

LUMBER SPECIFYING INFORMATION: FRAMING (in Base Values) AND FINISH CARPENTRY MATERIALS

SPECIFYING FRAMING MATERIALS

All lumber should be grade-stamped by an agency certified by the Board of Review of the American Lumber Standard Committee, Inc. and manufactured in accordance with Voluntary Product Standard PS 20, as published by the Department of Commerce.

The following guidelines are intended to assist the designer and specifier in establishing the most economical and efficient use of solid lumber products and to eliminate potential misunderstandings between specifier and supplier.

A specification should allow for all species and grades suited to the job while recognizing all species, grades and conditions or seasoning are not available in all locations. Verify availability of species and grades with local suppliers, and specify standard grades as described in the official WWPA *Western Lumber Grading Rules*.

Moisture Content of Framing Lumber

The following designations are used in grade stamps to denote the moisture content (MC) of lumber at the time of surfacing:

KD or S-DRY - 19% maximum MC
MC 15 or KD 15 - 15% maximum MC
S-GRN - over 19% MC

Unseasoned (S-GRN) lumber is manufactured oversized so that when it reaches 19% MC it will be approximately the same size as the dry size. Therefore, when unseasoned lumber is shipped, the same design values that are assigned and used for dry lumber apply. Even though dry and unseasoned lumber carry the same design values they should not be mixed in a framing system, e.g. floor joists and wall studs, as they may acclimate at different rates before achieving equilibrium MC with the atmosphere.

Regional market conditions and preferences dictate the availability of dry or unseasoned material in thicknesses of 2" and less. Framing lumber, over 2" in thickness, is

typically shipped unseasoned, and when surfaced, carries the S-GRN indication in the grade stamp.

2" to 4" Thick by 2" to 4" Wide Framing Lumber

The most widely available grades are STANDARD & BETTER (STAND & BTR) and STUD, in all of the commercial softwood species.

These grades are appropriate for most light frame applications such as general wall framing.

STUD, STAND & BTR and the other grades (CONSTRUCTION and UTILITY) are available in any conventional length. Dimension lumber grades apply to both solid sawn and certified structural glued lumber.

UTILITY may be used for plates, blocking, etc. and some walls. Review building codes for acceptance, and structural analysis for appropriate species when structural blocking is used in conjunction with fasteners.

When small posts or beams (2x4, 4x4) require specific design values, refer to Table 1 in the WWPA *Product Use Manual* to determine appropriateness of CONSTRUCTION, STANDARD, UTILITY and STUD grades. Specify according to **base values**. Specified **base values** are then modified by adjustments for engineering analysis, using Tables A-H, WWPA *Product Use Manual*.

Some 2x2s through 4x4s may require higher design values than available in these grades. In this case, refer to SELECT STRUCTURAL, NO. 1 & BTR, NO. 1, NO. 2 and NO. 3 grades. An APPEARANCE classification (APP) for structural lumber also is available that provides a higher aesthetic level. Specify **base value** structural values. Adjust **base values** for engineering analysis or refer to the design values for Machine Stress-Rated Lumber in Table 3 of the *Product Use Manual* for grades 2" and less in thickness.

Specifying **Machine Stress-Rated Lumber** is very straightforward because it is generally marketed by strength and stiffness values, F_b and E .

When ordering, specify machine-rated, gradestamped lumber and list the strength value (F_b) and corresponding modulus of elasticity (E) values, nominal sizes and lengths required. Species should only be specified when horizontal shear (F_v), compression perpendicular-to-grain ($F_{c\perp}$) or specific gravity (SG) are controlling.

Some MSR lumber producers provide voluntary daily quality control for tension (F_t) and/or specific gravity (SG) in addition to the mandatory F_b and E testing. When this additional level of quality control is provided, the F_t and SG value will appear on the grade-stamp (in addition to F_b and E).

2" to 4" Thick by 5" and Wider Framing Lumber

Joists, rafters and small beams should be specified by minimum required F_b and E base values. Refer to the *Product Use Manual*, Table 1 with Adjustment Factors. Whenever possible, design analysis should be based on NO. 2 grade values of locally available species, as most material is marketed NO. 2 and better.

STUD grade 2x6 and wider studs are also available in most regions and should be considered for inclusion in a specification when engineering analysis permits.

NO. 1 & BTR may be available in some markets in Douglas Fir, Douglas Fir-Larch or Hem-Fir. Higher design values over NO. 1 can be used for longer spans or higher loads. Lightly loaded structures should take advantage of the economy of NO. 3 grade. Machine stress-rated and certified structural glued material of same stresses can be used as substitutions with the above.

5" x 5" and Larger, Beams & Stringers and Posts & Timbers

The grades are SELECT STRUCTURAL, NO. 1 and NO. 2. Grade and species should be determined by required design values. Refer to Tables 4 & 5 of

the *Product Use Manual*, along with appropriate adjustments for conditions of use. Where maximum dimensional stability is a requirement, specify Free of Heart Center (FOHC), realizing costs will be increased and availability limited.

Structural Decking

WWPA grades are SELECTED DECKING and COMMERCIAL DECKING. Decking is manufactured at either 19% or 15% maximum moisture content. It may be identified on the grade stamp as S-DRY, KD, KD-15 or MC 15 at the manufacturer's option. Check with local suppliers.

Some tongued-and-grooved decking is manufactured to pattern from either dry or unseasoned NO. 2 & BTR or NO. 3 2x6 or 2x8 framing lumber, and is generally used for concealed subfloors in deck and girder construction. Refer to Table 10 of the *Product Use Manual* for decking span tables of 2" and 3" T&G lumber.

Appearance of Framing Material

Where structural material is to receive a natural finish and appearance is a factor, the top grade in the respective size category may be specified. An Appearance classification (APP) for structural lumber also is available that provides a higher aesthetic level. The Appearance category provides the same level of structural performance as the applicable NGR grade, but with added restrictions on manufacture, wane, skip and warp. While such a specification may yield structural products of good appearance, it is important to recognize that structural grades of lumber are graded primarily for strength rather than appearance and even in the highest grades visual imperfections are not eliminated. The added expense and limited availability of the Appearance grades should be evaluated. If limited quantities are required it may be beneficial to specify "Selected for Appearance", rather than the top grade, dictating which visual characteristics are unacceptable.

Board Lumber Used for Rough Carpentry

Boards are 1" nominal thickness. Board grades used for rough carpentry are generally controlled by building

code requirements, and the grades are selected from the Common or Alternate Board Grades listed in Table 1.

As an example, major model building codes recognize NO. 3 COMMON or STANDARD grades as equal minimum grades for spaced roof sheathing even though there are differences in grading characteristics. Verify local building code requirements and dealer availability prior to specifying.

SPECIFYING FINISH CARPENTRY MATERIALS

A specification for a nonstructural appearance lumber grade (refer to Table 1) should include a reference to the section number, title and edition of the grading rules from which it is written. If you are specifying from Section 20.00, Special Western Red Cedar Rules, WWPA *Western Lumber Grading Rules*, so state.

Grain patterns, when desired, can also be specified for Select, Finish and Special Western Red Cedar Grades. Three categories are available: vertical grain (VG), flat grain (FG) or a shipment of both VG and FG, generally referred to as mixed grain

(MG). The most readily available and least costly is mixed grain. Unless otherwise specified, siding, paneling and finish boards are shipped with mixed grain. Stair treads, stepping, etc. should be vertical grain as it is more durable.

Interior and Exterior Trim and Finish Board Materials

Select from nonstructural appearance grades as indicated in Table 1 and described in the WWPA *Western Lumber Grading Rules*.

Refer to WWPA's *Western Wood Species Book, Vol. 2*, for color photographs of Select, Finish, Common and Alternate Board Grades in many Western Lumber species.

Moisture Content of Appearance Lumber

Moisture Content (MC) designations on the grade stamps indicate the condition of seasoning at the time of surfacing. However, many of the higher quality nonstructural appearance grades are not gradestamped so as to eliminate the necessity for removing the marking prior to use.

TABLE 1: NONSTRUCTURAL APPEARANCE LUMBER GRADES

	Product	Grades ¹	Equivalent Grades in Idaho White Pine	WWPA Grading Rules Section Number
Highest Quality Appearance Grades	SELECTS (<i>all species</i>)	B & BTR SELECT	SUPREME	10.11
		C SELECT	CHOICE	10.12
		D SELECT	QUALITY	10.13
	FINISH (<i>usually available only in Douglas Fir and Hem-Fir</i>)	SUPERIOR		10.51
		PRIME		10.52
		E		10.53
	SPECIAL WESTERN RED CEDAR GRADES	CLEAR HEART		20.11
		A GRADE		20.12
		B GRADE		20.13
	General Purpose Grades	COMMON BOARDS (WWPA Rules) (<i>primarily in pines, spruces, and cedars</i>)	1 COMMON	COLONIAL
2 COMMON			STERLING	30.12
3 COMMON			STANDARD	30.13
4 COMMON			UTILITY	30.14
5 COMMON			INDUSTRIAL	30.15
WCLIB ²				
ALTERNATE BOARDS (<i>primarily in Douglas Fir and Hem-Fir</i>)		SELECT MERCHANTABLE CONSTRUCTION		118-a
		STANDARD		118-b
		UTILITY		118-c
		ECONOMY		118-d
			118-e	
WCLIB ²				
SPECIAL WESTERN RED CEDAR GRADES	SELECT KNOTTY ³			
	QUALITY KNOTTY ³			

¹ Refer to WWPA's *Western Wood Species Book, Vol. 2, (#11)* for full-color photography.

² West Coast Lumber Inspection Bureau's *West Coast Lumber Standard Grading Rules*.

³ Select Knotty and Quality Knotty grade rules are not published in WWPA's *Western Lumber Grading Rules*.

Moisture is removed from lumber either by air drying or by use of drying kilns. Kiln-dried (KD) lumber is lumber that has been seasoned in a chamber to a predetermined moisture content by applying heat.

Moisture content standards for nonstructural appearance lumber grades are similar to those for framing lumber except for the WWPA Finish and Select grades, as well as the highest quality Special Western Red Cedar Grades. They are shipped seasoned as follows: *KD, KD 15, S-DRY or MC 15 with at least 85 percent of items not exceeding 12% in moisture content and no portion exceeding 15% moisture content.*

Thus, regardless of whether Finish and Select grades are marketed as MC 15 or as S-DRY, KD or KD 15 these grades are limited to a maximum of 15% MC as defined in the *Western Lumber Grading Rules*.

The Common grades in the general purpose category are typically KD or S-DRY, with a maximum of 19% moisture content. However, these grades may be specified to KD 15 or MC 15 by special arrangements with the manufacturer.

Alternate Board Grades are manufactured and shipped S-DRY and S-GRN so it is important to specify the desired moisture content when ordering these general purpose boards.

The Select Knotty and Quality Knotty Special Western Red Cedar Grades are also manufactured and shipped S-GRN or S-DRY.

SPECIFYING NATURAL WOOD SIDING

A siding specification should include specific grade names, along with paragraph numbers from ALS-approved grading rules. Recognized Western siding grades are outlined in Table 2.

After a general pattern type has been selected, the pattern number should be specified from the WWPA publication *Standard Patterns* (G-16).

When a saw-textured face is desired, the face to be textured and the type of texture (band sawn, rough sawn, circular sawn, etc.) should be specified.

A siding specification should also include WWPA's industry recommendations for acclimatization, back-priming, nailing and finishing. Refer to the WWPA publication *Natural*

Wood Siding (TG-8) for additional installation details.

Moisture Content of Siding Products

The premium siding grades are manufactured and shipped MC 15 or KD 15. The Alternate Board Grades (WCLIB Rules) and the Select Knotty and Quality Knotty Special Western Red Cedar Grades (WWPA and WCLIB Rules) are manufactured and shipped as KD, S-DRY or S-GRN.

The moisture content level should be included in the specification along with the guidelines for acclimating the specified product to the climate where the siding will be installed. Keep in mind that dry for the clear grades means 15% MC whereas dry for knotty grades means 19% MC.

Table 3 on the back page suggests the approximate moisture content level of the air in various regions of the country. When unseasoned (S-GRN) siding products are brought into dry climates, extra precautions should be written into the specification for the acclimatization process.

ACCLIMATIZATION

Wood is a natural material and will adjust itself to surrounding atmospheric conditions once it is in place. Consequently, preconditioning is an essential step in the installation process.

In a covered structure, lumber will stabilize at approximately 6 to 12% moisture content. Outside, lumber will stabilize at the levels shown in Table 3. Size will vary approximately 1% for each 4% change in moisture content.

A written specification should include acclimatization guidelines to ensure that material is correctly handled, before it is installed, so that it will perform satisfactorily over time.

Acclimating Interior Finish Materials and Paneling

Interior construction contains moisture-laden materials such as plaster or textured drywall which should be dry before finish lumber is delivered or installed. Masonry or concrete walls should be waterproofed prior to finish lumber installation.

Any grade may pick up moisture in transit or during storage and will need some acclimatization. It is a good practice to stack all paneling

and/or finish materials in the room where the wood will be installed, with separators between the layers, for a week or ten days prior to installation (see diagram). HVAC systems should be operating to more closely approximate in-use relative humidity.

In-use interior moisture levels in living areas vary (4% to 13%) between regions and seasonal change. Lumber will acclimate to the interior moisture content shown in Table 3. Like exterior use lumber, the size of the product will vary approximately 1% for each 4% change in moisture content.

If preconditioning is not feasible, use as narrow a width as possible in order to minimize dimensional change.

"Knotty" grades of paneling generally have a higher moisture content than the premium grades. When installed in a heated room, without preconditioning, paneling may be expected to shrink. This shrinkage will be minimized by acclimating the paneling prior to installation.

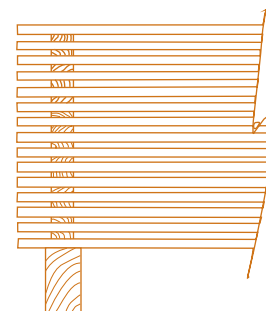
Once the wood product has become dimensionally stable, it should be sanded and primed or prefinished prior to installation.

Wood in kitchens, bathrooms, basements or other high moisture areas, should be protected. A suitable installation in these areas would include an application of sealer to front, back, ends and edges of each piece.

Acclimating Natural Wood Siding

Any wood siding product may pick up or lose moisture content in transit or storage so it is important to allow it to acclimate to the surrounding air of its final site prior to application.

Stack the siding, with spacers between the pieces (see diagram) in



STACK FOR ACCLIMATIZATION

an area where there will be good air flow through the stack. An open garage is ideal; if completely outdoors, then loosely cover the top (only) of the stack with panels or coverboards. If stack is over wet ground or damp concrete, lay down a vapor barrier beneath the stack.

Allow air to flow through and around the stack for a week to ten days for dry siding. Once siding has reached climatic balance, prime or prefinish both sides, edges and ends before application.

If unseasoned siding is used, then the following additional precautions should be taken:

- 1) Allow materials to acclimate, as described, over a longer period - at least 30 days or longer in damp or humid conditions - before installation.
- 2) Use patterns which allow for some shrinkage, such as bevel, channel or board-and-batten. These patterns have a profile which can more easily accommodate dimensional change.
- 3) Use as narrow a width as possible. Dimensional change is proportional; the wider the width, the greater the change.

Once acclimated, prefinish as described earlier.

Additional Information

Additional information and titles referenced in this publication are available for purchase from WWPA.

For a full description of technical publications available and a printable order form, go to the WWPA web site at www.wwpa.org.



Western Wood Products Association
1500 SW First Avenue, Suite 870
Portland, OR 97201-8561
503/224-3930 fax: 503/224-3935
e-mail: info@wwpa.org
web site: www.wwpa.org

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Table 2: SIDING GRADES

General Categories <i>(Note that there are additional grades for bevel pattern.)</i>		GRADES			Grade Rule Paragraph Numbers for Reference & Specifying		
		WESTERN SPECIES		CEDAR Western & Canadian	WWPA ²	WCLIB ³	NLGA ⁴
		Selects ¹	Finish				
All Patterns	Premium Grades	C Select ⁵ D Select ⁵	Superior Prime	Clear Heart ⁵ A Grade ⁵ B Grade	20.11	102-b	200a
					20.12	102-c	200b
					10.12	-	-
					10.51	-	-
					10.13	-	-
				10.52	-	-	
				20.13	102-d	200c	
Additional Grades for Bevel Patterns	Premium		Superior Bevel	Clear VG Heart ⁵ A Bevel ⁵ B Bevel Rustic C Bevel	21.11	106-aa	201a
					21.12	106-a	201b
					16.11	-	-
					21.13	106-b	201c
					-	-	201d
				21.14	106-c	201e	
All Patterns	Knotty	Prime Bevel		Select Knotty ⁶ Quality Knotty ⁶	16.12	-	-
					-	-	205a
					-	-	205b
All Patterns	Knotty Grades	Commons ¹	Alternate Boards	Select Knotty ⁶ Quality Knotty ⁶	30.12 118-b - - 30.13 118-c	118-a 118-b 111-e 111-f - 118-c	114a 114b 204a 204b - 114c
		#2 Common	Select Merch. Construction				
		#3 Common	Standard				

¹ Equivalent grades, under the same paragraph numbers in WWPA Rules, are available in Idaho White Pine. Refer to *Western Lumber Grading Rules*.

² Western Wood Products Association's *Western Lumber Grading Rules*.

³ West Coast Lumber Inspection Bureau's *West Coast Lumber Standard Grading Rules*.

⁴ National Lumber Grades Authority's *Standard Grading Rules for Canadian Lumber*.

⁵ Some clear grades may be specified VG (vertical grain). Common practice is to ship orders as a combination of vertical and flat grain, unless specified otherwise.

⁶ The widely used marketing term, "STK" usually describes a combination of Select Knotty and Quality Knotty, sometimes marketed with approximately 15% of the order in Quality Knotty.

The grade names in bold face type are the most widely available grades. These are often specified as a grade combination that includes some portion of material in the next higher grade; i.e. C&BTR Select, D&BTR Select, A&BTR Cedar, 2&BTR Common, 3&BTR Common or STD&BTR (Standard & Better).

Table 3: MOISTURE CONTENT GUIDELINES

Use of Wood	Recommended Moisture Content at Time of Installation					
	Most Areas of the U.S.		Dry Southwestern States		Damp, Warm Southeastern Coastal Areas	
	Individual Average ¹	Pieces	Individual Average ¹	Pieces	Individual Average ¹	Pieces
Interior: Furniture, Woodwork, Flooring and Wood Trim	8%	6-10%	6%	4-9%	11%	8-13%
Exterior: Siding, Trim, Sheathing and Laminated Timbers	12%	9-14%	9%	7-12%	12%	9-14%

¹ To obtain a realistic average, test at least 10% of each item, i.e. 10% of the siding pieces, 10% of the trim pieces and random checks of the sheathing material. It is particularly important to check the sheathing prior to the siding application if it has become wet after installation.

Source: USDA *Wood Handbook*, 1999, Table 12-2, Forest Products Laboratory Report FPL-GTR-113.

Checklist for a Siding Material Specification

- Select species suited to the project.
- List grade names, paragraph numbers and rules-writing agency. (Refer to Table 1)
- Specify surface texture for exposed face.
- Specify moisture content suited to the project and specify acclimatization details especially if unseasoned (S-GRN) materials are to be used.
- If gradestamped, specify lumber be stamped on back or ends.
- Specify VG (vertical grain) if appropriate and available.
- Specify pattern and size. (WWPA's *Standard Patterns* offers additional information)
- Specify installation, nailing and finishing. (Refer to WWPA's *Natural Wood Siding*)