



ANSI O5.3-2021

Solid Sawn Wood Crossarms, Braces, and Ground Wire Moulding: Specifications and Dimensions

AMERICAN NATIONAL STANDARD FOR WOOD UTILITY PRODUCTS



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ANSI O5.3-2021 – Solid Sawn Wood Crossarms, Braces, and Ground Wire Moulding: Specifications and Dimensions

is an American National Standard developed by **ASC O5 – Wood Utility Products**.

Published by

American Wood Protection Association
P.O. Box 361784
Birmingham, AL 35236-1784 USA

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Printed in the United States of America.

American National Standard for Wood Utility Products

Solid Sawn Wood Crossarms, Braces, and Ground Wire Moulding: Specifications and Dimensions

Secretariat
American Wood Protection Association, Inc.

Approved February 26, 2021
American National Standards Institute, Inc.

Foreword

This American National Standard establishes specifications and dimensions for solid sawn wood crossarms and braces manufactured from coastal Douglas-fir grown in the West Coast region and from dense Southern pine, as well as wood ground wire moulding manufactured from Douglas-fir or red oak.

This standard was developed by Accredited Standards Committee O5 – Wood Utility Products (ASC O5) under the procedural administration of the American Wood Protection Association (AWPA). ASC O5 was organized in December 1924 and has produced revisions of this standard from time to time as required or deemed beneficial. This standard supersedes American National Standard ANSI O5.3-2015.

Suggestions for improvement of this standard will be welcomed. They should be sent to ASC O5 through its Secretariat: American Wood Protection Association, P.O. Box 361784, Birmingham, AL 35236-1784 USA <<https://awpa.com>>.

This standard was processed and approved for submittal to ANSI by ASC O5. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it processed and approved this standard, ASC O5 had the following leadership and members:

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American National Standard for Wood Utility Products

Solid Sawn Wood Crossarms, Braces, and Ground Wire Moulding: Specifications and Dimensions

1 Scope & organization

1.1 Scope

This standard consists of specifications covering solid sawn-wood crossarms and braces manufactured from coastal Douglas-fir (*Pseudotsuga menziesii* - variety *menziesii*) grown in the West Coast region (i.e., from the summit area of the Cascade Mountains of Washington, Oregon, California, and British Columbia, Canada) to the Pacific Ocean; and from dense Southern pine of the following species: longleaf pine (*Pinus palustris*), shortleaf pine (*Pinus echinata*), loblolly pine (*Pinus taeda*), and slash pine (*Pinus elliottii*), as well as ground wire moulding manufactured from Douglas-fir (*Pseudotsuga menziesii*) or red oak (*Quercus rubra* group). The specifications are intended to cover communications crossarms, power crossarms, heavy-duty crossarms, heavy-duty braces, and ground wire moulding. Crossarms are intended primarily for use as beams. Heavy-duty crossarms may also be used as struts or columns in braced H-frames. Braces are used for tension and/or compression-bracing. Ground wire moulding is used to protect the ground wire at the base of the pole.

1.2 General organization of the standard

This standard is divided into four parts:

- (1) Part I: General requirements and options that are applicable to all crossarms and braces covered in this standard are specified in Part I;
- (2) Part II: Specific requirements and options relating to crossarms and braces manufactured from Douglas-fir are specified in Part II; and
- (3) Part III: Specific requirements and options relating to crossarms and braces manufactured from dense Southern pine are specified in Part III.
- (4) Part IV: Requirements for the quality and dimensions of wood moulding used to protect ground wires on utility pole structures are specified in Part IV.

2 Normative references

The following standards 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, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ASTM D9-20, *Standard terminology relating to wood and wood-based products*.¹⁾

ASTM D198-15, *Standard test methods of static tests of lumber in structural sizes*.¹⁾

ASTM D2915-17, *Standard practice for sampling and data-analysis for structural wood and wood-based products*.¹⁾

AWPA U1-20, *User specification for treated wood*.²⁾

AWPA M6-18, *Brands used on preservative treated materials*.²⁾

¹⁾ Available from ASTM International < www.astm.org >.

²⁾ Available from American Wood Protection Association (AWPA) < www.awpa.com >.

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AWPA T1-20, *Processing and treatment standard*.²⁾

SPIB, *Grading Rules – 2002 Edition, Southern Pine Inspection Bureau*.³⁾

SPIB, *Special Product Rules for Structural, Industrial and Railroad Freight Car Lumber*.³⁾

WCLIB, *Standard Grading Rules No. 17*.⁴⁾

³⁾ Available from Southern Pine Inspection Bureau (SPIB) < www.spib.org >.

⁴⁾ Available from Pacific Lumber Inspection Bureau (PLIB), < www.plib.org >.

Part I -- General requirements for crossarms and braces

3. Scope of Part I

This part of the standard consists of general requirements and options that are applicable to all crossarms and braces.

4 Definitions

The following definitions are aligned with those used in ASTM D9-12, WCLIB *Standard Grading Rules No. 17*, or SPIB *Grading Rules*, and shall apply to the terms used in this standard.

4.1 brashness: The tendency of the wood to fail suddenly under stress, and to break at relatively small deflection across the grain, with little or no splintering. It is also called *brittleness*. Possible causes of brashness include heat degradation or the presence of decay. The following three characteristics are particularly indicative of brashness of a piece:

- a) Low specific gravity or density, as compared to average density of the species;
- b) A small proportion (e.g. less than 10%) of latewood; and
- c) Fibers with thin walls.

4.2 check: Lengthwise grain separation, usually occurring across or through the growth rings, as a result of seasoning. This is shown in Figure 1b.

4.3 close grain grade: A Douglas-fir grade (WCLIB *Standard Grading Rules No. 17*, paragraph 204-b) requiring an average of approximately 6, but not more than approximately 30 annual growth rings per inch (2.5 cm) on either one end or the other of a piece, measured as shown in Figure 1a, Rate of growth, as shown in WCLIB *Standard Grading Rules No. 17*, paragraph 204-d. Pieces averaging 5 rings or more but not more than 30 rings per inch (2.5 cm) are accepted as close grain if they average 1/3 or more latewood (summerwood).

4.4 compression failures: Localized buckling of fibers, produced by the compression of wood along the grain beyond its ultimate capacity.

4.5 compression wood: Abnormal wood growth that frequently occurs on the underside of leaning coniferous trees. It is denser and harder than normal wood, and is characterized by relatively wide growth rings, usually eccentric, and includes what appears to be an exceptional proportion of latewood. In compression wood, the contrast in color between earlywood and latewood is usually less than in normal wood. Compression wood is low in strength for its weight and shrinks excessively along the grain compared to normal wood.

4.6 cross break: A break or fracture across the grain of the wood.

4.7 crossgrain: Fibers in wood that are not parallel with the long axis of the piece.

4.8 decay: A disintegration of wood substance due to the action of wood-destroying fungi, resulting in loss of strength. Also called *dote* or *rot*.

4.8.1 advanced (typical) decay: The older stage of decay in which the disintegration is readily recognized because hardness and other strength properties are reduced. Decided discoloration or bleaching of the rotted wood may be apparent. Unsound red heart is a typical example of advanced decay.

4.8.2 firm red heart: A stage of incipient decay, characterized by a reddish color in the heartwood.

4.8.3 incipient decay: 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.

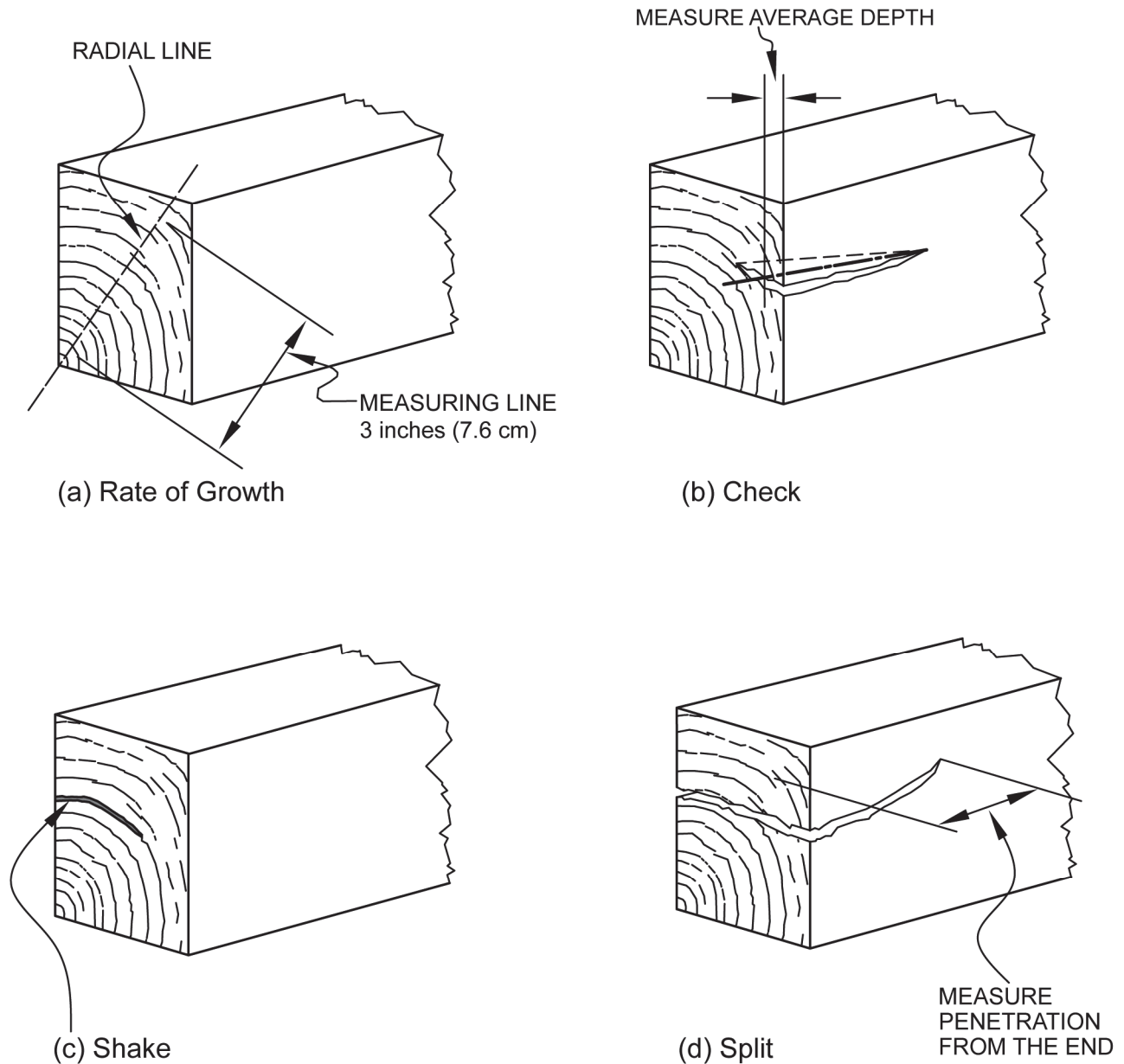


Figure 1 - Features observed during grading

4.9 dense material grade:

4.9.1 Douglas-fir: (see WCLIB *Standard Grading Rules No. 17*, paragraph 204-c) requiring an average of approximately 6 or more annual growth rings per inch (2.5cm) and, in addition, 1/3 or more latewood (summerwood) on either one end or the other of a piece, measured as shown in Figure 1, Rate of growth, in WCLIB *Standard Grading Rule No. 17*, paragraph 204-d. The contrast in color between the latewood (summerwood) and earlywood (springwood) must be distinct. Pieces averaging less than 6 annual rings per inch (2.5 cm) but not less than 4 are accepted as dense if averaging 1/2 or more latewood (summerwood).

4.9.2 Dense Southern Pine: Southern pine crossarm stock purchased by crossarm producers shall meet the requirements of Dense Industrial 65, 72, or 86 grades in the SPIB *Special Product Rules for Structural, Industrial, and Railroad-Freightcar Lumber*. See Annex A.

4.10 density: Mass (weight) of wood per unit volume. Strength is related to density. Higher working strengths can be assigned to wood when lightweight pieces are eliminated, by specifying limits for rate of growth and minimum percentages of latewood (summerwood). See *rate of growth*. See *close grain grade* and *dense material grade*.

4.11 dote: See *decay*.

4.12 earlywood: That portion of the growth ring that is formed during the early part of the season's growth. It is usually less dense, lighter in color, and weaker mechanically than latewood. The term is preferred to springwood.

4.13 equilibrium moisture content (EMC): Moisture content at which the wood is neither gaining nor losing moisture at a given temperature and relative humidity.

4.14 heart center: The pith or center core of the tree. "Free of heart centers" (FOHC) means "without pith" (side-cut).

4.15 heartwood: The inner portion of wood between the *pith* and the *sapwood*, composed entirely of nonliving cells. It is usually darker in color and more durable than the sapwood. Heartwood and sapwood are comparable in strength.

4.16 knot: A portion of a branch or limb that has become incorporated in a piece of lumber. The shape of the knot depends on the angle through which the branch was cut. Least diameters determine the size unless otherwise stated. Terms used to describe knots include:

4.16.1 decayed knot: A knot that is softer than the surrounding wood, containing advanced decay.

4.16.2 firm knot: A knot that is solid across its face, containing incipient decay.

4.16.3 fixed knot: A knot that will hold its place in dry lumber under ordinary conditions, but can be moved by pressure, not easily pushed out.

4.16.4 intergrown knot: A knot whose growth rings are partially or completely intergrown on one or more faces with the growth rings of the surrounding wood.

4.16.5 knot cluster: Two or more knots grouped together as a unit with the fibers of the wood deflected around the entire unit. A knot cluster is distinct from a group of single knots, in which each is a unit.

4.16.6 loose knot: A knot not held firmly in place by growth or position, that cannot be relied upon to remain in place.

4.16.7 sound knot: A knot that is solid across its face, is as hard as the surrounding wood, and shows no indications of decay. It may vary in color from the natural color of the wood to reddish brown or black.

4.16.8 spike knot: A knot cut lengthwise or diagonally through the long axis of the branch. In a crossarm, the cross-sectional view of the knot appears on one surface of the arm, and the longitudinal view appears on an adjacent surface. The size of a spike knot is considered to be the distance across the end-grain of the knot, between the edge of the arm and a line parallel to the edge.

4.16.9 tight knot: A knot that is so fixed by growth, shape, or position that it will firmly retain its place in the piece.

4.17 latewood: That portion of the annual growth ring that is formed during the latter part of the yearly growth period. It is usually denser, darker in color, and stronger mechanically than earlywood. This term is preferred to *summerwood*.

4.18 nail plate: A galvanized metal plate placed on the end-surfaces to prevent split-widening.

4.19 pitch pocket: An opening between growth rings that usually contains, or has contained, resin.

4.20 pith: The small core in the structural center of a log. See *heart center*.

4.21 rate of growth: The amount of tree growth each year, expressed as the number of growth rings per inch (2.5 cm) (see Figure 1a).