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SUITABILITY OF WOODS FOR USE IN THE FRAME HOUSE

Wise selection of lumber for building a house yields high returns in ultimate savings and satisfaction.

Such selection calls for an understanding of what is required in the various building items. For instance, the actual service conditions for joists call for stiffness, dryness as delivered, ability to stay in place, and minimum tendency to shrink, but it is not uncommon for the builder to select such members largely on the basis of bending strength.

Detailed information based on actual tests on all of the strength and other physical properties of all the woods available for use in house construction is not at hand through any one source. The accumulated fund of information that is available, however, together with the observations and mature judgment of technical workers and builders affords a sound basis for selection of building lumber items. It is on such a combination of actual test data and practical judgment that the following recommendations are based:

Exterior Trim (House)**Usual requirements:**

Medium decay resistance, good painting and weathering characteristics, easy-working qualities, maximum freedom from warp.

Woods combining usual requirements in a high degree:

Cedars, cypress, redwood. (Heartwood only. Adapted to blinds, rails, and balcony and porch trim, where decay hazard is high.)

Eastern white pine, sugar pine, western white pine, yellow-poplar. (Heartwood only. Adapted to ordinary trim where decay hazard is moderate or low.)

Woods for special architectural treatments:

American chestnut, white oak. (Heartwood only. Used with natural finish.)

Woods combining usual requirements in a good degree:

Hemlocks, ponderosa pine, spruces, white fir. (When drainage is good.)

Douglas-fir, western larch, southern yellow pine. (Special priming treatment advisable to improve paint-holding qualities.)

Grades used:

A, B, or B and Better finish is used in the best construction, C and D finish in more economical construction, and No. 1 or No. 2 boards where appearance is not important.

Flooring (House)

Living Room and Bedroom Flooring

Usual requirements:

High resistance to wear, attractive figure or color, minimum warp and shrinkage.

Woods combining usual requirements in a high degree:

Hard maple, red and white oak. (Most commonly used hardwoods.)

Ash (white), American beech, birch, walnut. (Not commonly used.)

Hickory, black locust, pecan. (Not commonly available. Hard to work and nail.)

Woods combining usual requirements in a good degree:

Cypress, Douglas-fir, western hemlock, western larch, redwood, southern yellow pine. (Vertical grain.)

Cherry, sweetgum, American sycamore (quartered). (Not commonly available. Highly decorative and suitable where wear is light and maintenance good.)

Grades used:

In American beech, birch, and maple flooring the grade of Firsts is ordinarily used for the better class of homes and Seconds and sometimes Thirds in low-cost jobs. In oak the grade of Clear (either plain or quartered) is used in better class work and Selects and sometimes No. 1 Common in low-cost work. Other hardwoods are ordinarily used in the same grades as oak. When softwood flooring is used (without covering) in better class homes, grade A or B and Better vertical grain is used. Grade D or C (vertical grain) is used in more economical and low-cost homes.

Kitchen Flooring (Uncovered)

Usual requirements:

Resistance to wear, fine texture, ability to withstand washing and wear without discoloring and slivering, minimum warp and shrinkage.

Woods combining usual requirements in a high degree:

American beech, birch, hard maple. (Fine textured.)

Woods combining usual requirements in a good degree:

Ash, red and white oak. (Open textured.)

Soft maple.

Woods combining usual requirements in a fair degree:

Cypress, Douglas-fir, western hemlock, western larch, redwood, southern yellow pine. (Vertical grain preferred.)

Elm, hackberry, American sycamore.

Grades used:

The flooring grades, Seconds in American beech, birch, and hard maple, and Selects in the oaks are used in high-priced houses. In more economical construction Thirds in American beech, birch, and hard maple, and No. 1 Common or No. 2 Common in the oaks are used. D (vertical grain) is the lowest grade of softwood that proves thoroughly satisfactory in high-class construction. A grade and B and Better grade (vertical grain) are used most extensively. No. 1 and No. 2 are serviceable in low-cost construction, but wear unevenly around knots.

Porch Flooring

Usual requirements:

Medium to good decay resistance, medium wear resistance, nonsplintering, freedom from warping.

Woods combining usual requirements in a high degree:

Cypress, Douglas-fir (vertical grain), western larch (vertical grain), southern yellow pine (vertical grain), redwood, white oak. (If full drainage is not obtainable only the heartwood of cypress, redwood, and white oak can be given a high rating.)

Black locust, walnut. (Usually impractical except when cut from homegrown timber.)

Grades used:

Grades C to A are used in the better types of homes. No. 1 and No. 2

are used in lower cost homes and are serviceable, but wear unevenly around knots, and the maintenance of paint on the knots is difficult. The superior paint-holding qualities and uniform wearing surface of vertical grain makes it preferred in all grades. Hardwoods, if used at all, should be of Select or No. 1 Common quality.

Framing (House)

Usual requirements:

High stiffness, good bending strength, good nail-holding power, hardness, freedom from pronounced warp. For this use dryness and size are more important factors than inherent properties of the different woods.

Woods combining usual requirements in a high degree:

Douglas-fir, western larch, southern yellow pine. (Extensively used.)
Ash, American beech, birch, maple, oak. (Sometimes used, but more difficult to obtain in straight pieces and harder to nail and saw than preceding group.)
Cypress, redwood. (Seldom used.)

Woods combining usual requirements in a good degree:

Eastern hemlock, western hemlock, eastern spruce, Sitka spruce, white fir. (Extensively used.)
Eastern white pine, ponderosa pine, sugar pine, western white pine. (Seldom used because of adaptability to more exacting uses. Low strength may be compensated for by the use of larger members.)
American chestnut, yellow-poplar. (Seldom used.)

Woods combining usual requirements in a fair degree:

Elm, sweetgum, American sycamore, tupelo. (Seldom used.)

Grades used:

No. 1 and No. 2 Dimension are the usual softwood grades for all framing items in both high- and medium-class construction. No. 2 Dimension renders satisfactory service once it is in place, but is not so straight or easily fabricated as No. 1. No. 3 Dimension is serviceable for studs and joists in the more economical and low-cost homes, especially when warped pieces and short lengths resulting from cutting out defects can be used to advantage. When hardwoods are used for framing, sound square edge is used in the better types of construction and for such items as joists, rafters, and sills. Hardwood Common Dimension is used in the more economical type of buildings and for studding in all types.

Interior Trim (House)

Interior Trim with Natural Finish

Usual requirements:

Pleasing figure, hardness, freedom from warp.

Woods combining usual requirements in a high degree:

Ash, birch, cherry, American chestnut, oak, American sycamore (quartered), walnut.

Woods adaptable to special selection and architectural treatment:

Pecky cypress, etched or special-grain cypress, Douglas-fir, western larch, southern yellow pine, curly or bird's eye maple.

Knotty cedars, ponderosa pine, spruces, sugar pine, white pine. (Lack hardness of the preceding group.)

Woods combining usual requirements in a good degree:

Cypress, Douglas-fir, western hemlock, western larch, southern yellow pine, redwood, American beech, maple, sweetgum. (With conventional treatment.)

Grades used:

High-class hardwood interior trim is usually of A grade. The softwood grade A or B and Better is commonly used in a high-class construction. In the more economical types of construction C grade is serviceable. D grade requires special selection or some cutting to obtain clear material. Special grades of knotty pine, pecky cypress, white-pocket Douglas-fir, and sound wormy oak and chestnut are available to meet special architectural requirements in some types of high-class construction.

Interior Trim with Paint Finish

Usual requirements:

Fine and uniform texture, hardness, absence of discoloring pitch, freedom from warp and shrinkage.

Woods combining usual requirements in a high degree:

Birch, cherry, walnut, yellow-poplar.

Eastern white pine, ponderosa pine, sugar pine, western white pine.

(Where likelihood of marring is negligible and special priming is used.)

Woods combining usual requirements in a good degree:

Hemlocks, redwood, spruce, white fir.

American basswood, American beech, sweetgum, maple, tupelo.

Cypress, Douglas-fir, western larch, southern yellow pine, ash, American chestnut, oak. (Used satisfactorily where requirements for smoothness of finish are not exacting.)

Grades used:

C is the lowest softwood grade commonly used for high-class paint and enamel finish. D can be used, but requires some selection or cutting. No. 1 is used for ordinary or rough-paint finishes. In cheaper and more economical homes No. 2 may be used for ordinary or rough-paint finishes. Smooth-paint finishes are difficult to obtain and maintain over knots in No. 1, No. 2, and No. 3 grades. The A trim grade in the hardwoods is used for exacting requirements of high-class paint and enamel finish in high-cost homes. The standard grade of Firsts and Seconds is also used, but requires some selection or cutting. No. 2 Common hardwoods are used for interior trim in the low-cost home, but in this class of home softwoods are generally used for the interior trim that is to be painted.

Roof Boards (House)

Usual requirements:

High stiffness, good nail holding, small tendency to warp, ease of working.

Woods combining usual requirements in a high degree:

Douglas-fir, western larch, southern yellow pine. (Commonly used.)

Cypress. (Not commonly used because of adaptability to more exacting uses.)

Ash, American beech, birch, American chestnut, elm, hackberry, maple, oak, tupelo. (Seldom used because not readily available and hard to work.)

Woods combining usual requirements in a good degree:

Hemlocks, ponderosa pine, spruces, white fir. (Commonly used.)

Eastern white pine, sugar pine, western white pine, redwood, yellow-poplar. (Seldom used because of adaptability to more exacting uses.)

Grades used:

No. 2 and No. 3 boards are used in both high- and medium-type homes.

No. 3 is serviceable, but not so tight as No. 2. No. 4 and No. 5 are available in some species, but entail waste in cutting. When hardwoods are used, No. 2 Common is adapted to the better-class houses and No. 3 Common to the more economical.

Sash

Sash Used in a Dry Location (Low Decay Hazard)

Usual requirements:

Moderate shrinkage, good paint qualities, freedom from warping, ease of working, screw-holding power.

Woods combining usual requirements in a high degree:

Eastern white pine, ponderosa pine, sugar pine, western white pine.
(Principal woods used for sash.)

Cypress, redwood.

Woods combining usual requirements in a good degree:

Douglas-fir, western larch, southern yellow pine. (Vertical grain.
Use limited by milling and finishing characteristics.)

Sash Used in a Moist Location (High Decay Hazard)

Usual requirements:

High decay resistance. Moderate shrinkage, good paint qualities, freedom from warping, ease of working, screw-holding power.

Woods combining usual requirements in a high degree:

Eastern white pine, ponderosa pine, sugar pine, western white pine.
(Principal woods used for sash. Require good preservative treatment.)

Cypress, cedars, redwood, American chestnut. (Heartwood only or sapwood when treated.)

Woods combining usual requirements in a good degree:

Douglas-fir, western larch, southern yellow pine. (Heartwood only.)
White oak. (Harder to work and higher shrinkage than the softwoods.)

Grades used:

Grades of lumber used for sash are primarily of interest to manufacturers rather than to users.

Shelving (House)

Shelving with Natural or High-Class Paint Finish

Usual requirements:

Stiffness, good finishing qualities, freedom from pitch and warp.

Woods combining usual requirements in a high degree:

Ash, birch, maple, oak, walnut. (Suitable for natural finishes used principally to match interior trim.)

Cypress, redwood, yellow-poplar. (Suitable for high-class paint finishes, but use limited.)

Eastern white pine, ponderosa pine, sugar pine, western white pine. (Principal woods used for high-class paint finishes.)

Woods combining usual requirements in a good degree:

Douglas-fir, hemlocks, western larch, southern yellow pine, spruces, white fir, American basswood, American chestnut. (May be used with either natural or paint finishes.)

Shelving with Unfinished or Plain Paint Coating

Usual requirements:

Stiffness, ease of working, freedom from pitch and warp.

Woods combining usual requirements in a good degree:

Eastern white pine, ponderosa pine, sugar pine, western white pine. (Principal woods used.)

Cypress, hemlocks, redwood, spruces, white fir, American basswood, American chestnut, yellow-poplar.

Douglas-fir, western larch, southern yellow pine. (Softwoods with high stiffness.)

Birch, maple, oak. (Seldom used; difficult to work.)

Grades used:

The grade best adapted to use depends on the character of the shelving as well as on type of construction. C or a better grade is used for shelves that are to receive a high-class paint or enamel finish. D grade is serviceable, but may entail some waste. No. 1 and No. 2 are used for shelving that is unpainted or receives only a rough-paint finish. No. 3 is serviceable, especially when cut into short lengths, but may entail some waste. When hardwoods are used for shelving in closets or storerooms No. 1 or No. 2 Common is used. These two grades are suitable for higher-class shelving where short-length or narrow, clear cutting can be used to advantage.

Shingles (House)

Usual requirements:

High decay resistance, small tendency to curl or check, freedom from splitting in nailing.

Woods combining usual requirements in a high degree:

Cedars, cypress, redwood. (Principal shingle woods; heartwood only, edge grain.)

Eastern white pine, ponderosa pine, sugar pine, western white pine. (Hand-made shingles or shakes from locally grown timber; require good preservative treatment.)

White oak. (Hand-made shingles or shakes from locally grown timber; require care in nailing.)

Grades used:

In western redcedar, cypress, and redwood No. 1 shingles (all heart, edge-grain clear stock) should be used for the longest life and greatest ultimate economy in dwelling roofs. Grades permitting flat grain, such as No. 2 in redwood and western redcedar and Bests in cypress, are sometimes used to reduce the first cost.

Siding (House)

Usual requirements:

Good painting characteristics, easy working qualities, freedom from warp.

Woods combining usual requirements in a high degree:

Cedars, cypress, eastern white pine, sugar pine, western white pine, redwood.

Woods combining usual requirements in a good degree:

Western hemlock, ponderosa pine, spruce, yellow-poplar.

Woods combining usual requirements in a fair degree:

Douglas-fir, western larch, southern yellow pine.

Grades used:

Redwood and cypress are available in special siding grades of Clear Heart, and western redcedar in a siding grade of Clear. In other softwoods the B and Better siding is used in the highest class of construction. Siding in more economical types of construction is usually of C or D grade, but No. 1 and No. 2 are available in a number of species.

Stepping (Outdoor Use)

Usual requirements:

High decay resistance, nonsplintering, good bending strength and wear resistance, freedom from warping.

Woods combining usual requirements in a high degree:

Cypress, white oak (especially when quartersawn). (Heartwood only.)

Black locust, walnut. (Usually impractical except when cut from home-grown timber.)

Woods combining usual requirements in a good degree:

Douglas-fir, western larch, redwood, southern yellow pine. (Vertical-grain heartwood only.)

Woods combining usual requirements in a fair degree:

Cedar, Douglas-fir, western larch, southern yellow pine. (Flat grain.)

Grades used:

C or a higher grade of softwoods and Firsts and Seconds in hardwoods are used in high-class construction. In the less costly construction, No. 1 Common in hardwoods and as low as No. 2 grade in softwoods are used. No. 1 and No. 2 grades in softwoods are serviceable, but wear unevenly around knots. Dense No. 1 southern pine is sometimes used in better-type homes.

Subfloors (House)

Usual requirements:

Requirements are not exacting, but high stiffness, medium shrinkage and warp, and ease of working are desired.

Woods combining usual requirements in a high degree:

Douglas-fir, western larch, southern yellow pine. (Commonly used.)

Cypress, redwood, ash, yellow-poplar. (Seldom used because of adaptability to more exacting uses.)

Woods combining usual requirements in a good degree:

Hemlocks, ponderosa pine, spruces, white fir. (Commonly used.)

Eastern white pine, sugar pine, western white pine. (Seldom used because of adaptability to more exacting uses.)

American beech, birch, American chestnut, elm, hackberry, maple, oak, tupelo. (Seldom used. Not readily available and hard to work.)

Grades used:

No. 2 boards are used extensively in higher-type homes. In more economical construction both No. 2 and No. 3 are used. No. 3 is serviceable, but not so tight as No. 2. No. 4 and No. 5 are available in some species, but entail waste in cutting. When hardwoods are used, No. 2 Common is adapted to the better class houses and No. 3 Common to the more economical.

Wall Sheathing (House)

Usual requirements:

Easy working, easy nailing, moderate shrinkage. All woods can be used for sheathing with satisfactory results although some woods are less time-consuming to work than are others.

Woods combining usual requirements in a high degree:

Cedar, cypress, hemlocks, eastern white pine, ponderosa pine, sugar pine, western white pine, redwood, spruce, white fir, American basswood, yellow-poplar.

Woods combining usual requirements in a good degree:

Douglas-fir, western larch, southern yellow pine, cottonwood.

Grades used:

No. 3 grade of softwoods makes a serviceable sheathing when covered with good building paper. No. 1 and No. 2 make a tighter coverage, but do not warrant omitting use of building paper. No. 4 and No. 5 are used in low-cost homes, but are not generally available. They both entail some waste in cutting. When a hardwood is used for sheathing, No. 2 Common is adapted to the better-type homes, and No. 3 Common to the more economical.

The foregoing information is a part of U. S. Department of Agriculture Farmer's Bulletin 1756, "Selection of Lumber for Farm and Home Building," copies of which can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 15 cents each, stamps not accepted.