than 2 feet (0.61m).

**5.4.12 Shelling**

Shelling on the surface of the pole shall be limited to no more than one inch (25mm) in depth.

**5.4.13 Cone Holes**

For species containing cone holes, the sum of the diameter of all cone holes greater than 0.5 inch (13 mm) shall be combined with the sum of the diameter of all knots greater than 0.5 inch (13 mm) knot diameters in any 1-foot (0.31m) section, and the result shall not exceed the limits of Table 2. In determining the combined sum of cone hole and knot diameters, the 1-foot (0.31m) section shall be

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<sup>5</sup> The double sweep limitation for northern white cedar poles shall be as follows: Where sweep is in two planes (double sweep), the sum of the sweeps in the two planes (each sweep being measured as shown in Figure 1, Diagram 1) shall be not greater than the allowance for sweep in one plane and one direction for a pole of the same length.

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located so as to include the maximum sum of cone hole and knot diameters greater than 0.5 inch (13 mm).

## **6 DIMENSIONS**

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For dimensions of particular species of poles, see Tables 3 through 10 (or Tables 3M through 10M).

### *6.1 Length*

Poles less than 50 feet (15.2m) in length shall be not more than 3 inches (80mm) shorter or 6 inches (150mm) longer than nominal length. Poles 50 feet (15.2m) or more in length shall be not more than 6 inches (150mm) shorter or 12 inches (0.31m) longer than nominal length.

Length shall be measured between the extreme ends of the pole.

### *6.2 Circumference*

#### **6.2.1 General**

Poles are classed while in the green condition, after bark removal and/or shaving. Subsequently, there may be some shrinkage due to conditioning, seasoning, or while in service. Therefore, this shrinkage, which is usually about 2 percent as the pole dries below fiber saturation, should be recognized if remeasuring circumference at a later date.

#### **6.2.2 Circumference**

The minimum circumferences at 6 feet (1.8m) from the butt and at the top, for each length and class of pole, are listed in Tables 3 through 10 (or Tables 3M through 10M). The circumference at 6 feet (1.8m) from the butt of a pole shall be not more than 7 inches (0.18m) or 20 percent larger than the specified minimum, whichever is greater. The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

### *6.3 Classification*

The true circumference class shall be determined as follows: Measure the circumference at 6 feet (1.8m) from the butt. This dimension will determine the true class of the pole, provided that its top (measured at the minimum length point) is large enough. Otherwise, the circumference at the top will determine the true class, provided that the circumference at 6 feet (1.8m) from the butt does not exceed the specified minimum by more than 7 inches (0.18m) or 20 percent, whichever is greater.

## **7 MANUFACTURING REQUIREMENTS**

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### *7.1 Bark removal*

Outer bark shall be completely removed from all poles.

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Table 2 - Limits of Knot Sizes

	Maximum sizes permitted		
	Diameter of any single knot (in) and (mm)		Sum of diameters of all knots (and cone holes, if applicable) greater than 0.5 inch (13mm) in any 1-foot (0.31m) section (in) and (mm)
Length of Pole	Classes H6 to 3	Classes 4 to 10	All Classes
45 feet (13.7m) and shorter Lower half of length Upper half of length	3 in (80mm) 5 in (130mm)	2 in (50mm) 4 in (100mm)	1/3 of the average circumference of the same 1-foot (0.31m) section or 8 inches (.20m), whichever is greater, but not to exceed 12 inches (0.31m) <sup>1)</sup>
50 feet (15.2m) and longer Lower half of length Upper half of length	4 in (100mm) 6 in (150mm)	4 in (100mm) 6 in (150mm)	1/3 of the average circumference of the same 1-foot (0.31m) section or 10 inches (0.25m), whichever is greater, but not to exceed 14 inches (.36m) <sup>1)</sup>
NOTE - See clause 4 and Tables 3 through 10 (or Tables 3M through 10M) for pole classes.			
<sup>1)</sup> Both upper and lower halves			

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DIAGRAM 1 - MEASUREMENT OF SWEEP IN ONE PLANE AND ONE DIRECTION

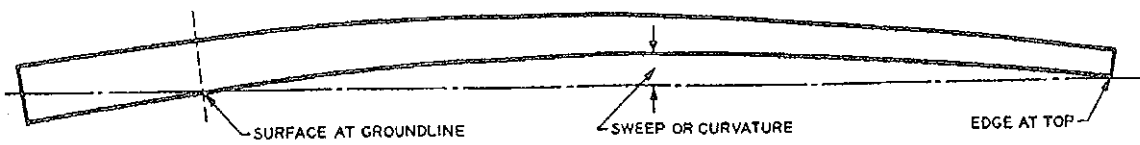


DIAGRAM 2 - MEASUREMENT OF SWEEP IN TWO PLANES (DOUBLE SWEEP)  
OR IN TWO DIRECTIONS IN ONE PLANE (REVERSE SWEEP)

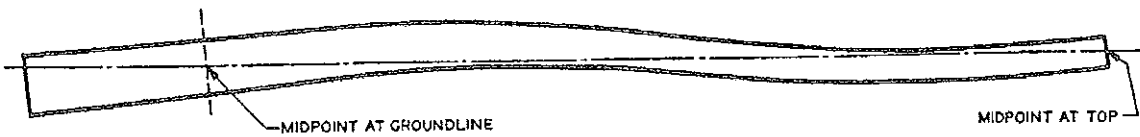
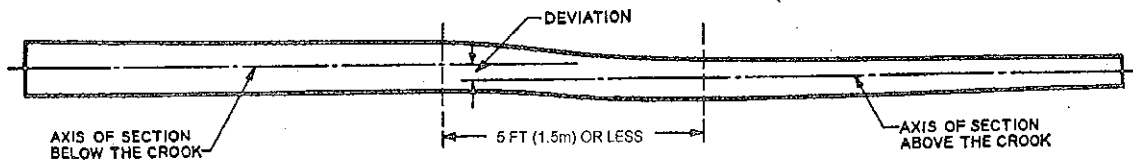
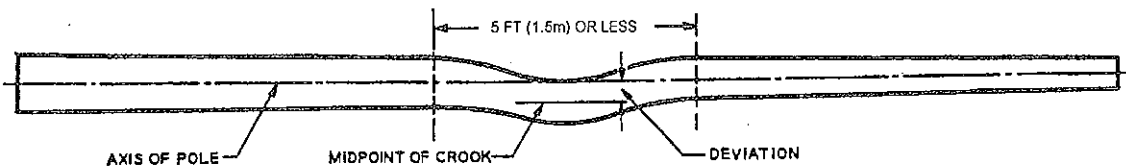


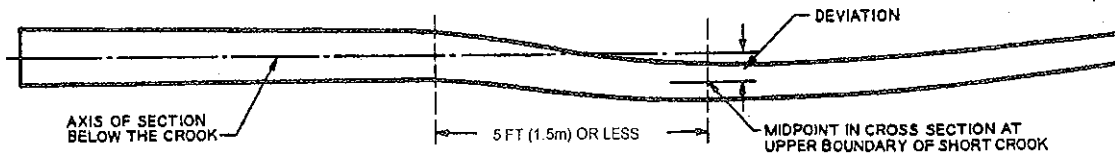
DIAGRAM 3 - MEASUREMENT OF SHORT CROOK (THREE CASES SHOWN)



CASE 1: WHERE THE REFERENCE AXES ARE APPROXIMATELY PARALLEL



CASE 2: WHERE AXES OF SECTIONS ABOVE AND BELOW THE CROOK COINCIDE OR ARE PRACTICALLY COINCIDENT



CASE 3: WHERE AXIS OF SECTION ABOVE SHORT CROOK IS NOT PARALLEL OR COINCIDENT WITH AXIS BELOW THE CROOK

NOTE - The three cases shown under Diagram 3 are typical and are intended to establish the principle of measuring short crooks. There may be other cases not exactly like those illustrated.

Figure 1 - Measurement of sweep and short crook in poles