

# **NATIONAL GRADING RULE for DIMENSION LUMBER**

**November 9, 2018**

**National Grading Rule Committee**



Quality.Together

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## **INTRODUCTION**

Product Standard 20 American Softwood Lumber Standard published by the U. S. Department of Commerce, stipulates that a National Grading Rule Committee composed of members competent in the field of lumber technology shall "establish, maintain and make fully and fairly available nomenclature and descriptions of grades for dimension lumber." It provides further that "grading rules of an agency shall not be certified as conforming to the American Softwood Lumber Standard if the Board of Review determines that the dimension lumber rules therein fail to conform to the provisions of the National Grading Rule for dimension lumber" established in conformance with Section 11 of PS 20. The National Grading Rule applies to all species of softwood lumber<sup>1</sup> which are covered by grading rules developed and approved under PS 20.

Bracketed material which is applicable to a species shall be included in certified grading rules.

*Material in italics is mandatory instructions to the accredited rules writing agencies, which incorporate this italicized material in their regional grading rule books. It is not required that this italicized information be included in the grading rules for those species for which the information does not apply.*

Notes are non-mandatory.

## **SCOPE**

For purposes of the National Grading Rule for Dimension Lumber, "dimension" is limited to surfaced softwood lumber of nominal thicknesses from 2 through 4 inches and nominal widths 2 inches and wider; and which is designed for use as framing members such as joists, planks, rafters and studs. [For Redwood, dimension is further classified as consisting only of structural and stud grades.] It does not apply to those grades that are segregated for special uses but which are sometimes manufactured to the "dimension" sizes provided that descriptions for such special grades are included in the applicable agency grading rules.

Lumber grades provide standard specifications for segregating the lumber cut from logs into appropriate use categories. Use categories may be developed based on appearance, structural capacity, suitability for secondary manufacturing or a combination of these. The grade specifications in the National Grading Rule for dimension lumber are based primarily on structural performance. Limitations for appearance characteristics are established principally to ensure good suitability and utility of the material in covered structural or industrial framing uses.

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<sup>1</sup> Hardwood lumber shall not be graded under provisions of this rule unless included in rules certified by the Board.

The following are examples of special products excluded from the National Grading Rule for Dimension Lumber:

Crossarms	Ladder Stock	Scaffold Planks
Factory and Shop Lumber	Laminating Stock	Ship Decking and Plank Stock
Finish (Selects)	Railroad Stock	Stadium Plank
Foundation Lumber	Rough Lumber	Worked Lumber
Industrial Clears		

*When provisions are developed for segregating lumber based on rate of growth or specific gravity in accordance with the general provisions of ASTM D245 for a species, such provisions shall be included in grading rules applicable to that species. The provisions shall include the specific manner in which the specific gravity and/or rate of growth is to be determined.*

*These rules shall not prohibit the development of additional lumber grades in any category by a certified rules writing agency which have higher bending strengths than Select Structural grade or lower bending strengths than Utility grade as specified in the National Grading Rule.*

## **CLASSIFICATION**

The National Grading Rule for Dimension Lumber classifies dimension into 3 width categories and 4 use categories. Dimension up to 4 inches wide is classified as "Structural Light Framing" and "Light Framing". Dimension 2 inches and wider is classified as "Studs". Dimension 5 inches and wider is classified as "Structural Joists and Planks."

The basic grade descriptions for dimension lumber provide good structural capacity, serviceability and general good appearance however sometimes, structural grades with a higher appearance level are desired. An Appearance classification is also available that provides standard specifications for such uses. The Appearance category provides the same level of structural performance as the applicable NGR Grade, but with the added restrictions on manufacture, wane, skip and warp. Any NGR Grade may be graded or ordered with "Appearance" limitations. "Appearance" shall be designated by either including the term "Appearance" or the abbreviation "App" on the grade stamp or by specifically identifying "Appearance" in the purchase and shipping documents.

2-4" Thick, 2-4" Wide

**STRUCTURAL LIGHT FRAMING**

Grade Name (and Abbreviation)

Select Structural (Sel Str)

1

2

3

**LIGHT FRAMING**

Grade Name (and Abbreviation)

Construction (Const)

Standard (Stand)

Utility (Util)

2-4" Thick, 2" and Wider

**STUDS**

Grade Name

Stud

2-4" Thick, 5" & Wider

**STRUCTURAL JOISTS & PLANKS**

Grade Name (and Abbreviation)

Select Structural (Sel Str)

1

2

3

**APPEARANCE**

Grade Name (and Abbreviation)

NGR grade name plus Appearance (NGR grade name plus APP)

Applicable to all NGR grades.

*Except as otherwise provided herein, the above grades shall constitute the dimension grades included in rule books of certified rule writing agencies and are the only dimension grades which shall be grade stamped as American Standard Lumber. Modification of these descriptions shall be made only by the National Grading Rule Committee.*

## **GENERAL**

The major characteristics encountered in grading of softwood lumber are listed for each grade herein. Not all the listed characteristics will occur in lumber of any particular grade. When characteristics unique to a single species are encountered which are not included in the grade description, the characteristics shall be assessed in comparison to the most similar characteristic listed and permitted to the same degree. All grade descriptions set forth the major limiting characteristics that occur in lumber in each grade. Hence, the rules describe the poorest pieces permitted in a grade. All or nearly all of the permissible characteristics of a grade are rarely present in maximum size or number in any one piece.

Any piece with a combination of characteristics which are judged to be more severe than the maximum characteristics permitted in the grade, even though each if taken individually is permitted, shall be excluded from the grade. The grading of lumber cannot be considered an exact science because it is based on a visual inspection of each piece and the judgment of the grader and/or on the results of a method of mechanically determining the strength characteristics of structural lumber. The National Grading Rule for Dimension Lumber establishes a maximum of 5 percent below grade as the tolerance allowed between graders.

Knots, checks, shakes and slope of grain in visually graded lumber shall be measured in accordance with the provisions of ASTM D245 except that no increase in slope of grain or size of knots is permitted outside the middle one third of the length. Except as otherwise provided herein, knots appearing on narrow faces are limited to the same displacement as knots specified at edges of wide faces. The limitations on knot sizes and other characteristics governing strength shall not be exceeded. Compression wood shall be limited in effect to other appearance or strength reducing characteristics permitted in the grade.

*[When a certified rules writing agency assigns design values to these grade descriptions for a species or a group of species, calculation and assignment of values shall be made in accordance with PS 20.]*

## **[MACHINE GRADED LUMBER**

*A basic description for machine graded lumber is included for those certified rules writing agencies which possess the necessary technical information on their species to include detailed machine grading provisions in their grading rules. This method for mechanical testing and marking of machine graded lumber shall be included in certified agency rules if they provide for machine graded lumber. Grade descriptions and grade marking privileges shall be provided by the certified rules writing agencies for machine graded lumber when lumber is evaluated by mechanical means.]*

**STRUCTURAL LIGHT FRAMING  
STRUCTURAL JOISTS AND PLANKS**

**SELECT STRUCTURAL  
2" to 4" Thick, 2" and Wider**

Characteristics permitted and limiting provisions shall be:

Checks - Surface seasoning checks, not limited. Through checks at ends are limited as splits.

Knots - Sound, firm, encased, and pith knots, if tight and well spaced, are permitted in sizes not to exceed the following, or equivalent displacement:

<u>Nom. Width</u>	<u>At Edge Wide Face</u>	<u>Centerline Wide Face</u>	<u>Unsound or Loose Knots &amp; Holes (any cause)</u>	
2"	3/8"	3/8"	3/8"	} One hole or equivalent smaller holes per 4 lin. ft.
3"	1/2"	1/2"	1/2"	
4"	3/4"	7/8"	3/4"	
5"	1"	1-1/2"	7/8"	
6"	1-1/8"	1-7/8"	1"	
8"	1-1/2"	2-1/4"	1-1/4"	
10"	1-7/8"	2-5/8"	1-1/4"	
12"	2-1/4"	3"	1-1/4"	
14"	2-3/8"	3-1/4"	1-1/4"	
16"	2-3/8"	3-3/8"	1-1/4"	
18"	2-1/2"	3-1/2"	1-1/4"	

Manufacture - Standard "E". See para. 722(e).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - If through at ends, limited as splits. Surface shakes up to 2' long.

Skips - Hit and miss skips in a maximum of 10% of the pieces. See para. 720(f).

Slope of grain - 1 in 12.

Splits - Equal in length to the width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart limited to 10% of the piece.

Wane - 1/4 the thickness and 1/4 the width full length, or equivalent on each face, provided that wane not exceed 1/2 the thickness or 1/3 the width for up to 1/4 the length. See para. 750.

Warp - 1/2 of medium. See para. 752.

**STRUCTURAL LIGHT FRAMING  
STRUCTURAL JOISTS AND PLANKS**

**NO. 1**

**2" to 4" Thick, 2" and Wider**

[For explanation of No. 1 & Better design values see Paragraph 754.]

Characteristics permitted and limiting provisions shall be:

Checks - Surface seasoning checks, not limited. Through checks at ends are limited as splits.

Knots - Sound, firm, encased, and pith knots, if tight and well spaced, are permitted in sizes not to exceed the following, or equivalent displacement:

<u>Nom. Width</u>	<u>At Edge Wide Face</u>	<u>Centerline Wide Face</u>	<u>Unsound or Loose Knots &amp; Holes (any cause)</u>
2"	1/2"	1/2"	1/2"
3"	3/4"	3/4"	3/4"
4"	1"	1-1/2"	1"
5"	1-1/4"	1-7/8"	1-1/8"
6"	1-1/2"	2-1/4"	1-1/4"
8"	2"	2-3/4"	1-1/2"
10"	2-1/2"	3-1/4"	1-1/2"
12"	3"	3-3/4"	1-1/2"
14"	3-1/8"	4"	1-1/2"
16"	3-1/4"	4-1/2"	1-1/2"
18"	3-3/8"	4-5/8"	1-1/2"

} One hole or  
equivalent  
smaller holes per  
3 lin. ft.

Manufacture - Standard "E". See para. 722(e).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark- Not limited.

Shake - If through at ends, limited as splits. Surface shakes up to 2' long.

Skips - Hit and miss skips in a maximum of 10% of pieces. See para. 720(f).

Slope of grain - 1 in 10.

Splits - Equal in length to width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart.

Wane - 1/4 the thickness and 1/4 the width full length, or equivalent on each face, provided that wane not exceed 1/2 the thickness or 1/3 the width for up to 1/4 the length. See para. 750.

Warp - 1/2 of medium. See para. 752.



**STRUCTURAL LIGHT FRAMING  
STRUCTURAL JOISTS AND PLANKS**

**NO. 2**

**2" to 4" Thick, 2" and Wider**

Characteristics permitted and limiting provisions shall be:

Checks - Seasoning checks not limited. Through checks at ends are limited as splits.

Knots - Well spaced knots of any quality are permitted in sizes not to exceed the following or equivalent displacement:

<u>Nom. Width</u>	<u>At Edge Wide Face</u>	<u>Centerline Wide Face</u>	<u>Holes (Any Cause)</u>	
2"	5/8"	5/8"	5/8"	} One hole or equivalent smaller holes per 2 lin. ft.
3"	7/8"	7/8"	7/8"	
4"	1-1/4"	2"	1-1/4"	
5"	1-5/8"	2-3/8"	1-3/8"	
6"	1-7/8"	2-7/8"	1-1/2"	
8"	2-1/2"	3-1/2"	2"	
10"	3-1/4"	4-1/4"	2-1/2"	
12"	3-3/4"	4-3/4"	3"	
14"	4-1/8"	5-1/4"	3-1/2"	
16"	4-1/4"	5-3/4"	4"	
18"	4-3/8"	5-7/8"	4-1/2"	

Manufacture - Standard "F". See para. 722(f).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - If through at ends, limited as splits. Away from ends through shakes up to 2' long, well separated. If not through, single shakes shall not exceed 3' long or 1/4 the length, whichever is greater.

Skips - Hit and miss, with a maximum of 5% of the pieces containing hit or miss or heavy skip 2' or less in length. See para. 720(e), (f) and (g).

Slope of grain - 1 in 8.

Splits - Equal in length to 1-1/2 times the width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart. Not limited.

Unsound wood (excluding white speck) - Not permitted in thicknesses over 2".

[Southern Pine - In 2" lumber, heart center streaks are limited to 1/3 the thickness or width.]

[All other species or species groups - In 2" lumber, small spots or streaks of firm honeycomb or peck are limited to 1/6 the width. Any other unsound wood is limited to a spot 1/12 the width and 2" in length or equivalent smaller.]

Wane - 1/3 the thickness and 1/3 the width full length, or equivalent on each face, provided that wane not exceed 2/3 the thickness or 1/2 the width for up to 1/4 the length. See para. 750.

Warp - Light. See para. 752.

White Speck - Firm, 1/3 the face or equivalent.

**STRUCTURAL LIGHT FRAMING  
STRUCTURAL JOISTS AND PLANKS**

**NO. 3**

**2" to 4" Thick, 2" and Wider**

Characteristics permitted and limiting provisions shall be:

Checks - Seasoning checks not limited. Through checks at ends are limited as splits.

Knots - Well spaced knots of any quality are permitted in the following sizes or their equivalent displacement:

<u>Nom. Width</u>	<u>At Edge Wide Face</u>	<u>Centerline Wide Face</u>	<u>Holes (Any Cause)</u>	
2"	3/4"	3/4"	3/4"	} One hole or equivalent smaller holes per 1 lin. ft.
3"	1-1/4"	1-1/4"	1-1/4"	
4"	1-3/4"	2-1/2"	1-3/4"	
5"	2-1/4"	3"	1-7/8"	
6"	2-3/4"	3-3/4"	2"	
8"	3-1/2"	4-1/2"	2-1/2"	
10"	4-1/2"	5-1/2"	3"	
12"	5-1/2"	6-1/2"	3-1/2"	
14"	6"	7"	4"	
16"	6-3/8"	8"	4-1/2"	
18"	6-1/2"	8-1/4"	5"	

Manufacture - Standard "F". See para. 722(f).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - Surface shakes permitted. If through at edges or ends, limited as splits. Elsewhere through shakes 1/3 the length, scattered along the length.

Skips - Hit or miss, with a maximum of 10% of the pieces containing heavy skips. See para. 720(e) and (g).

Slope of grain - 1 in 4.

Splits - Equal to 1/6 the length of the piece.

Stain - Stained wood, not limited.

Unsound wood - Must not destroy the nailing edge. See Para 710 (e).

[Southern Pine - Heart center streaks are limited to 1/3 the cross section at any point along the length.]

[All other species or species groups - spots or streaks limited to 1/3 the cross section at any point along the length.]

Wane - 1/2 the thickness and 1/2 the width full length, or equivalent on each face, provided that wane not exceed 7/8 the thickness or 3/4 the width for up to 1/4 the length. See para. 750.

Warp - Medium. See para. 752.

White speck and honeycomb - firm.

## LIGHT FRAMING

### CONSTRUCTION

#### 2" TO 4" Thick, 2" TO 4" Wide

Characteristics permitted and limiting provisions shall be:

Checks - Surface seasoning checks, not limited. Through checks at ends are limited as splits.

Knots - Sound, firm, encased and pith, must be tight and are permitted in the following sizes or their equivalent displacement:

<u>Nom. Width</u>	<u>Anywhere On Wide Face</u>	<u>Unsound or Loose Knots and Holes (Any cause)</u>	
2"	3/4"	5/8"	} One hole or equivalent smaller holes per 3 lin. ft.
3"	1-1/4"	3/4"	
4"	1-1/2"	1"	

Manufacture - Standard "E". See para. 722(e).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - If through at ends, limited as splits. Surface shakes up to 2' long.

Skips - Hit and miss skips in a maximum of 10% of the pieces. See para. 720(f).

Slope of grain - 1 in 6.

Splits - Equal in length to the width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart.

Wane - 1/4 the thickness and 1/4 the width full length, or equivalent on each face, provided that wane not exceed 1/2 the thickness or 1/3 the width for up to 1/4 the length. See para. 750.

Warp - 1/2 of medium. See para. 752.

## LIGHT FRAMING

### STANDARD

#### 2" to 4" Thick, 2" to 4" Wide

Characteristics permitted and limiting provisions shall be:

Checks - Seasoning checks not limited. Through checks at ends are limited as splits.

Knots - Not restricted as to quality and are permitted in the following sizes or their equivalent displacement:

<u>Nom. Width</u>	<u>Anywhere On Wide Face</u>	<u>Holes (Any cause)</u>	
2"	1"	3/4"	} One hole or equivalent smaller holes per 2 lin. ft.
3"	1-1/2"	1"	
4"	2"	1-1/4"	

Manufacture - Standard "F". See para. 722(f).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - If through at ends, limited as splits. Away from ends through shakes up to 2' long, well separated. If not through, single shakes shall not exceed 3' long or 1/4 the length, whichever is greater.

Skips - Hit and miss, with a maximum of 5% of the pieces containing hit or miss or heavy skip 2' or less in length. See para. 720(e), (f) and (g).

Slope of grain - 1 in 4.

Splits - Equal in length to 1-1/2 times the width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart. Not limited.

Unsound wood -

[Southern Pine - Heart center streaks are limited to 1/3 the thickness or width.]

[All other species or species groups - Small spots or streaks of firm honeycomb or peck are limited to 1/6 the width. In 2" lumber, any other unsound wood is limited to a spot 1/12 the width and 2" in length or equivalent smaller.]

Wane - 1/3 the thickness and 1/3 the width full length, or equivalent on each face, provided that wane not exceed 2/3 the thickness or 1/2 the width for up to 1/4 the length. See para. 750.

Warp - Light. See para. 752.

White speck - Firm, 1/3 the face or equivalent.

## LIGHT FRAMING

### UTILITY

#### 2" to 4" Thick, 2" to 4" Wide

Characteristics permitted and limiting provisions shall be:

Checks - Seasoning checks not limited. Through checks at ends are limited as splits.

Knots - Not restricted as to quality and are permitted in the following sizes or their equivalent displacement:

<u>Nom. Width</u>	<u>Anywhere On Wide Face</u>	<u>Holes (Any cause)</u>	
2"	1-1/4"	1"	} One hole or equivalent smaller holes per 1 lin. ft.
3"	2"	1-1/4"	
4"	2-1/2"	1-1/2"	

Manufacture - Standard "F". See para. 722(f).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark - Not limited.

Shake - Surface shakes permitted. If through at edges or ends, limited as splits. Elsewhere through shakes 1/3 the length, scattered along the length.

Skips - Hit or miss, with a maximum of 10% of the pieces containing heavy skips. See para. 720(e) and (g).

Slope of grain - 1 in 4.

Splits - Equal to 1/6 the length of the piece.

Stain - Stained wood, not limited.

Unsound wood - Must not destroy the nailing edge. See Para 710 (e).

[Southern Pine - Heart center streaks are limited to 1/3 the cross section at any point along the length.]

[All other species or species groups - spots or streaks limited to 1/3 the cross section at any point along the length.]

Wane - 1/2 the thickness and 1/2 the width full length, or equivalent on each face, provided that wane not exceed 7/8 the thickness or 3/4 the width for up to 1/4 the length. See para. 750.

Warp - Medium. See para. 752.

White speck and honeycomb - Firm.

## STUD

### 2" to 4" thick, 2" and wider

Characteristics permitted and limiting provisions shall be:

Checks - Seasoning checks not limited. Through checks at ends are limited as splits.

Knots - Not limited as to quality but are well spaced and are permitted in the following sizes or their equivalent displacement:

<u>Nom. Width</u>	<u>At Edge Wide Face</u>	<u>Centerline Wide Face</u>	<u>Holes (Any cause)</u>	
2"	3/4"	3/4"	3/4"	} One hole or equivalent smaller holes per 1 lin. ft.
3"	1-1/4"	1-1/4"	1-1/4"	
4"	1-3/4"	2-1/2"	1-1/2"	
5"	2-1/4"	3"	1-3/4"	
6"	2-3/4"	3-3/4"	2"	
8"	3-1/2"	4-1/2"	2-1/2"	
10"	4-1/2"	5-1/2"	3"	
12"	5-1/2"	6-1/2"	3-1/2"	
14"	6"	7"	4"	

Manufacture - Standard "F". See para. 722(f).

Pitch and pitch streaks - Not limited.

Pockets - Pitch or bark- Not limited.

Shake - If through at ends, limited as splits. Elsewhere through shakes 1/3 the length.

Skips - Hit or miss on any face, with a maximum of 10% of the pieces containing heavy skips on wide faces only. See para. 720(e) and (g).

Slope of grain - 1 in 4.

Splits - Equal in length to twice the width of the piece.

Stain - Stained sapwood. Firm heart stain or firm red heart.

Unsound wood - Must not destroy nailing edge. See para. 710 (e).

[Southern Pine - Heart center streaks are limited to 1/3 the cross section at any point along the length.]

[All other species or species groups - in spots or streaks limited to 1/3 the cross section at any point along the length.]

Wane - 1/3 the thickness and 1/2 the width full length, or equivalent on each face, provided that wane not exceed 1/2 the thickness and 3/4 the width for up to 1/4 the length. See para. 750.

Warp - 1/2 medium. See para. 752.

White speck and honeycomb - Firm

## **APPEARANCE**

Conforms to all provisions of the applicable NGR grade. In addition, the following limiting provisions shall apply:

Manufacture -- Standard E. See Para. 722

Skip -- hit and miss skips in a maximum of 10% of pieces. See Para. 720(f)

Wane -- 1/4 the thickness and 1/6 the width by 1/4 the length. Omit Para. 750b.

Warp -- 1/2 of medium. See Para. 752

### **[MACHINE GRADED LUMBER]**

[When grading rules provide for machine graded lumber this section shall be included.

The grading of lumber by mechanical means is recognized as an acceptable method of grading. All grading equipment and methods shall be approved and certified by the Board of Review.

Machine graded lumber is lumber that has been evaluated by mechanical grading equipment. Machine graded lumber is distinguished from visually stress graded lumber in that each piece is nondestructively evaluated for a physical or mechanical property and marked to indicate the appropriate sorted category. Machine graded lumber is also required to meet the visual requirements developed by the respective rules writing agency.

Grades of machine graded lumber and allowable design values shall be established by the rules writing agencies.

A grade mark on machine graded lumber indicates that the stress rating system meets requirements of the grading agency's certification and quality control procedures. For Machine Stress Rated (MSR) lumber the grade mark shall show the agency trademark, the mill name or number, the phrase "Machine Rated" or "MSR", the species identification, the seasoning designation, the "Fb" and the "E" ratings for the grade. The "Fb" rating is the fiber stress in bending in pounds per square inch, and "E" rating is the rated modulus of elasticity in millions of pounds per square inch. For Machine Evaluated Lumber (MEL) the grade mark shall show the agency trademark, the mill name or number, the species identification, the seasoning designation, the grade code for MEL and allowable design values for fiber stress in bending, tension and average modulus of elasticity.

Visual Grading Requirements (Machine Graded Lumber)]

## GLOSSARY

**700** Throughout these rules various words and terms are used with meanings specifically applicable to lumber. In the use of these rules a full understanding of the words and terms in this Glossary is essential. An index to the Glossary follows:

**702 BURL**  
**704 CHECKS**  
**706 COMPRESSION WOOD**  
**708 DECAY**  
**710 EDGE**  
**712 GRAIN**  
**714 HEART**  
**716 HOLES**  
**718 KNOTS**  
**720 MANUFACTURING IMPERFECTIONS**  
**722 MANUFACTURING IMPERFECTIONS CLASSIFICATION**  
**724 MOISTURE CONTENT**  
**726 OCCASIONAL PIECES**  
**728 PITCH**  
**730 PITCH STREAK**  
**732 PITH**  
**734 POCKETS (including Pitch Pockets and Bark Pockets)**  
**736 PLUGS AND FILLERS**  
**738 SAPWOOD**  
**740 SHAKE**  
**742 SPLITS**  
**744 STAINS**  
**746 STRESS GRADES**  
**748 TRIM**  
**750 WANE**  
**752 WARP**  
**754 COMBINATION GRADES**

## DEFINITIONS

**702 BURL** - A distortion of grain, usually caused by abnormal growth due to injury of the tree. The effect of burls is assessed in relation to knots.

**704 CHECKS** - A separation of the wood normally occurring across or through the rings of annual growth and usually as a result of seasoning.

(a) A surface check occurs on a face of a piece.

(b) A through check extends from one surface of a piece to the opposite or adjoining surface.

(c) Small checks are not over 1/32" wide and not over 4" long.

(d) Medium checks are not over 1/32" wide and not over 10" long.

(e) Large checks are more than 1/32" wide or longer than 10" or both.

(f) A roller check is a crack in the wood structure caused by a piece of cupped lumber being flattened in passing between the machine rollers.

A light roller check is a perceptible opening not over 2' long.

A medium roller check is a perceptible opening over 2' long but not exceeding 4' in length.

A heavy roller check is over 4' in length.

**706 COMPRESSION WOOD** - Abnormal wood that forms on the under side of leaning and crooked coniferous trees. It is characterized, aside from its distinguishing color, by being hard and brittle and by its relatively lifeless appearance. Compression wood shall be limited in effect to other appearance or strength reducing characteristics permitted in the grade.

**708 DECAY (UN SOUND WOOD)** - A disintegration of the wood substance due to action of wood-destroying fungi, and is also known as dote or rot. Some examples are as follows:

(a) Heart center decay is a localized decay developing along the pith in some species and is detected by visual inspection. The limitation for heart center decay applies to Southern Pine. Heart center decay develops in the living tree and does not progress further after the tree is cut.

(b) White specks are small white or brown pits or spots in wood caused by the fungus "Fomes pini". It develops in the living tree and does not develop further in wood in service. Where permitted in these rules it is so limited that it has no more effect on the intended use of the pieces than other characteristics permitted in the same grade. Pieces containing white speck are no more subject to decay than pieces which do not contain it. NOTE: "Firm" in relation to white speck infers that it will not crumble readily under thumb pressure and cannot be easily picked out.

(c) Honeycomb is similar to white speck but the pockets are larger. Where permitted in the rules it is so limited that it has no more effect on the intended use of the piece than other characteristics permitted in the same grade. Pieces containing honeycomb are no more subject to decay than pieces which do not contain it. NOTE: "Firm" in relation to honeycomb infers that it will not crumble readily under thumb pressure and cannot be easily picked out.

(d) Incipient decay is an early stage of decay in which disintegration of the wood fibers has not proceeded far enough to soften or otherwise change the hardness of the wood perceptibly. It is usually accompanied by a slight discoloration or bleaching of the wood.

(e) Peck is channeled or pitted areas or pockets found in cedar and cypress. Wood tissue between pecky areas remains unaffected in appearance and strength. All further growth of the fungus causing peckiness ceases after the trees are felled.

**710 EDGE** - There are three meanings for edge: (1) The narrow face of rectangular-shaped pieces. (2) The corner of a piece at the intersection of two longitudinal faces. (3) In stress grades that part of the wide face nearest the corner of the piece.

(a) Eased edges means slightly rounded surfacing on pieces of lumber to remove sharp corners. The standard radius for 1", 2", 3" and 4" nominal thickness lumber shall not exceed 1/16", 1/8", 3/16" and 1/4" respectively. Note: Lumber 4" or less in thickness is frequently shipped with eased edges unless otherwise specified.

(b) Square edged means free from wane and without



eased edges.

(c) Free of wane means without wane but has either eased or square edges. (See WANE definition.)

(d) Square corners means without eased edges but has an allowance for wane in certain grades.

(e) To "destroy the nailing edge" shall mean (1) the decay occupies more of the narrow face than the allowable maximum wane in thickness when in streak form, or (2) the decay occupies more than twice the length of the allowable knot hole when a spot occurs completely through the narrow face.

**712 GRAIN** - The fibers in wood and their direction, size, arrangement, appearance or quality.

(a) For requirements and method of measuring medium grain, close grain and dense material, see Para. \_\_\_\_ [appropriate paragraph to be filled in by individual rules writers].

(b) Slope of grain is the deviation of the line of fibers from a straight line parallel to the sides of the piece. For method of measurement, see Para. \_\_\_\_ [appropriate paragraph to be filled in by individual rules writers].

(c) Summerwood is the portion of the annual growth ring formed during the latter part of the yearly growth ring. It is darker in color, more dense, and stronger mechanically than springwood.

(d) Springwood is the portion of the annual growth ring formed during the early part of the yearly growth period. It is lighter in color, less dense, and not as strong mechanically as summerwood.

(e) Vertical grain (VG) (Edge grain EG) (Rift grain) lumber is a piece or pieces sawn at approximately right angles to the annual growth rings so that the rings form an angle of 45 degrees or more with the surface of the piece.

(f) Flat grain (FG) (Slash grain SG) lumber is a piece or pieces sawn approximately parallel to the annual growth rings so that all or some of the rings form an angle of less than 45 degrees with the surface of the piece.

(g) Mixed grain (MG) lumber includes either or both vertical and flat grained pieces.

(h) Spiral grain is a deviation in the slope of grain caused when the fibers in a tree take a spiral course around the trunk of the tree, instead of the normal vertical course.

(i) Diagonal grain is a deviation in the slope of grain caused by sawing at an angle with the bark of the tree. See slope of grain.

**714 HEART** - (Heartwood) Inner core of the tree trunk comprising the annual rings containing nonliving elements. In some species, heartwood has a prominent color different from sapwood.

(a) Boxed heart means with the pith enclosed in the piece.

(b) Heart center is the pith or center core of the log.

(c) Free of heart centers (FOHC) means without pith (side cut). An occasional piece (See para. 726) when showing pith for not more than 1/4 the length on the surface shall be accepted.

(d) Firm red heart is a stage of incipient decay characterized by a reddish color in the heartwood, which does not render the wood unfit for the majority of yard purposes.

(e) Heartwood and sapwood of equivalent character are of

equal strength. No requirement of heartwood is made when strength alone is the governing factor.

(f) Heartwood is more durable than sapwood. When wood is to be exposed to decay-producing conditions without preservative treatment, it shall be permitted to specify the minimum percentage of heartwood to be present in all pieces in a shipment.

(g) Sapwood takes preservative treatment more readily than heartwood.

**716 HOLES** - Holes either extend partially or wholly through the piece. An alternate designation for holes which extend only partially through the piece is surface pits.

Unless otherwise specified holes are measured the same as knots. Holes are classified by size as follows:

(a) A pin hole is not over 1/16" in diameter.

(b) A medium (small) hole is not over 1/4" in diameter.

(c) A large hole is not over 1" in diameter.

(d) A very large hole is over 1" in diameter.

**718 KNOTS** - A portion of a branch or limb that has become incorporated in a piece of lumber. In lumber, knots are classified as to form, size, quality and occurrence.

A red knot is one that results from a live branch growth in the tree and is intergrown with the surrounding wood. A black knot is one that results from a dead branch which the wood growth of the tree has surrounded.

(a) A round knot is produced when the limb is cut at approximately a right angle to its long axis.

(b) An oval knot is produced when the limb is cut at slightly more than a right angle to the long axis.

(c) A spike knot is produced when the limb is cut either lengthwise or diagonally.

(d) A pin knot is not over 1/2".

(e) A small knot is not over 3/4".

(f) A medium knot is not over 1-1/2".

(g) A large knot is over 1-1/2".

(h) A sound knot contains no decay.

(i) A pith knot is sound in all respects except it contains a pith hole not over 1/4" in diameter.

(j) A hollow knot is a sound knot containing a hole greater than 1/4" in diameter. Through opening of a hollow knot is limited to the size of other holes permitted.

(k) An unsound knot contains decay.

(l) A "firm" knot is solid across its face but contains incipient decay.

(m) A tight knot is so fixed by growth, shape or position that it retains its place in the piece.

(n) An intergrown knot is one whose growth rings are partially or completely intergrown on one or more faces with the growth rings of the surrounding wood.

(o) A watertight knot has its annual rings completely intergrown with those of the surrounding wood on one surface of the piece, and it is sound on that surface.

(p) An encased knot is one which is not intergrown with the growth rings of the surrounding wood.

(q) A "loose" or "not firmly fixed" knot is one not held tightly in place by growth, shape or position.

(r) A "fixed" knot will retain its place in dry lumber under ordinary conditions but is movable under pressure though not easily pushed out.

(s) A knot cluster is two or more knots grouped together as

a unit with the fibers of the wood deflected around the entire unit. A group of single knots is not a knot cluster.

(t) A star-checked knot has radial checks.

(u) Well-scattered knots are not in clusters and each knot is separated from any other by a distance at least equal to the diameter of the smaller of the two.

(v) Well-spaced knots means that the sum of the sizes of all knots in any 6" of length of a piece must not exceed twice the size of the largest knot permitted. More than one knot of maximum permissible size must not be in same 6" of length and the combination of knots must not be serious.

**720 MANUFACTURING IMPERFECTIONS** - Means all imperfections or blemishes which are the result of surfacing, such as the following:

(a) Chipped grain is a barely perceptible irregularity in the surface of a piece caused when particles of wood are chipped or broken below the line of cut. It is too small to be classed as torn grain and is not considered unless in excess of 25% of the surface involved.

(b) Torn grain is an irregularity in the surface of a piece where wood has been torn or broken out by surfacing. Torn grain is described as follows:

Very light torn grain - not over 1/64" deep.

Light torn grain - not over 1/32" deep.

Medium torn grain - not over 1/16" deep.

Heavy torn grain - not over 1/8" deep.

Very heavy torn grain - over 1/8" deep.

(c) Raised grain is a roughened condition of the surface of dressed lumber in which the hard summerwood is raised above the softer springwood, but not torn loose from it. Very light raised grain is not over 1/64". Light raised grain is not over 1/32". Medium raised grain is not over 1/16". Heavy raised grain is not over 1/8".

(d) Loosened grain is a grain separation or loosening between springwood and summerwood without displacement. Very light loosened grain is not over 1/64" separation. Light loosened grain is not over 1/32" separation. Medium loosened grain is not over 1/16" separation. Heavy loosened grain is not over 1/8" separation. Very heavy loosened grain is over 1/8" separation.

(e) Skips are areas on a piece that failed to surface clean. Skips are described as follows:

Very light skip is not over 1/64" deep.

Light skip is not over 1/32" deep.

Medium skip is not over 1/16" deep.

Heavy skip is not over 1/8" deep.

(f) Hit and miss is a series of skips not over 1/16" deep with surfaced areas between.

(g) Hit or miss means completely or partly surfaced or entirely rough. Scantness may be 1/16".

(h) Mismatch is an uneven fit in worked lumber when adjoining pieces do not meet tightly at all points of contact or when the surface of adjoining pieces are not in the same plane.

Slight mismatch is a barely evident trace of mismatch.

Very light mismatch is not over 1/64".

Light mismatch is not over 1/32".

Medium mismatch is not over 1/16".

Heavy mismatch is not over 1/8".

(i) Machine burn is a darkening of the wood due to overheating by machine knives or rolls when pieces are stopped in machine.

(j) Machine bite is a depressed cut of the machine knives at the end of the piece. Very light machine bite is not over 1/64" deep. Light machine bite is not over 1/32" deep. Medium machine bite is not over 1/16" deep. Heavy machine bite is not over 1/8" deep. Very heavy machine bite is over 1/8" deep.

(k) Machine gouge is a groove cut by the machine below the desired line. Very light machine gouge is not over 1/64" deep. Light machine gouge is not over 1/32" deep. Medium machine gouge is not over 1/16" deep. Heavy machine gouge is not over 1/8" deep. Very heavy machine gouge is over 1/8" deep.

(l) A machine offset is an abrupt dressing variation in the edge surface which usually occurs near the end of the piece and without reducing the width or without changing the plane of the wide surface. Very light machine offset is a variation not over 1/64". Light machine offset is a variation not over 1/32". Medium machine offset is a variation not over 1/16". Heavy machine offset is a variation not over 1/8". Very heavy machine offset is a variation over 1/8".

(m) Chip marks are shallow depressions or indentations on or in the surface of dressed lumber caused by shavings or chips getting embedded in the surface during dressing. Very light chip marks are not over 1/64" deep. Light chip marks are not over 1/32" deep. Medium chip marks are not over 1/16" deep. Heavy chip marks are not over 1/8" deep.

(n) Knife marks are the imprints or markings of the machine knives on the surface of dressed lumber. Very slight knife marks are visible only from a favorable angle and are perfectly smooth to the touch. Slight knife marks are readily visible but evidence no unevenness to the touch.

(o) Wavy dressing involves more uneven dressing than knife marks. Very light wavy dressing is not over 1/64" deep. Light wavy dressing is not over 1/32" deep. Medium wavy dressing is not over 1/16" deep. Heavy wavy dressing is not over 1/8" deep. Very heavy wavy dressing is over 1/8" deep.

## **722 CLASSIFICATION OF MANUFACTURING IMPERFECTIONS** -

(a) Standard "A" Manufacture admits: Very light torn grain; occasional very light chip marks; very slight knife marks.

(b) Standard "B" Manufacture admits: Very light torn grain; very light raised grain; very light loosened grain; very light chip marks; average of one very light chip mark per lineal foot but not more than two in any lineal foot; very slight knife marks; slight mismatch.

(c) Standard "C" Manufacture admits: Medium torn grain; light raised grain; light loosened grain; very light machine bite; very light machine gouge; very light machine offset; light chip marks if well-scattered; occasional medium chip marks; very slight knife marks; slight mismatch.

(d) Standard "D" Manufacture admits: Heavy torn grain; medium raised grain; very heavy loosened grain; light machine bite; light machine gouge; light machine offset; medium chip marks; slight knife marks; very light mismatch.

(e) Standard "E" Manufacture admits: Very heavy torn grain; raised grain; very heavy loosened grain; medium

machine bite; machine gouge; medium machine offset; chip marks; knife marks; light wavy dressing; light mismatch.

(f) Standard "F" Manufacture admits: Very heavy torn grain; raised grain; very heavy loosened grain; heavy machine bite; machine gouge; heavy machine offset; chip marks; knife marks; medium wavy dressing; medium mismatch.

**724 MOISTURE CONTENT** - The weight of the water in wood expressed in percentage of the weight of the oven-dry wood.

**726 OCCASIONAL PIECES** - Means not more than 10% of the pieces in a parcel or shipment.

**728 PITCH** - Is an accumulation of resinous material.  
(a) Light pitch is the light but evident presence of pitch. (b) Medium pitch is a somewhat more evident presence of pitch than is the light. (c) Heavy pitch is a very evident accumulation of pitch showing by its color and consistency. (d) Massed pitch is a clearly defined accumulation of solid pitch in a body by itself..

**730 PITCH STREAK** - Is a well-defined accumulation of pitch in the wood cells in a streak. Pitch streaks are described as follows, with equivalent areas being permissible: (a) Very small pitch streak 3/8" in width and 15" in length. (b) Small pitch streak 1/12 the width and 1/6 the length of the piece. (c) Medium pitch streak 1/6 the width and 1/3 the length of the piece. (d) A large pitch streak is not over 1/4 the width by 1/2 the length of the surface. (e) A very large pitch streak is over 1/4 the width by 1/2 the length of the surface. (f) A pitch seam is a shake or check which contains pitch.

**732 PITH** - Pith is the small soft core in the structural center of a log.

(a) Very small pith is not over 1/8" wide and occupies on face surface not over 1/4 square inch (1/8" wide by 2" long, or 1/16" by 4").

(b) Small pith occupies not over 3/4 square inch (1/4" by 3", 3/16" by 4", 1/8" by 6", or 1/16" by 12").

(c) Free of pith means that pith on or within the body of the piece is prohibited.

**734 POCKET** - A well-defined opening between the rings of annual growth which develops during the growth of the tree. It usually contains pitch or bark.

Pockets are described as follows with equivalent areas being permissible: (a) Very small pocket - 1/16" in width and 3" in length, or 1/8" in width and 2" in length. (b) Small pocket - 1/16" in width and 6" in length, or 1/8" in width and 4" in length, or 1/4" in width and 2" in length. (c) Medium pocket - 1/16" in width and 12" in length, or 1/8" in width and 8" in length, or 3/8" in width and 4" in length. (d) A large pocket is not over 4 square inches in area. (e) A very large pocket is over 4 square inches in area (f) A closed pocket has an opening on one surface only. (g) A through or open pocket has an opening on opposite surfaces, and the through opening is considered the same as a through hole of equal size.

**736 PLUGS AND FILLERS** - Wood plugs and fillers are inserted into pieces of lumber to improve their appearance and usefulness. Lumber containing plugs and fillers shall only be shipped when the order, acknowledgment and invoice carry reference to the inserts. Quality of the inserts and workmanship must be in keeping with the quality of the grade. In dimension and other lumber graded for strength, inserts are limited to the same size and location as knots.

**738 SAPWOOD** - Outer layers of growth between the bark and the heartwood which contain the sap.

(a) Bright sapwood shows no stain and is not limited in any grade unless specifically stated in the grade description.

(b) Sapwood restrictions waived means that any restrictions in a rule on the amount of sapwood permitted in pieces graded under that rule are not to apply.

(c) Bright sapwood no defect (BSND) means that bright sapwood is permitted in each piece in any amount.

**740 SHAKE** - A lengthwise separation of the wood which occurs between or through the rings of annual growth.

(a) A light shake is not over 1/32" wide.

(b) A medium shake is not over 1/8" wide.

(c) A surface shake occurs on only one surface of a piece.

(d) A through shake extends from one surface of a piece to the opposite or to an adjoining surface.

(e) A pith shake (or heart shake or heart check) extends through the growth rings from or through the pith towards the surface of a piece, and is distinguished from a seasoning check by the fact that its greatest width is nearest the pith, whereas the greatest width of a season check in a pith-centered piece is farthest from the pith.

(f) A ring shake occurs between the growth rings to partially or wholly encircle the pith.

**742 SPLITS** - A separation of the wood through the piece to the opposite surface or to an adjoining surface due to the tearing apart of the wood cells.

(a) A very short split is equal in length to 1/2 the width of the piece.

(b) A short split is equal in length to the width of the piece and in no case exceeds 1/6 the length.

(c) A medium split is equal in length to twice the width of the piece and in no case exceeds 1/6 the length.

(d) A long split is longer than a medium split.

#### **744 STAINED WOOD -**

(a) Stained Heartwood and Firm Red Heart - Stained Heartwood or Firm Red Heart is a marked variation from the natural color. Note: It ranges from pink to brown. It is not to be confused with natural red heart. Natural color is usually uniformly distributed through certain annual rings, whereas stains are usually in irregular patches. In grades where it is permitted, it has no more effect on the intended use of the piece than other characteristics permitted in the grade.

(b) Stained Sapwood - Stained Sapwood similarly has no effect on the intended use of the pieces in which it is permitted but affects appearance in varying degrees.

(1) Light stained sapwood is so slightly discolored that it

does not affect natural finishes.

(2) Medium stained sapwood has a pronounced difference in coloring. Note: Sometimes the usefulness for natural finishes but not for paint finishes is affected.

(3) Heavy stained sapwood has so pronounced a difference in color as to obscure the grain of the wood but the lumber containing it is acceptable for paint finishes.

(c) Discoloration through exposure to the elements is admitted in all grades of framing and sheathing lumber.

**746 STRESS GRADES** - Lumber grades having assigned working stress and modulus of elasticity values in accordance with accepted basic principles of strength grading, and the provisions of sections 6.3.2.1 and 6.3.2.2 of Voluntary Product Standard 20.

**748 TRIM -**

(a) Trimming of lumber is the act of cross-cutting a piece to a given length.

(b) Double end trimmed (DET) Note: It is intended that DET lumber be trimmed square on both ends. Tolerances are found in certified grading rules.

(c) Precision end trimmed (PET) lumber is trimmed square on both ends to uniform lengths with a manufacturing tolerance of 1/16" over or under in length in 20% of the pieces.

(d) Square end trimmed lumber is trimmed square having a manufacturing tolerance of 1/64" for each nominal 2" of thickness or width.

**750 WANE -**

(a) Bark or lack of wood from any cause, except eased edges, on the edge or corner of a piece of lumber.

(b) Wane Dip - Wane away from ends extending partially or completely across any face is permitted for one foot if no more serious than skips in dressing allowed or across a narrow face if no more damaging than the knot hole allowed (not to exceed in length twice the diameter of the maximum knot hole allowed in the grade) and is limited to one occurrence in each piece. These variations shall not be allowed in more than 5% of the pieces. (This provision applies only to the National Grading Rule for Dimension Lumber).

**752 WARP** - Any deviation from a true or plane surface, including bow, crook, cup and twist or any combination thereof. Warp restrictions are based on the average form of warp as it occurs normally, and any variation from this average form, such as short kinks, shall be appraised according to its equivalent effect. Pieces containing two or more forms shall be appraised according to the combined effect in determining the amount permissible. In these rules warp is classified as very light, light, medium and heavy, and applied to each width and length as set forth in the various grades in accordance with the following provisions and tables:

(a) Bow is a deviation flatwise from a straight line drawn from end to end of a piece. It is measured at the point of greatest distance from the straight line. The maximum amount of bow allowed in a grade is as follows: If under 2"

thick, three times as much as crook for 2" faces. If 2" thick and under 3", twice as much as crook for 2" faces. If 3" thick and over, the same as the amount of crook for that thickness.

(b) Crook is a deviation edgewise from a straight line drawn from end to end of a piece. It is measured at the point of greatest distance from the straight line. The maximum amount of crook allowed shall be that shown in the table on page 24.

(c) Cup is a deviation in the face of a piece from a straight line drawn from edge to edge of a piece. It is measured at the point of greatest distance from the straight line. The maximum amount of cup allowed shall be that shown in the cup table.

CUP TABLE

FACE WIDTH

	<u>2"&amp;3"</u>	<u>4"</u>	<u>5"&amp;6"</u>	<u>8"</u>
Very Light	1/32"	1/32"	1/32"	1/16"
Light	1/32"	1/32"	1/16"	1/8"
Medium	1/32"	1/16"	1/8"	3/16"
Heavy	1/16"	1/8"	3/16"	1/4"

	<u>10"</u>	<u>12"</u>	<u>14" and Wider</u>
Very Light	3/32"	1/8"	Proportionately
Light	3/16"	1/4"	more
Medium	1/4"	3/8"	"
Heavy	3/8"	1/2"	"

(d) Twist is a deviation flatwise, or a combination of flatwise and edgewise, in the form of a curl or spiral, and the amount is the distance an edge of a piece at one end is raised above a flat surface against which both edges at the opposite end are resting snugly. The maximum amount of twist allowed shall be that shown in the tables on page 25.

**754 Combination Grades** - Product Standard PS 20 permits grouping the highest two grades in a grade category, and grade marking the combination as an "& Better" grade. The combined grade is assigned the allowable property values of the lower grade unless allowable property values have been assigned to the combination. [In the case of "No. 1 & Better", data collected for Douglas fir, larch, Douglas fir-larch, and Hem-Fir during the U. S. In-grade testing program permits development of allowable property values specific to the combination grade. When the "No. 1 & Better" grade combination is assigned specific allowable properties, as for Douglas fir, larch, Douglas fir-larch, and Hem-Fir, the material is required to be stamped with a "No. 1 & Better" grade stamp. If the lumber is grade stamped as "Select Structural" and "No. 1" rather than "No. 1 & Better", the values assigned to the individual grades apply.]

CROOK TABLE								
Length in feet	Description	WIDTH OF PIECE						
		2"	3"	4"	5",6"	8"	10"	12"
4 & 6	Very Light	1/8	1/8	1/8	1/8	1/16	1/16	1/16
	Light	1/4	1/4	1/4	3/16	1/8	1/16	1/16
	Medium	3/8	3/8	3/8	1/4	3/16	1/8	1/8
	Heavy	1/2	1/2	1/2	3/8	1/4	3/16	3/16
8	Very Light	1/4	1/4	3/16	1/8	1/8	1/16	1/16
	Light	3/8	3/8	3/8	5/16	1/4	3/16	1/8
	Medium	1/2	1/2	1/2	1/2	3/8	1/4	3/16
	Heavy	3/4	3/4	3/4	5/8	1/2	3/8	1/4
10	Very Light	3/8	5/16	1/4	3/16	3/16	1/8	1/8
	Light	3/4	5/8	1/2	7/16	3/8	1/4	3/16
	Medium	1-3/8	1	3/4	5/8	1/2	7/16	3/8
	Heavy	1-3/4	1-1/4	1-1/8	1	7/8	3/4	5/8
12	Very Light	1/2	3/8	3/8	5/16	1/4	1/4	3/16
	Light	1	3/4	11/16	5/8	1/2	7/16	3/8
	Medium	1-1/2	1-1/8	1	7/8	13/16	3/4	9/16
	Heavy	2	1-1/2	1-3/8	1-1/4	1-1/8	1	13/16
14	Very Light	5/8	1/2	7/16	3/8	5/16	1/4	3/16
	Light	1-1/4	1	7/8	3/4	5/8	1/2	3/8
	Medium	2	1-1/2	1-1/4	1-1/8	1	7/8	3/4
	Heavy	2-3/4	2	1-3/4	1-1/2	1-1/4	1-1/8	1
16	Very Light	3/4	5/8	1/2	7/16	3/8	5/16	1/4
	Light	1-5/8	1-1/4	1	7/8	3/4	5/8	1/2
	Medium	2-1/2	1-7/8	1-1/2	1-3/8	1-1/8	1	7/8
	Heavy	3-1/4	2-1/2	2	1-3/4	1-1/2	1-1/4	1-1/8
18	Very Light	1	3/4	5/8	1/2	7/16	3/8	5/16
	Light	2	1-3/8	1-1/8	1	7/8	3/4	5/8
	Medium	3	2-1/16	1-5/8	1-1/2	1-1/4	1-1/8	1
	Heavy	4	2-3/4	2-1/4	2	1-3/4	1-1/2	1-1/4
20	Very Light	1-1/8	7/8	3/4	5/8	1/2	7/16	3/8
	Light	2-1/4	1-1/2	1-3/8	1-1/4	1	7/8	3/4
	Medium	3-3/8	2-1/4	2-1/16	1-7/8	1-1/2	1-5/16	1-1/8
	Heavy	4-1/2	3	2-3/4	2-1/2	2	1-3/4	1-1/2
22	Very Light	1-1/4	1	7/8	3/4	5/8	1/2	7/16
	Light	2-1/2	1-3/4	1-5/8	1-1/2	1-1/4	1	7/8
	Medium	3-3/4	2-5/8	2-7/16	2-1/4	1-7/8	1-1/2	1-1/4
	Heavy	5	3-1/2	3-1/4	3	2-1/2	2	1-3/4
24	Very Light	1-1/2	1-1/8	1	7/8	3/4	5/8	1/2
	Light	3	2	1-7/8	1-3/4	1-1/2	1-1/4	1
	Medium	4-1/2	3	2-3/4	2-5/8	2-1/4	1-7/8	1-5/8
	Heavy	6	4	3-3/4	3-1/2	3	2-1/2	2-1/4

TWIST TABLE							
Length in feet	Description	FACE WIDTH					
		2"	3",4"	5",6"	8"	10"	12"
4	Very Light	1/16	1/8	3/16	1/4	5/16	3/8
	Light	1/8	1/4	3/8	1/2	5/8	3/4
	Medium	3/16	3/8	1/2	3/4	7/8	1-1/8
	Heavy	1/4	1/2	3/4	1	1-1/4	1-1/2
6	Very Light	3/32	3/16	5/16	3/8	7/16	9/16
	Light	3/16	3/8	1/2	3/4	7/8	1-1/8
	Medium	9/32	1/2	3/4	1-1/8	1-3/8	1-5/8
	Heavy	3/8	3/4	1-1/8	1-1/2	1-7/8	2-1/4
8	Very Light	1/8	1/4	3/8	1/2	5/8	3/4
	Light	1/4	1/2	3/4	1	1-1/4	1-1/2
	Medium	3/8	3/4	1-1/8	1-1/2	1-7/8	2-1/4
	Heavy	1/2	1	1-1/2	2	2-1/2	3
10	Very Light	5/32	5/16	7/16	5/8	3/4	15/16
	Light	5/16	5/8	7/8	1-1/4	1-1/2	1-7/8
	Medium	1/2	7/8	1-3/8	1-7/8	2-3/8	2-3/4
	Heavy	5/8	1-1/4	1-7/8	2-1/2	3-1/8	3-3/4
12	Very Light	3/16	3/8	9/16	3/4	15/16	1-1/8
	Light	3/8	3/4	1-1/8	1-1/2	1-7/8	2-1/4
	Medium	9/16	1-1/8	1-5/8	2-1/4	2-3/4	3-3/8
	Heavy	3/4	1-1/2	2-1/4	3	3-3/4	4-1/2
14	Very Light	7/32	7/16	5/8	7/8	1-1/16	1-5/16
	Light	7/16	7/8	1-1/4	1-3/4	2-1/8	2-5/8
	Medium	5/8	1-1/4	1-7/8	2-5/8	3-1/4	3-7/8
	Heavy	7/8	1-3/4	2-5/8	3-1/2	4-3/8	5-1/4
16	Very Light	1/4	1/2	3/4	1	1-1/4	1-1/2
	Light	1/2	1	1-1/2	2	2-1/2	3
	Medium	3/4	1-1/2	2-1/4	3	3-3/4	4-1/2
	Heavy	1	2	3	4	5	6
18	Very Light	5/16	9/16	13/16	1-1/8	1-7/16	1-11/16
	Light	9/16	1-1/8	1-5/8	2-1/4	2-3/4	3-3/8
	Medium	7/8	1-5/8	2-1/2	3-3/8	4-1/4	5
	Heavy	1-1/8	2-1/4	3-3/8	4-1/2	5-5/8	6-3/4
20 and Longer	Very Light	5/16	5/8	15/16	1-1/4	1-9/16	1-7/8
	Light	5/8	1-1/4	1-7/8	2-1/2	3-1/8	3-3/4
	Medium	1	1-7/8	2-3/4	3-3/4	4-5/8	5-5/8
	Heavy	1-1/4	2-1/2	3-3/4	5	6-1/4	7-1/2

# **INTERPRETATIONS OF THE NATIONAL GRADING RULE FOR DIMENSION LUMBER**

**National Grading Rule Committee**

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The limiting provisions of the National Grading Rule delineate the characteristics permitted. However, because lumber is manufactured from trees which have developed naturally and responsively to their environment and every piece is different it is not possible to anticipate in a grade description all of the possible combinations or types of characteristics which a grader will encounter. These National Grading Rule Interpretations provide additional information to the grader/inspector in the application of the National Grading Rule. These interpretations have been approved by the National Grading Rule Committee and shall be considered a mandatory part of the National Grading Rule.

All measurements are based on actual size unless otherwise specified except splits and warp are based on nominal.

The limitations on knot sizes and other characteristics governing strength shall not be exceeded.

## **BARK AND PITCH POCKETS:**

Bark or pitch pockets are not restricted as to number.

## **BEVEL SAWING:**

Limited on the basis of equivalent loss of wood from wane.

## **BREAKS – TIMBER BREAKS AND COMPRESSION FAILURES:**

Separations resulting from seasoning which occur in allowable bands of compression wood shall not be evaluated as timber breaks or compression failures.

Compression failures and timber breaks are permitted only in the grades of Standard, No. 3, Utility and Stud. They are limited to the size of the allowable knot hole and measured on the worst face.

## **CELL COLLAPSE:**

Cell collapse shall be evaluated as either wane or skip.

### **CHECKS:**

Seasoning checks extending from wide faces completely through the narrow face are limited as planer tears.

### **CHIP AND SAW CHANNELS (RABBETTED EDGE) :**

Is limited on a basis of wane except in those instances in which the depth or width of the cut exceeds the full length wane provisions, the limitation shall be on a basis of equivalent loss of wood from maximum natural wane.

### **COMPRESSION WOOD :**

Compression wood shall be limited in effect to other appearance or strength-reducing characteristics permitted in the grade.

### **HOLES:**

**Insect Holes:** Pin holes, grub holes and toredo holes are handled on an "equivalent smaller" basis. Equivalent smaller shall mean that the area occupied by all pin, grub and toredo holes shall be added together and treated as the maximum size hole permitted. For example, twelve 1/4" holes shall be accepted as equivalent to a single 1" hole. The poorest face shall govern.

**Manufactured Holes:** The area of a manufactured hole shall not exceed the equivalent area of the knot hole permitted and is limited to one manufactured hole in lengths of 12' or less of length, or two in lengths longer than 12'. The following length restrictions shall apply:

SELECT STRUCTURAL: equal in length to diameter of hole permitted

NO. 1 and CONSTRUCTION: equal in length to 1-1/2 times diameter of hole permitted.

NO. 2 and STANDARD: equal in length to width of piece.

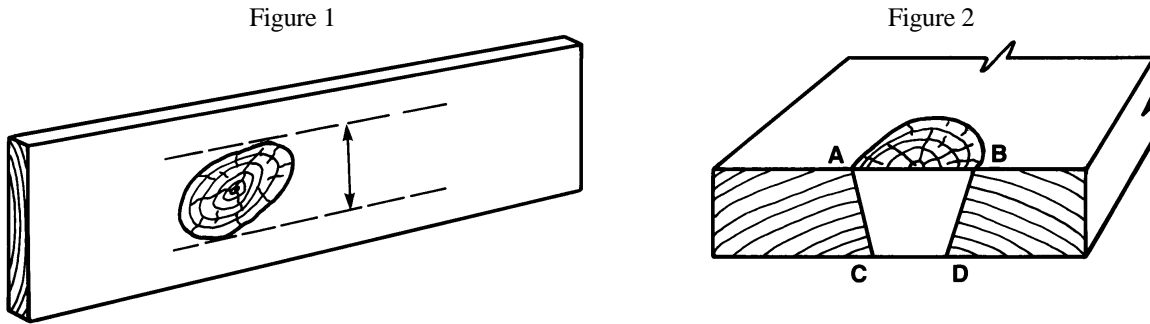
NO. 3, UTILITY and STUD: equal in length to 1-1/2 times width of piece.

Manufactured holes are defects caused by the manufacturing process that are not specifically listed in the grading rule (e.g. Dog holes, log turner marks, debarker damage, etc.). The length of manufactured holes shall be the entire length of the defect encountered and limited to the frequency and length restrictions as listed. Manufactured holes that have no more effect on the grade of the piece than wane shall be assessed and limited as wane but not a combination of the wane and manufactured hole limitations. The listed limitations for manufactured holes shall not be used to exceed the maximum wane limitations of the grade.



**KNOTS:**

**Knot Measurement:** Knots appearing on wide faces are measured between lines enclosing the knot drawn parallel to the edge (Fig. 1). Knot size is equal to the average of the two wide face measurements (Fig. 2).

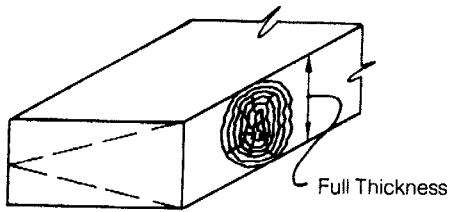


$$\text{Knot size} = \frac{AB + CD}{2}$$

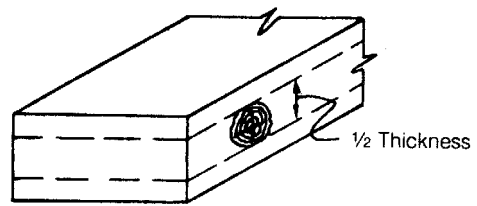
Except as otherwise provided, in these interpretations for knots on narrow faces, the cross sectional area displacement shall not exceed that of the maximum knot allowed at the edge of the wide face (see chart in Fig. 3 for allowable displacement percentages).

Figure 3

ALLOWABLE DISPLACEMENT (IN PERCENTAGE) OF NARROW FACE KNOTS											
Nominal Width	Light Framing			Structural Light Framing				Structural Joists & Planks			
	Const	Stand	Util	SS	No 1	No 2	Stud No 3	SS	No 1	No 2	Stud No 3
2"	50	67	83	25	33	42	50				
3"	50	60	80	20	30	35	50				
4"	43	57	71	21	29	36	50				
5"								22	28	36	50
6"								20	27	34	50
8"								21	28	34	48
10"								20	27	35	49
12"								20	27	33	49
14"								18	24	31	45



Narrow face knot – 1/2 displacement

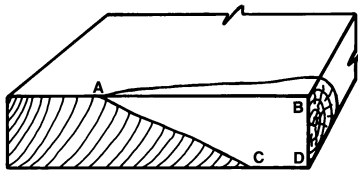


Narrow face knot – 1/2 displacement

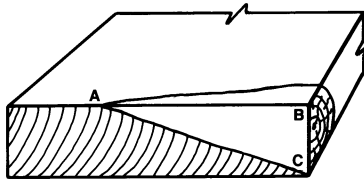
Narrow face knots (spike knots) shall be measured according to the formulas depicted in Figure 4. The measurement of wide face knots overlapping one or two edges is demonstrated in Figure 5.

Figure 4

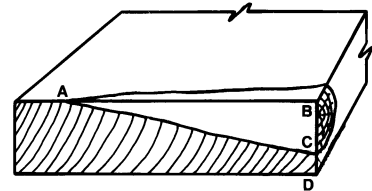
Spike Knots



$$\text{Knot size} = \frac{AB + CD}{2}$$



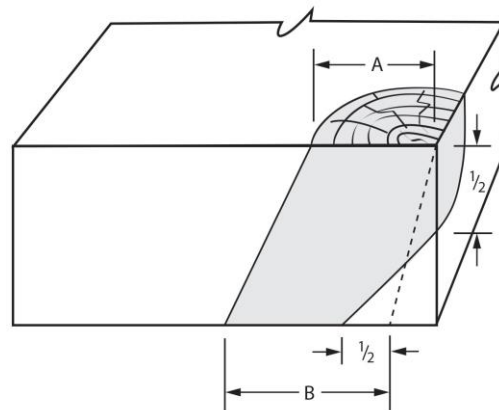
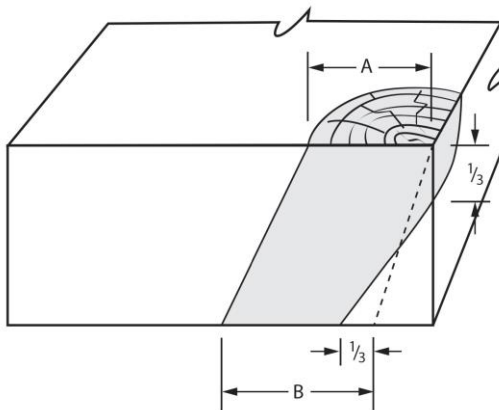
$$\text{Knot size} = \frac{AB}{2}$$



$$\text{Knot size} = \frac{(AB) (BC)}{2 (BD)}$$

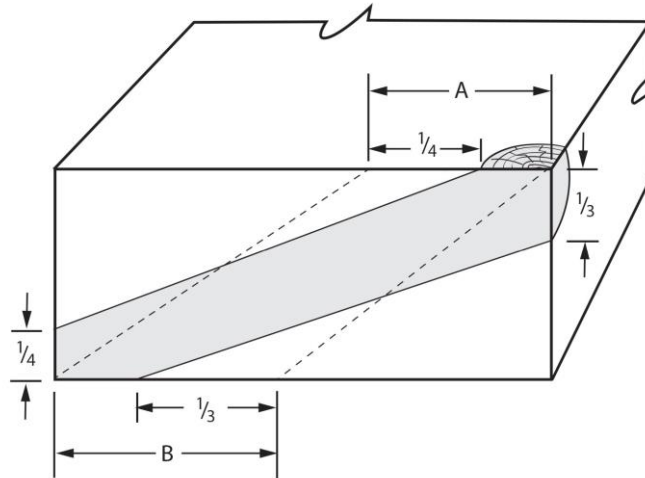
Figure 5

3 – Face Knots



$$\text{Knot Size} = \frac{A+B}{2}$$

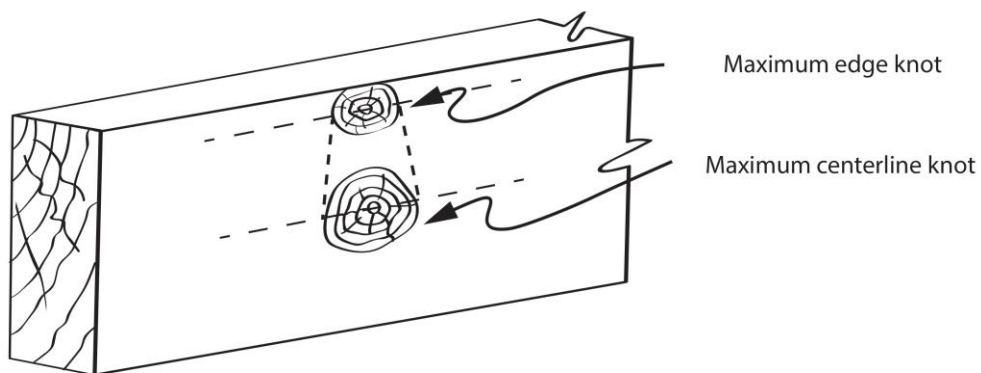
4 - face knots



$$\text{Knot Size} = \frac{A+B}{2}$$

**Knot Location:** The allowable size for knots on wide faces, when appearing away from the edge, shall be proportionately increased from the size specified for knots located at the edge of the wide face to the size specified for knots located along the center line. The increase shall start at a distance from the edge equal to 1/2 the diameter of the allowable edge knot (Fig. 6).

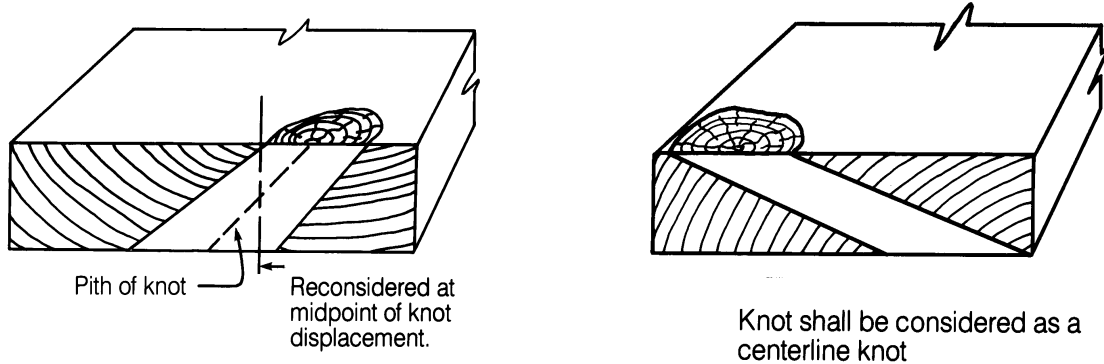
Figure 6



The size of knots on wide faces are permitted to be increased proportionately from the size permitted at the edge to the size permitted at the centerline.

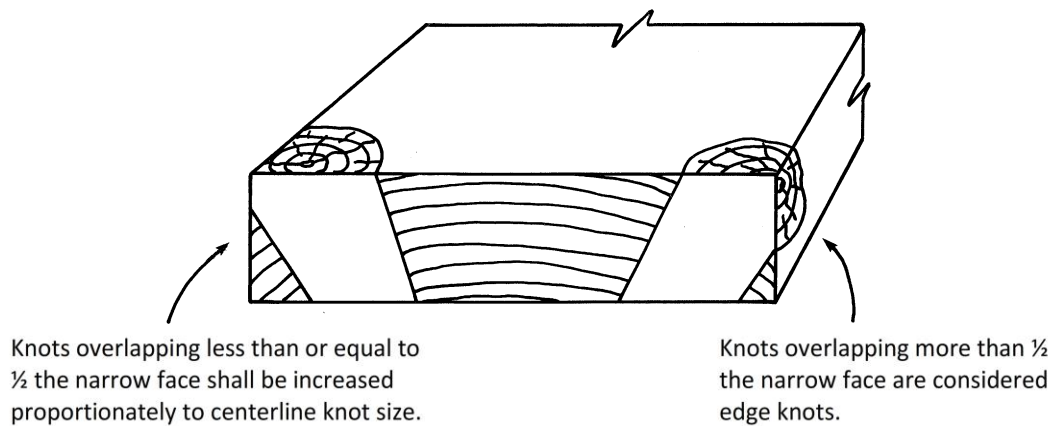
Knots appearing on wide faces shall be considered as located at the midpoint of its displacement (Fig. 7).

Figure 7



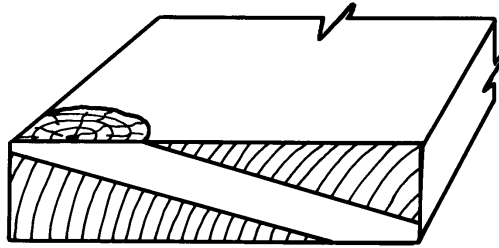
A wide face knot overlapping part of the edge shall be considered an edge knot if it occupies more than 1/2 the thickness (Fig. 8).

Figure 8



The allowable size for diagonal knots that only involve the wide face shall be proportionately increased to the size specified for knots located along the center line. (Figure 7 above). Diagonal knots involving both narrow faces are equated to an edge knot (Fig. 9).

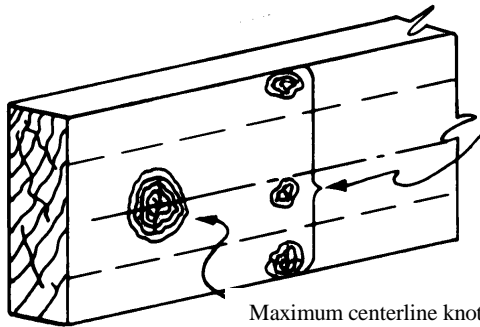
Figure 9



Knot located at edge of wide face

**Knot Spacing:** When two or more knots appear in the same cross section the sum of their sizes or displacement shall not exceed the maximum size specified for the center line knot (Fig. 10). When reference is made to knots in the same cross section, the cross section is the area across the width of a piece equal to the diameter of the largest knot present (Fig. 11). If loose knots, fixed knots or holes on the edge are involved, the sum of their sizes or displacement is limited to the maximum edge knot size. When directly opposite spike knots in boxed heart pieces are involved, the sum of their sizes or displacement shall not exceed the allowable centerline knot.

Figure 10

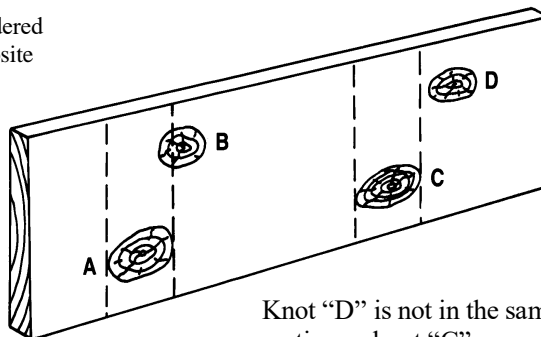


Permitted if sum does not exceed diameter of centerline knot and edge knots are tight

Maximum centerline knot

Figure 11

Knot "B" is considered to be directly opposite

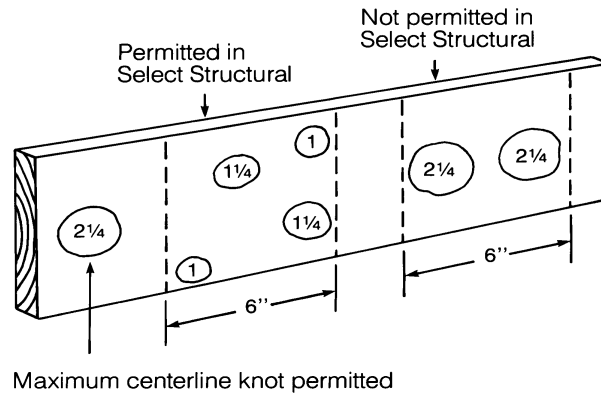


Knot "D" is not in the same cross section as knot "C"

The sum of the sizes of all knots within any 6" of length shall not exceed twice the diameter of the allowable centerline knot (Fig. 12). No two centerline knots of maximum size shall appear in the same 6" of length.

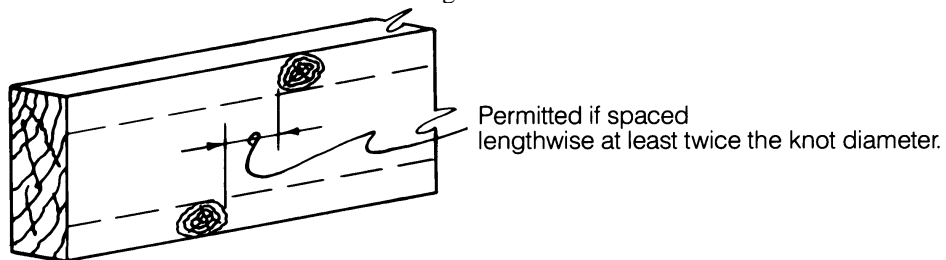
Figure 12

Example for a Select Structural 2x8



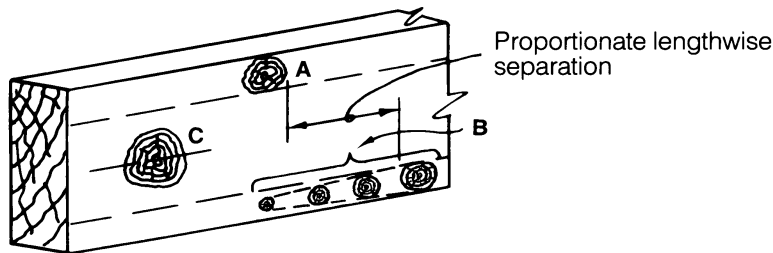
Two maximum edge knots appearing on opposite edges shall be spaced at least a lengthwise distance equal to twice the size of the allowable edge knot (Fig. 13).

Figure 13



When the sum of knots at opposite edges on a wide face exceeds the allowable size of the centerline knot but either or both are less than the size allowed at edge of wide face, the lengthwise spacing shall be proportionate (Fig. 14).

Figure 14



When 'A' plus 'B' exceeds the diameter of 'C' but either or both are less than the maximum allowed, the lengthwise separation is proportionate.

**Assessment of Grain Deviations Around Knots:** Abnormal distortion is defined as grain deviation associated with a knot which is greater than that associated with a typical knot of the same size. When abnormal grain distortion is evident, the measurement of the knot size shall include the extent of distortion. The most critical influence of any grain deflection occurs on the narrow face or through the thickness of the piece. Abnormal grain distortion is characterized by a steep gradient running in the direction of the knot which produces extensive chipped or torn grain on the face in a semi-circular pattern around the knot.

**PLANER TEARS:**

Planer or chipper tears are permitted in No. 2/Standard and higher grades provided they are not more than the width of the piece in length and not more than 1/4" in depth. In No. 3, Utility, and Stud grades, tears shall not exceed the allowable hole size in depth, nor the permissible split in length.

**ROLLER CHECKS:**

If through at the end, treat equivalent to a split. When away from ends, treat as shake.

**SAW CUTS (SAW KERFS):**

This characteristic occurs in two ways: (1) the cut passes completely through the thickness and extends across a portion of the width (Fig. 21) and (2) the cut does not pass completely through the thickness and extends completely or partially across the width (Fig. 22).

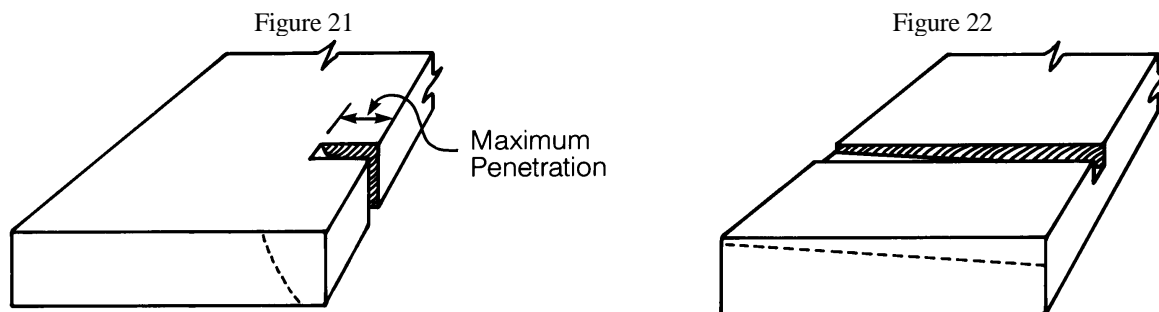


Figure 21 restricts the maximum penetration across the width to 1/2 the allowable edge knot size. Note: Generally no saw kerfs would be allowed in Select Structural and No. 1 grades.

The cut described in Item 2 above, as depicted by Figure 22 restricts the penetration to 1/2 the equivalent edge knot displacement. Note: Generally no saw kerfs would be allowed in Select Structural and No. 1 grades.

**SHAKE:**

A shake is "well separated" or "scattered" (i.e. not continuous) if there is evidence of wood separating the shakes. A surface shake is not permitted to extend into an adjacent or opposite face.

In No. 2 and Standard, shake through from one wide face to the other is not permitted to extend into the edge. A shake showing on only one wide face extending into the edge shall be limited to a depth of 3/4 the thickness and a length of 2'.

Shake extending from one wide face through the edge to the other wide face is permitted in No. 3, Utility and Stud and is measured from the point at which the shake enters the piece as illustrated below (Fig. 15 and Fig. 16). The shake shall not extend across the wide face more than the width of the allowable hole, measured on the worst face penetration. The shake is limited in length to 1/6 the length of the piece in No. 3 and Utility, and 1/3 the length of the piece in Stud grade.

Figure 15

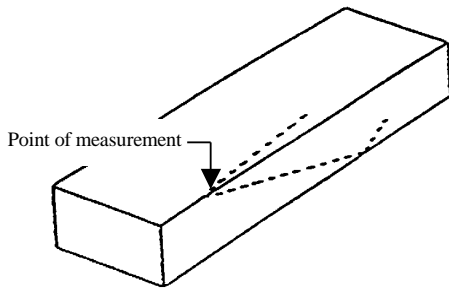
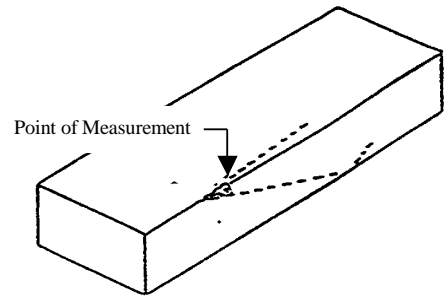
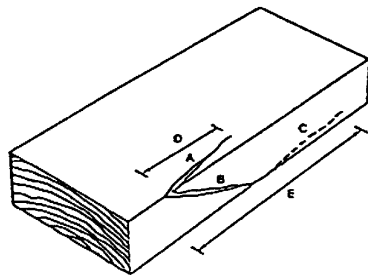


Figure 16



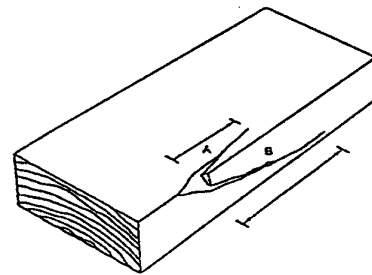
Method for Measuring Shake: Shake limitations are stated in the rule. Measure shakes parallel to wide face.

Figure 17



$$\frac{\text{Length D} + \text{Length E}}{2}$$

Figure 18



$$\frac{\text{Length A} + \text{Length B}}{2}$$



Figure 19

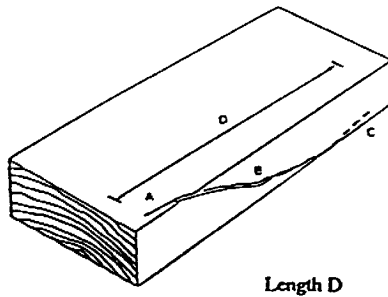
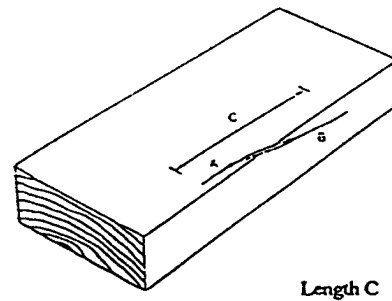


Figure 20



### **SKIPS:**

Hit and Miss skip is defined as a series of skips not over 1/16" deep with surfaced areas between. Where this degree of skip is permitted, it shall be further clarified to include that the "hits" shall average one hit per four lineal feet of length. A "hit" is a plainly visible surfaced area approximately 1/2 the width or more and 2" or more in length. No piece shall have less than two hits.

Hit or Miss provisions shall not be used to permit surfacing below specified minimum sizes.

When skips appear on opposing faces the combined scantness shall not exceed the depth permitted.

In Select Structural, No. 1 and Construction, one medium skip 2' in length is not to be included in the limitation of "10% hit and miss."

In No. 2, Standard, No. 3 and Utility, the maximum skip must never appear on both the wide face and narrow face in the same cross section (in No.2, Standard-does not apply to hit or miss skip).

Skips permitted on the surfaced face of resawn Stress Rated Boards is limited according to the rules under which it is graded, independent of the variation in thickness permitted in resawn boards.

### **SLOPE OF GRAIN:**

**Slope of Grain on Narrow Faces and Local Deviations:** In 1" stress-rated boards or similar small sizes of stress-rated lumber, a general slope of grain anywhere in the length shall not pass completely through the thickness of the piece in a longitudinal distance in inches less than the number expressing the specified permissible slope. Where such a slope varies across the width of the board, its average shall be taken, except when the slope of grain occurs in a way that effects the piece more than other permitted strength reducing grade characteristics. Slope of grain on narrow faces of 2" in nominal thickness and thicker shall be measured on the same basis as on wide faces.

Local deviations must be considered in small sizes, and if a local deviation occurs in a piece less than 4" nominal in width or on the narrow face of a piece less than 2" nominal in thickness, and is not associated with a permissible knot in the piece, the measurement of slope shall include the local deviation.

**SPLITS:**

Are measured by average penetration. One maximum allowable split is permitted on each end of the piece. When more than one split occurs, only the worst split is considered for length of split.

**UN SOUND WOOD:**

Note: "Heart Center Streaks" is a localized decay peculiar to Southern Pine and the limitation applies to that species.

Note: "Peck" is a type of decay peculiar to species of cedar and applies to those species.

Note: "Honeycomb" is found in most softwood species and is similar to "white speck" except the pitted areas are more elongated or channeled.

Note: "Firm" in relation to white speck and honeycomb provisions infers that it will not crumble readily under thumb pressure and cannot be easily picked out.

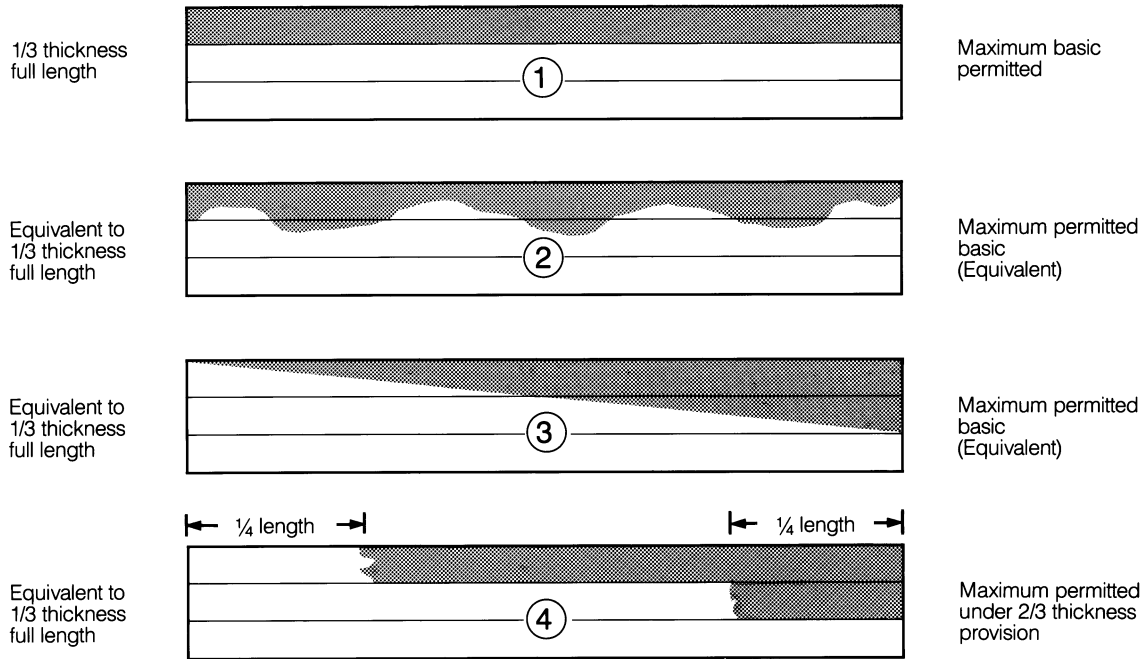
In No. 2 and Standard, white speck "1/3 face or equivalent" is a volume restriction. When white speck appears, it is limited to the following or equivalent area: a) a maximum of 1/3 the length for the full width of the face, or b) a maximum of 1/3 the width of the face for the full length.

In No. 2 and Standard, firm honeycomb or peck on the narrow face that occupies the entire thickness shall not penetrate more than 1/6 the width of the wide face and such peck must not destroy the nailing edge.

In No. 3, Utility and Stud, "spots or streaks" of soft decay occurring on one face shall not be limited in length; if through two faces, each streak is limited to 1/6 the length of the piece. Measurement shall be taken in the through portion of the streak.

**WANE:** In reference to paragraph 750, wane is permitted to extend partially or completely through the narrow face provided it does not displace more area than the allowable hole and does not exceed in length more than twice the allowable hole diameter. Wane is permitted to extend partially or completely across any face provided it does not exceed the depth of the specified skip nor exceed one foot in length. Such wane permitted in the grade description shall be measured at the point that wane exceeds the maximum thickness or width provision as stated in the grade. Wane extending partially or completely across any face shall be included in the assessment of equivalent wane. "Away from ends" means such wane shall not appear on the end section of the piece.

**WANE EXAMPLES - THICKNESS - NO. 2/STANDARD GRADE**



- ① Basic
- ② Equivalent to basic
- ③ Equivalent to basic
- ④ Equivalent to basic. Maximum amount of incremental wane permitted.

Basic wane is maximum full length wane as stated in the NGR. The same concept of equivalent wane in thickness and width applies to all grades within their respective stated limitations.

**WARP:**

Measurement of Crook, Twist and Bow When in Combination. When two or more forms of warp are present in the same piece, only proportionate amounts of each are permitted. Maximum warp is based on a gradual deviation from one end of the piece to the other. Bow is limited according to thickness, not width. Other forms of warp are limited according to width.