

NATIONAL GRADING RULES, FRAMING & DECKING

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NATIONAL GRADING RULE FOR SOFTWOOD DIMENSION LUMBER¹

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 pursuant to Section 11 of PS 20. The National Grading Rule applies to all species of softwood lumber¹ which are covered by grading rules developed and approved under PS 20.

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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. 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.

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

Crossarms	Foundation Lumber
Factory & Shop Lumber	Industrial Clears

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

Finish (Selects)	Ladder Stock
Laminating Stock	Ship Decking & Plank Stock
Railroad Stock	Stadium Plank
Rough Lumber	Worked Lumber
Scaffold Planks	

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.”

STRUCTURAL LIGHT FRAMING

2-4” Thick, 2-4” Wide

Grade Name (and Abbreviation)

Select Structural (Sel Str)

1

2

3

LIGHT FRAMING

2-4” Thick, 2-4” Wide

Grade Name (and Abbreviation)

Construction (Const)

Standard (Stand)

Utility (Util)

STUDS

2-4” Thick, 2” and Wider

Grade Name

Stud

STRUCTURAL JOISTS & PLANKS

2-4” Thick, 5” and Wider

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

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.

Machine Stress Rated Lumber (MSR)

A basic description for machine stress rated lumber is included for those certified rules writing agencies which possess the necessary technical information on their species to include detailed MSR provisions in their grading rules. This method for mechanical testing and marking of MSR lumber shall be included in certified agency rules if they provide for MSR lumber. Grade descriptions and grade marking privileges shall be provided by the certified rules writing agencies for MSR lumber when lumber is evaluated by mechanical means. See para. 16.0.

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10.0 LIGHT FRAMING

All Species

2" to 4" Thick

2" to 4" Wide

10.1 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:

Nom. Width	Anywhere on Wide Face	Unsound or Loose Knots & Holes (any cause)
2"	3/4"	5/8"
3"	1-1/4"	3/4"
4"	1-1/2"	1"
		} One hole or equivalent smaller holes per 3 lin. ft.

Manufacture — Standard “E.” See para. 722.0(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. 720.0 (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. 750.0.
 Warp — 1/2 of medium. See para. 752.0.

10.2 STANDARD

2” to 4” thick, 2” to 4” wide.

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Characteristics permitted and limiting provisions shall be:

Checks — Surface 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:

Nom. Width	Anywhere on Wide Face	Unsound or Loose Knots & Holes (any cause)
2”	1”	3/4”
3”	1-1/2”	1”
4”	2”	1-1/4”

One hole or equivalent smaller holes per 2 lin. ft.

Manufacture — Standard “F.” See para. 722.0(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. 720.0 (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 — 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. 750.0.

Warp — Light. See para. 752.0.

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

10.3 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:

Nom. Width	Anywhere on Wide Face	Holes (any cause)
2"	1-1/4"	1"
3"	2"	1-1/4"
4"	2-1/2"	1-1/2"
		} One hole or equivalent smaller holes per 1 lin. ft.

Manufacture — Standard "F." See para. 722.0(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. 720.0 (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. 710.0(e). 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. 750.0.

Warp — Medium. See para. 752.0.

White speck and honeycomb — Firm.

11.0 STUDS

All Species

2" to 4" Thick

2" and Wider

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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, but are well spaced and are permitted in the following sizes or their equivalent displacement:

Nom. Width	At Edge Wide Face	Centerline Wide Face	Holes (any cause)
2"	3/4"	3/4"	3/4"
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"

One hole or
equivalent
smaller holes
per 1 lin. ft.

Manufacture — Standard "F." See para. 722.0(f).

Pitch and pitch streaks — Not limited.

Pockets — Pitch or bark — Not limited.
Shake — If through at ends, limited as splits.
Elsewhere through shakes $\frac{1}{3}$ 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. 720.0(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. 710.0(e). In spots or streaks limited to $\frac{1}{3}$ the cross section at any point along the length.
Wane — $\frac{1}{3}$ the thickness and $\frac{1}{2}$ the width full length, or equivalent on each face, provided that wane not exceed $\frac{1}{2}$ the thickness and $\frac{3}{4}$ the width for up to $\frac{1}{4}$ the length. See para. 750.0.
Warp — $\frac{1}{2}$ medium. See para. 752.0.
White speck and honeycomb — Firm.

12.0 STRUCTURAL LIGHT FRAMING STRUCTURAL JOISTS AND PLANKS

**All Species
2" to 4" Thick
2" and Wider**

12.1 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 pitch knots, if tight and well spaced, are permitted in sizes not to exceed the following, or equivalent displacement:

Nom. Width	At Edge Wide Face	Centerline Wide Face	Unsound or Loose Knots & Holes (any cause)
2"	3/8"	3/8"	3/8"
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"

One hole or
equivalent
smaller holes
per 4 lin. ft.

Manufacture — Standard "E." See para. 722.0(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 in a maximum of 10% of the pieces. See para. 720.0(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. 750.0.

Warp — 1/2 medium. See para. 752.0.

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12.2 No. 1

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 pitch knots, if tight and well spaced, are permitted in sizes not to exceed the following, or equivalent displacement:

Nom. Width	At Edge Wide Face	Centerline Wide Face	Unsound or Loose Knots & Holes (any cause)
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"

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

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Manufacture — Standard "E." See para. 722.0(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 in a maximum of 10% of the pieces. See para. 720.0(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. 750.0.

Warp — 1/2 of medium. See para. 752.0.

12.3 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:

Nom. Width	At Edge Wide Face	Centerline Wide Face	Holes (any cause)
2"	5/8"	5/8"	5/8"
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"

One hole or
equivalent
smaller holes
per 2 lin. ft.

Manufacture — Standard "F." See para. 722.0(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. 720.0(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 — Not permitted in thicknesses over 2". 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. 750.0.

Warp — Light. See para. 752.0.

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

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12.4 NO. 3

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

Characteristics permitted and limiting provisions shall be:

Checks — Seasoning checks not limited. Through checks are limited as splits.

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

Nom. Width	At Edge Wide Face	Centerline Wide Face	Holes (any cause)
2"	3/4"	3/4"	3/4"
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"

One hole or
equivalent
smaller holes
per 1 lin. ft.

Manufacture — Standard "F." See para. 722.0(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. 720.0(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. 710.0(e). 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. 750.0.
Warp — Medium. See para. 752.0.
White speck and honeycomb — Firm.

12.5 APPEARANCE

All species, 2" to 4" thick, 2" and wider.

The grade specifications in the National Grading Rule for Dimension Lumber are based primarily on structural performance. Lumber graded as Appearance conforms to the applicable NGR grade and additional limitations in appearance characteristics.

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

Manufacture — Standard "E." See para. 722.0(e).

Skip — Hit and miss skips in a maximum of 10% of pieces. See para. 720.0(f).

Wane — 1/4 the thickness and 1/6 the width by 1/4 the length. Omit para. 750.0.

Warp — 1/2 of medium. See para. 752.0.



13.0 SPECIAL PRODUCT RULES FOR NO. 1 PRIME AND NO. 2 PRIME DIMENSION (Adopted from SPIB)

FOREWORD

Manufacturers, specifiers, and users of Northeastern Lumber traditionally used the NELMA Standard Grading rules for the sale and purchase of Northeastern Lumber for general use. As new and special end-use products have been developed, these have been incorporated as supplements to the NELMA Rules or issued as a special standard for the product. These standards for nominal 2" to 4" thickness and 2" to 12" width are intended for use where appearance and strength are a consideration.

13.1 General rules

1. In the absence of special contract, exception or specification, Northeastern lumber sold or bought under this Special Product Rule shall be subject to provisions included herein and to applicable provisions of NELMA Standard Grading Rules. Northeastern lumber conforming to this standard is eligible for grade-marking.
2. The grading of Special Dimension involves limitation of wane and other characteristics that affect appearance. Knots and other characteristics are limited to meet the published design values. Knots are measured and limited by size or equivalent displacement. Compression wood is prohibited in all grades if present in readily identifiable and damaging form based on an ordinary visual inspection.
3. The rounding or easing of edges in S4S working is a requirement under this Standard unless particularly prohibited. The rounding for the 2" to 4" thickness covered by this Standard may be rounded to a radius of no more than 1/8" for 2", 3/16" for 3", and 1/4" for 4" thickness. Other rounding or nosed edge, when desired, must be specified.
4. Nominal and standard sizes of S4S are:

THICKNESS (Inches)			WIDTH (Inches)		
Nominal	Standard ALSC Min. Dressed		Nominal	Standard ALSC Min. Dressed	
	DRY	GREEN		DRY	GREEN
2	1-1/2	[1-9/16]	2	1-1/2	[1-9/16]
2-1/2	2	2-1/16	3	2-1/2	2-9/16
3	2-1/2	2-9/16	4	3-1/2	3-9/16
3-1/2	3	3-1/16	5	4-1/2	4-5/8
4	3-1/2	3-9/16	6	5-1/2	5-5/8
			8	7-1/4	7-1/2
			10	9-1/4	9-1/2
			12	11-1/4	11-1/2

5. [Moisture content of No. 1 Prime and No. 2 Prime of 2", 3" and 4" nominal thickness if over 19% shall be marked S-GRN. Moisture content of 19% or less shall be marked S-DRY or KD. Moisture content of 15% or less may be marked MC-15 or KD 15.]

6. Lengths — In specifications for assorted lengths, random lengths, standard stock lengths, and for lengths unspecified or indefinite as to range or assortment, standard practice shall be to furnish a fair assortment of standard stock lengths of 10' to 16', 18' or 20' except percentages or total board-foot quantities in lengths under 10' shall be permitted as follows:

GRADE	4' and/or 5'	6' and/or 7'	8' and/or 9'
No. 1 Prime	0%	5%	7% ⁽¹⁾
No. 2 Prime	0%	6%	8% ⁽¹⁾

⁽¹⁾Any unfilled portion of 6' and/or 7' may be filled in 8' and/or 9'.

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13.2 NO. 1 PRIME

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:

Nom. Width	At Edge Wide Face	Centerline Wide Face	Unsound Knots
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"

Manufacture — Standard “E.”
 Pitch and pitch streaks — Not limited.
 Pockets — Pitch or bark — Not limited.
 Shake — If through at edges or ends, limited as splits; surface shakes up to 2’ long.
 Skips — Light on 10% of wide face, hit and miss on edge.
 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” deep or 1/4” wide except occasional piece may have wane on one edge up to 3/8” deep by 3/8” wide for 12”.
 Warp — 1/2 of medium.

13.3 NO. 2 PRIME

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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 sizes not to exceed the following or equivalent displacement:

Nominal Width	At Edge Wide Face	Centerline Wide Face	Holes (Any Cause)
2”	5/8”	5/8”	1/4”
3”	7/8”	7/8”	1/4”
4”	1-1/4”	2”	1/4”
5”	1-5/8”	2-3/8”	1/4”
6”	1-7/8”	2-7/8”	1/4”
8”	2-1/2”	3-1/2”	1/4”
10”	3-1/4”	4-1/4”	1/4”
12”	3-3/4”	4-3/4”	1/4”

One hole or
 equivalent
 smaller holes
 per 2 lin. ft.

Manufacture — Standard “E.”
 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 dressing.

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 — Not permitted in thicknesses over 2". (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 — 1/4" deep or 1/4" wide except occasional piece may have wane on one edge up to 3/8" deep by 3/8" wide for 12".

Warp — Light.



13.4 DESIGN VALUES

No. 1 Prime and No. 2 Prime shall be graded as noted earlier in this publication. The design values are as provided for No. 1 and No. 2 Dimension grades as found in the current NELMA Standard Grading Rules.

14.0 ECONOMY (NOT NGR)

All Species
2" to 4" Thick
2" and Wider

Dimension lumber of this grade is not intended for use where strength and appearance are factors. Economy is suitable for bracing, crating, cribbing, blocking and other similar uses.

Economy is generally shipped Mixed Species. Single species orders must specifically exclude other species.

Characteristics permitted and limiting provisions shall be:

Knots — Knots of any quality and holes are permitted if their displacement does not exceed $\frac{3}{4}$ of the cross section.

Skips — Heavy skips are permitted, and in addition 20% of the pieces may be $\frac{1}{4}$ " scant full length.

Splits — $\frac{1}{3}$ the length.

Unsound wood — Not to exceed $\frac{3}{4}$ of the cross section at any point.

Wane — $\frac{2}{3}$ the thickness, $\frac{2}{3}$ the width. Wane full width or thickness is permitted in an occasional piece; scantness must not exceed $\frac{1}{4}$ ".

All characteristics which do not interfere with full length use are permitted. Pieces 9' and shorter must be usable full length. Pieces 10' and longer may contain an undesirable characteristic requiring removal by cutting the piece into shorter sections. When the undesirable characteristic is eliminated, the waste cannot exceed $\frac{1}{4}$ the length and not be located within 2' of either end.

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15.0 DECKING (55.00 WWPA)

2" to 4" Thick

4" and Wider

SPF(s)

EASTERN HEMLOCK / TAMARACK

NORTHERN WHITE CEDAR

EASTERN WHITE PINE

There are two grades of Decking: SELECTED DECKING and COMMERCIAL DECKING. Design values for these grades are shown in the table following the grade descriptions. Both grades are selected so that the face or better side will present the qualities desired for exposed view, such as in a paneled ceiling. The side with the pattern shall be considered the face. Decking is widely used for roofing and flooring and is valued for insulating and fire resistive qualities. In the thicker sizes,

the wider spacing allowed between supporting members is especially suited for economical construction. The moisture content of Decking is limited to a maximum of 19%.

Square end trim pieces are trimmed square across the face with 1/64" tolerance permitted on a 6" face. Back-beveling the ends from the face to reverse side is permitted to ensure a close fit.

Decking is usually surfaced to a single T & G in 2" thickness and may be ordered with V or rounded edges, striated, grooved or in other patterns. Standard lengths are 6' and longer in multiples of 1'.

15.1 SELECTED DECKING (55.11 WWPA)

Decking of this grade is widely used where the selected face will be used to show wood at its natural best, such as in a paneled ceiling.

Characteristics and limiting provisions on the face are:

Checks — Medium seasoning checks, scattered.

Holes — Pin to small in size, equivalent to chipped knots.

Knots — Sound and tight, on exposed face except as noted below.

Knots — Well spaced, are limited to the following sizes on both wide faces:

Nominal Width	Face Width	Knot Size
4"	3"	1-1/2"
5"	4"	1-7/8"
6"	5"	2-3/8"
8"	6-3/4"	3-1/4"
10"	8-3/4"	4"
12"	10-3/4"	5"

In occasional pieces, unsound and fixed knots not exceeding 1-1/2" in diameter are permitted if not through the piece and not exceeding two knots or equivalent smaller in 12' in length.

Narrow face and spike knots are allowed when their effect is judged to be no greater than other knots allowed.





- Knots may contain chipped out areas no larger than approximately 3/4" in diameter, if not through the piece and not exceeding two knots or equivalent smaller in 12' in length.
- Pitch — Light pitch or equivalent very small streak.
- Pockets — Medium bark pockets. Very small dry pitch pockets.
- Slope of grain — 1 in 10.
- Splits — Occasional short splits.
- Stain — Light sap stain, medium heart stain.
- Tongue — 1/16" narrow in occasional pieces.
- Torn or raised grain — Light torn or raised grain or a spot of medium.
- Warp — Light as shown in para. 752.0.

- Characteristics and limiting provisions on the back and unexposed edges are:
- Peck — Natural peck in Cedar admitted on the back and exposed edges if narrow, well scattered and not occupying more of the cross section than allowable knots.
 - Skip — Hit and miss skips.
 - Wane — 1/3 the width.
 - Other characteristics not interfering with the intended use of the grade.

15.2 COMMERCIAL DECKING (55.12 WWPA)

Lumber of this grade is recommended and customarily used for the same purposes served by higher grade when appearance is not of primary importance.

- Characteristics and limiting provisions on the face are:
- Checks — Seasoning checks.
 - Holes — Small knot holes.
 - Knots — Well spaced, are limited to the following sizes on both wide faces:

Nominal Width	Face Width	Knot Size
4"	3"	1-3/4"
5"	4"	2-3/8"
6"	5"	2-7/8"
8"	6-3/4"	3-7/8"
10"	8-3/4"	4-7/8"
12"	10-3/4"	6"

Narrow face and spike knots are allowed when their effect is judged to be no greater than other knots allowed.

Chipped knots and broken out knots, not larger than approximately 1-1/2" in diameter, are permitted if not through the piece.

Pitch streaks.

Pockets — Pitch or bark.

Shake — Not serious.

Skip — Hit and miss skips.

Slope of grain — 1 in 8.

Splits — Approximately 1/6 the length.

Stain — Stained wood.

Tongue — 1/16" narrow.

Torn grain.

Unsound wood — Unsound wood and peck in small spots or streaks up to 1" wide may be accepted on any face. In Cedar species only, spots or streaks may be accepted up to 1/3 the width.

Wane — Approximately 1/6 the face width.

Warp — 1/4" less than medium as shown in para. 752.0.

White speck — Firm white specks, narrow streak.

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Characteristics and limiting provisions on the back and unexposed edges are:

Wane — Approximately 1/3 of face.

Other characteristics not interfering with the intended use are permitted on unexposed back and edges except as noted.

Any piece with an unusual combination of characteristics which seriously affects normal serviceability is excluded from the grade.

DECKING

2" to 4" thick, 4" to 12" wide.

Design values in pounds per square inch.

For flatwise only — Maximum moisture content 19%.

Species	Grade	Extreme Fiber In Bending "Fb" Repetitive Member Uses	Modulus of Elasticity "E"
SPFs	Selected	1350	1,400,000
	Commercial	1100	1,200,000
Eastern Hemlock/ Tamarack	Selected	1700	1,300,000
	Commercial	1450	1,100,000
Northern White Cedar	Selected	1100	800,000
	Commercial	950	700,000
Eastern White Pine	Selected	1300	1,200,000
	Commercial	1100	1,100,000

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See para. 31.0 to 37.0 for information.

15.3 RADIUS EDGE DECKING GRADE — RED PINE (Abbreviation R.E. Decking)

Red Pine decking grade is available as a dry product only (max. 19%). The rounded (eased) edge is on 1/4" radius.

Thickness - Nominal 1-1/4" dressed to 1".

Widths - 4", 5" and 6".

Dressed - 3-1/2", 4-1/2" and 5-1/2".

Lengths - 6' to 16'.

Characteristics and limiting provisions:

Knots — wide face — sound, firm, encased and pith knots, if tight and well-spaced, are permitted in the following sizes or their equivalent displacement:

Nominal Width	Sound & Tight
4"	1-1/2"
5"	1-3/4"
6"	2-1/2"

Unsound knots, loose knots and holes are limited to 3/4", one of maximum size or two equivalent smaller per 12' of length.

Knots measured across the width between lines enclosing the knot parallel to the edge and averaged on both faces. The sum of all knots in the same cross section shall not exceed the size or displacement of the knot specified.

Checks — Medium checks permitted on face and back. If through, permitted on ends only equivalent to splits.

Splits — Short, one on each end.

Slope of grain — 1 in 8.

Decay — None.

Compression wood — Not permitted if present in readily identifiable and damaging form.

Pitch — Medium. One medium streak of heavy pitch permitted for each 12' of length.

Pockets, pitch or bark — Medium, well scattered.

Shake — Light shake permitted on face and back. If through, permitted on ends only equivalent to splits.

Skip — Light on face for 1' for each 12' of length. Light on edges, medium on back limited to 1/4 the length.

Stain — Medium over entire face.

Wane — 1/3 the thickness, 1/3 the width for 1/4 the length on reverse face.

Warp — Medium — see para. 752.0.

Reverse face — Sound.

Red Pine Decking design values in pounds per square inch for flatwise use only — maximum moisture 19%.

Fb	1,450 psi
Ft	750 psi
Fv	70 psi
Fc//	1000 psi
F \perp	410 psi
E	1,400,000 psi

To adjust these values to wet conditions of use, the following adjustment factors apply.

Fb	multiply by 0.80
Ft	multiply by 0.80
Fv	multiply by 0.93
Fc//	multiply by 0.67
F \perp	multiply by 0.67
E	multiply by 0.88

These values are already adjusted for flatwise use and are not intended for edgewise use.

15.4 SPF(s) RADIUS EDGE AND SQUARE EDGE DECKING (Abbreviation RE Decking, SqE Decking)

SPF(s) Decking Grade is available as a dry product only (maximum 19%). The rounded (eased) edge is on 1/4" radius.

- Thickness - Nominal 1-1/4" dressed to 1".
- Widths - 4", 5" and 6".
- Dressed - 3-1/2", 4-1/2" and 5-1/2".
- Lengths - 6' to 16'.

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Characteristics and limiting provisions:

Knots — wide face — sound, firm, encased and pith knots, if tight and well-spaced, are permitted in the following sizes or their equivalent displacement:

Nominal Width	Sound & Tight
4"	1-1/2"
5"	1-3/4"
6"	2-1/2"

Unsound knots, loose knots and holes are limited to 3/4", one of maximum size or two equivalent smaller per 12' of length.

Knots are measured across the width between lines enclosing the knot parallel to the edge and averaged on both faces. The sum of all knots in the same cross section shall not exceed the size or displacement of the knot specified.

Checks — Medium checks permitted on face and back. If through, permitted on ends only equivalent to splits.

Splits — Short, one on each end.

Slope of grain — 1 in 8.

Decay — None.

Compression wood — Not permitted if present in readily identifiable and damaging form.

Pitch — Medium. One medium streak of heavy pitch permitted for each 12' of length.

Pockets, pitch or bark — Medium, well scattered.

Shake — Light shake permitted on face and back.
If through, permitted on ends only equivalent to splits.

Skip — Light on face for 1' for each 12' of length.
Light on edges, medium on back limited to 1/4 the length.

Stain — Medium over entire face.

Wane — 1/3 the thickness, 1/3 the width for 1/4 the length on reverse face.

Warp — Medium — see para. 752.0.

Reverse face — Sound.

SPFs Decking Radius Edge or Square Edge

Design values in pounds per square inch for flatwise use only — maximum moisture 19%.

Fb	1,250 psi
Ft	650 psi
Fv	70 psi
Fc//	800 psi
F \perp	335 psi
E	1,200,000 psi

To adjust these values to wet conditions of use, the following adjustment factors apply.

Fb	multiply by 0.80
Ft	multiply by 0.80
Fv	multiply by 0.93
Fc//	multiply by 0.67
F \perp	multiply by 0.67
E	multiply by 0.88

These values are already adjusted for flatwise use and are not intended for edgewise use.

16.0 MACHINE STRESS-RATED LUMBER

(WWPA 52.00)

All Species
2" and Less in Thickness
2" and Wider

Machine Stress-Rated (MSR) lumber is lumber that has been evaluated by mechanical stress-rating equipment. MSR lumber is distinguished from visually stress graded lumber in that each piece is nondestructively tested and marked to indicate the modulus of elasticity (E). The stress-rating machine sorts the material into various modulus of elasticity classes. MSR lumber is also required to meet certain visual requirements as set forth herein.

STANDARD SIZES FOR MACHINE STRESS-RATED LUMBER 2" thick, 2" and wider

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Thicknesses				
Nominal	Surfaced Dry		Surfaced Unseasoned	
	Inch	mm ⁽¹⁾	Inch	mm ⁽¹⁾
2"	1-1/2"	38	1-9/16"	40
Widths				
2"	1-1/2"	38	1-9/16"	40
3"	2-1/2"	64	2-9/16"	65
4"	3-1/2"	89	3-9/16"	90
5"	4-1/2"	114	4-5/8"	117
6"	5-1/2"	140	5-5/8"	143
8" and wider	3/4" off nominal	19 off nominal	1/2" off nominal	13 off nominal

⁽¹⁾See para. 723.0.

Standard lengths are 6' and longer in multiples of 1'.

A grade stamp on Machine Stress-Rated lumber indicates that the stress-rating system used meets requirements of the grading agency's certification and quality control procedures. The grade stamp will show the agency trademark, the mill name or number, will

include the phrase “Machine Rated” or “MSR,” the species identification, the (E) rating for the grade and the fiber stress in bending value (Fb). The stamp will also include the design value for tensile stress parallel to grain (Ft), and the specific gravity (SG) value when any of these properties are specifically qualified. When mechanically stress-rated lumber is visually graded for optional wane limitations as described in these rules, the grade stamp will include the mark “1W”. [See Section 1 for sample grade marks for MSR Lumber.]

The (E) rating is the rated modulus of elasticity for the grade in millions of pounds per square inch when measured on edge. Stress-rating machines are adjusted so that the output will average the (E) level shown on the grade stamp. (Fb) indicates the fiber stress in bending applicable to lumber loaded on edge. Fiber stress in bending design values are based on the correlation of the modulus of rupture to (E). Machine output is controlled by testing pieces and adjusting machines so that the minimum assigned fiber stress in bending value, derived from a 5% exclusion level of modulus of rupture, is met after applying the same reduction factors as are applied to visually graded lumber in accordance with ASTM D 245. Design values appearing in the table for compression parallel to grain (Fc//) and (Ft) are based on tests of Machine Stress-Rated Lumber. (Fc⊥) and (Fv) values are the same as assigned by ASTM methods to visually graded No. 2 lumber of the appropriate species, except as noted below.

To meet the structural needs for a broad range of engineered construction, the (E), (Fb) grade combinations which can be qualified are not restricted to those combinations shown in the table. For any given (Fb) value, the (E) and (Ft) value may vary depending on species, timber source and other variables. The values shown in the design value table are those usually associated with each (Fb) level. Grade stamps may show higher or lower values if qualification procedures and subsequent quality control verification indicates the assignment is appropriate. If the (Ft) value is different for the MSR grade than that shown in the table for the same (Fb) level, then the assigned (Ft) value shall be included on the stamp. The remaining three assigned design values (Fc//, Fc⊥, Fv) for a grade shall be those listed in



the table for the equivalent (F_b) level. Higher values for ($F_{c\perp}$) and (F_v) may be assigned as described below.

When the specific gravity for the grade (based on oven dry weight and volume) exceeds the value for the species average shown in the table below and is controlled as part of the daily quality control program, the design values for ($F_{c\perp}$) and (F_v) may be calculated using the equations given at the end of this rule. When qualified, the specific gravity (SG) value must be included on the grade stamp. For the Spruce-Pine-Fir (South) species group, daily quality control for specific gravity is required for the 2.0E grade if the 2.0E grade is run in combination with a higher E grade(s).

**Machine Stress-Related Lumber
2" and Less in Thickness
2" and Wider**

**Design values in pounds per square inch (2)
Normal Duration of Load**

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Extreme Fiber Stress in Bending "F_b" (1) Single	Modulus of Elasticity "E"	Tension Parallel To Grain "F_t"	Compression Parallel To Grain "$F_{c//}$"
2850	2,300,000	2300	2150
2700	2,200,000	2150	2100
2550	2,100,000	2050	2025
2400	2,000,000	1925	1975
2250	1,900,000	1750	1925
2100	1,800,000	1575	1875
1950	1,700,000	1375	1800
1800	1,600,000	1175	1750
1650	1,500,000	1020	1700
1500	1,400,000	900	1650
1450	1,300,000	800	1625
1350	1,300,000	750	1600
1200	1,200,000	600	1400
900	1,000,000	350	1050

Horizontal Shear (F_v) for all stress levels (3)

Spruce-Pine-Fir (South) = 135

Compression Perpendicular to Grain ($F_{c\perp}$) (3)

Spruce-Pine-Fir (South) = 335

Specific Gravity*

Spruce-Pine-Fir (South)	2.0E and higher = 0.50
	1.8E to 1.9E = 0.46
	1.2E to 1.7E = 0.42

*Oven dry weight and volume.

(1)“Fb” design values are applicable to lumber loaded on edge. When loaded flatwise, the values may be increased by multiplying by the following factors:

Nominal Width (in.)	3” & less	4”	5”	6”	8”	10” & wider
Factor	1.00	1.10	1.10	1.15	1.15	1.20

(2)Design Values for grades intermediate between grades shown in the table may be interpolated. Values interpolated shall be rounded to the nearest increment as indicated below:

Modulus of Elasticity (E)	100,000 psi
Fiber Stress in Bending (Fb)	50 psi at 1000 psi and above 25 psi below 1000 psi
Tensile Stress Parallel to Grain (Ft)	25 psi
Compression Parallel to Grain (Ft//)	25 psi

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(3)Compression perpendicular to grain ($F_{c\perp}$) and horizontal shear (F_v) values are the same as assigned by ASTM methods to visually graded No. 2 lumber of the appropriate species unless qualified by specific gravity tests. [See Section 31.0 through 37.0 for additional information about the use of these values.]

(4)With the equations given at the end of this rule, the assigned Specific Gravity may be used to calculate higher F_v and $F_{c\perp}$ values than those listed in the tables for Horizontal Shear and Compression Perpendicular to Grain values.

When a grade is qualified by test and quality controlled for specific gravity, the horizontal shear design value may be calculated from the following formula:

$$F_v = 40 + (266 \times SG)$$

Note: Assigned values shall be rounded to the nearest 5 psi.

When a grade is qualified by test and quality controlled for specific gravity, the compression perpendicular to grain design value may be calculated from the following formula:

$$F_{c\perp} = (2252.4 \times SG) - 480$$

Note: Assigned values shall be rounded to the nearest 5 psi.

Compression perpendicular to grain values determined from the equation above are based on a 0.04 inch deformation limit and are for standard design of most structures.

Values at 0.02 inch deformation can be obtained with the following equations:

$$F_{c\perp} (0.02) = 14.6 + (0.71 \times F_{c\perp} 0.04)$$

$$F_{c\perp} (0.02) = (1605.5 \times SG) - 327.5$$

VISUAL GRADING REQUIREMENTS (MSR)

Mechanically stress-rated lumber must be well manufactured and visually graded to limit certain characteristics even though the actual strength is not affected. All pieces shall be visually graded to assure that the characteristics affecting strength are no more serious than the following limiting characteristics.

Checks — Seasoning checks not limited. Through checks at ends limited as splits.

Manufacture — Standard “F.” See para 722.0 (f).

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. 720.0 (e), (f) and (g).

Slope of Grain — For stress machines not evaluating slope of grain during machine rating, slope of grain shall not exceed:

Slope	Fb Class
1 in 8	0 to 1450
1 in 10	1500 to 2050
1 in 12	2100 and over

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

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. 750.0.

Warp — Light. See para. 752.0.

In addition to the visual limitations listed, knots, knot holes, burls, distorted grain or decay partially or wholly at edges of wide faces, must not occupy more of the net cross section than:

Fb Class

1/2 for 0 to 900

1/3 for 950 to 1450

1/4 for 1500 to 2050

1/6 for 2100 and over

The ends of the lumber not tested by the stress-rating equipment shall be limited as follows:

Edge Knots — As limited above.

Knots other than Edge Knots — Equal to the largest knot in the tested portion of the piece, or the edge knot in the next lower Fb class, whichever is greater.

Cross Section Knots — Sizes or displacement of all knots in the same cross section shall not exceed the size of the permitted largest knot, as described above.

Slope of Grain — General slope of grain shall not exceed:

Slope	Fb Class
1 in 8	0 to 1450
1 in 10	1500 to 2050
1 in 12	2100 and over

Other strength-reducing characteristics, such as knot holes, burls, distorted grain or decay, shall be considered the same as knots.

Optional 1W Wane Limitations

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. 750.00.

REINSPECTION

Any complaint on Machine Stress-Rated lumber involving visual grade, species, size, moisture, tally or assigned values shall be governed by applicable provisions of para. 5.0 of the Standard Grading Rules for Northeastern Lumber of the Northeastern Lumber Manufacturing Association in effect on the date of purchase of the product in dispute.

In the case of disputes over conformance to assigned values, a sample of 80 pieces of the item complained of shall be selected by a NELMA Lumber Inspector. The sample pieces shall be tested on edge by NELMA, or by an agency chosen by NELMA, to determine conformance with assigned (E) values. An item shall be considered to be in conformance if (1) the mean (average E) value of the sample equals or exceeds 0.97 times the assigned grade (E) value, and (2) no more than six pieces are less than 0.82 times the assigned grade (E) value.

When tests indicate an item is in nonconformance, all reinspection and testing costs shall be borne by the seller and the entire item shall be the property of the seller. When tests indicate an item is in conformance, all reinspection and testing costs shall be borne by the buyer and the entire item shall be accepted as invoiced. If more than one item is complained of, the reinspection and testing costs shall be prorated between buyer and seller, for that portion of the shipment upon which the complaint was registered, based on the ratio of the invoiced footage of the items found not in conformance to that found in conformance.

17.0 STRESS RATED BOARDS

**All Species
1", 1-1/4", 1-1/2" Thick
2" and Wider
6 ' to 16' in Length**

Stress rated boards are graded under the provisions of Structural Light Framing and Structural Joists and Planks (para. 12.0-12.3). The recommended design values shown in Tables 1 and 2 in Section 8 apply to stress rated boards. When stress rated boards are grade stamped, the grade name or number shown for the dimension grades will be shown on grade stamps along with "SRB" designating "Stress Rated Boards."

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