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Standard Terminology Relating to Wood[1]

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INTRODUCTION

The definitions contained herein constitute a lexicon of terms of general interest. Definitions in more specialized wood product or process use will be found in other standards. These include Practice D 245, Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber;[2] Terminology D 907, Adhesives;[3] Definitions D 1038, Terms Relating to Veneer and Plywood;[2] Nomenclature D 1165, Domestic Hardwoods and Softwoods;[2] Definitions D 1554, Terms Relating to Wood-Base Fiber and Particle Panel Materials;[2] Definitions F 547, Terms Relating to Nails for Use with Wood and Wood-Base Materials;[4] Methods D 2555, Establishing Clear-Wood Strength Values;[2] Definitions C 274, Terms Relating to Structural Sandwich Constructions.[5]

allowable properties—mechanical properties of materials as prepared for design use. Allowable properties of wood are identified with stress-grade descriptions and reflect the orthotropic structure of wood. Often considered synonomous with allowable unit stresses, working stresses, and design stresses.

American softwood lumber standard—a voluntary product standard of the U. S. Department of Commerce which serves as a basis for the preparation and revision of industry-sponsored grading rules for lumber.

American standard lumber—lumber conforming to the basic provisions of the American Softwood Lumber Standard.

annual ring—the growth layer produced by the tree in a single growth year, including earlywood and latewood.

bark—the layer of a tree outside the cambium comprising the inner bark and the outer bark.

inner bark—the layer of living bark (phloem) that separates the outer bark from the cambium and which in the living tree generally is moist and soft.

outer bark—the layer of dead bark outside the inner bark, forming the exterior surface of the tree stem. The outer bark frequently is corky and dry.

bark pocket—an opening between annual growth rings that contains bark. Bark pockets appear as dark streaks on radial surfaces and as rounded areas on tangential surfaces.

basic stress (*archaic*)—the term once used for an allowable property for clear, straight-grained lumber.

batten—a narrow strip of lumber for covering the adjoining edges of roofing or siding, often designated as "batts."

birdseyes—small localized areas in wood with the fibers indented and otherwise contorted to form small circular or elliptical figures remotely resembling birds' eyes on the tangential surface. Common in sugar maple; rare in other hardwood species.

blemish—in grading lumber, anything marring the appearance. May not be classified as a defect.

board foot—a unit of measurement represented by a board 1 ft long, 1 ft wide, and 1 in. thick. Abbreviation ft. b.m.; bd. ft., fmb. In finished or surfaced lumber, the board-foot measure is based on the nominal size. In practice, the working unit is 1000 board feet. Abbreviation M bd. ft.; M B.M.; M B.F.

board measure—a unit of measurement of the volume in board feet of logs or lumber. Abbreviation B.M.

boards—See **lumber.**

bole—the stem or trunk of a tree of size sufficient to yield lumber, veneer, or poles.

bolt—(*1*) a short section of a tree trunk or limb;
(*2*) a short log of a length suitable for peeling in a lathe for veneer; and
(*3*) a short portion of a log prepared for production of shingles, staves, etc.

bow—the distortion of a piece of lumber in which there is a deviation in a direction perpendicular to the flat face from a straight line from end to end of the piece.

boxed heart—the term used when the pith falls entirely within the four faces of a piece of wood throughout its length.

boxed pith—See **boxed heart.**

brashness—a condition that causes some pieces of wood to be relatively low in shock resistance for the species and, when broken in bending, to fail abruptly without splintering at comparatively small deflections.

bright-wood—wood free of stain or any discoloration.

built-up timbers—an assembly made by joining layers of lumber together with mechanical fastenings so the grain of all laminations is essentially parallel.

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[2] *Annual Book of ASTM Standards*, Vol 04.10.

[3] *Annual Book of ASTM Standards*, Vol 15.06.

[4] *Annual Book of ASTM Standards*, Vol 15.08.

[5] *Annual Book of ASTM Standards*, Vol 15.03.

burl—(*1*) a hard, woody outgrowth on a tree, more or less rounded in form, usually resulting from the entwined growth of a cluster of adventitious buds.
(*2*) in wood or veneer, a localized severe distortion of the grain generally rounded in outline, usually resulting from overgrowth of dead branch stubs, varying from 1/2 in. to several inches in diameter; frequently includes one or more clusters of several small contiguous conical protuberances, each usually having a core of pith but no appreciable amount of end grain (in tangential view) surrounding it.

cambium—the layer of cells that lies between the inner bark and the wood of a tree, that repeatedly subdivides to form new wood and bark cells.

cant—a log that has been slabbed on one or more sides, usually with the intention of resawing at right angles to the widest sawn face.

cap—a horizontal wood member, generally square or near square; used to crown and bind the top ends of upright posts and piles together as a unit and to support upper construction.

casehardening—a condition of stress and set in wood due to drying in which outer fibers are under compressive stress and inner fibers under tensile stress, a condition that often exists during subsequent processing. In commerce, the term often connotes a degree of severity regarded as detrimental in use.

cell—a general term for the minute units of wood structure having distinct cell walls and cell cavities including wood fibers, vessel segments, and other elements of diverse structure and function.

cellulose—the carbohydrate that is the principal constituent of wood and forms the structural framework of the wood cells.

center match—matched lumber with tongues and grooves precisely centered on the edges.

characteristic—a distinguishing feature or trait. In grading lumber and other wood products, a feature in or on the wood which by its nature, extent, and frequency of occurrence determines the grade or level of quality.

check—a separation of the wood along the fiber direction that usually extends across the rings of annual growth, commonly resulting from stresses set up in wood during seasoning.

end check—a seasoning check occurring on the end of a board or other piece of wood.

heart check—a check that extends across the growth layers in one or more directions from the pith toward, but not to, the surface of a piece of wood. A synonym is *pith check.*

pith check—see *heart check.*

roller check—a crack in the wood structure caused by a piece of cupped lumber being flattened between machine rollers.

star check—a heart check in which the separation extends in more than one direction from the pith.

surface check—a check occurring on the surface of a piece of wood, usually on the tangential face not extending through the piece.

through check—a check that extends through a piece of wood, or from a surface to the opposite or to an adjoining surface.

chip marks—shallow depressions or indentations in or on the surface of dressed lumber caused by chips or shavings getting embedded in the surface during dressing.

chips—small fragments of wood chopped or broken by cuts such as by a planer, chipper, mechanical hog, hammermill.

clear—free of defects or imperfections.

coarse grain—See **grain.**

collapse—the flattening of single cells or rows of cells during the drying or pressure treatment of wood, characterized by a caved-in or corrugated appearance.

compression failure—deformation of the wood fibers resulting from excessive compression along the grain either in direct end compression or in bending. It may develop in standing trees due to bending by wind or snow or to internal longitudinal stresses developed in growth, or it may result from stresses imposed after the tree is cut. In surfaced lumber, compression failures appear as fine wrinkles across the face of the piece.

compression parallel to grain—compression, endwise (parallel to the grain). The imposition of a compressive stress that acts in a direction parallel to the grain of the wood, as in a column.

compression perpendicular to grain—compression, sidewise (perpendicular to the grain). The imposition of a compressive stress that acts in a direction approximately perpendicular to the grain of the wood.

compression wood—abnormal wood formed typically on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric, relatively large amount of latewood, sometimes more than 50 % of the width of the annual rings in which it occurs, and its lack of demarcation between earlywood and latewood in the same annual rings. Compression wood shrinks excessively lengthwise, as compared with normal wood.

conifer—a tree belonging to the order *Coniferae,* usually evergreen, with cones and needle-shaped or scalelike leaves, and producing wood known commerically as "softwood."

crook—a distortion of a piece of lumber in which there is a deviation in a direction perpendicular to the edge from a straight line from end to end of the piece.

cross break—a separation of the wood cells across the grain. Such breaks may be due to internal stress resulting from unequal longitudinal shrinkage or external forces.

cross grain—See **grain.**

cross section—a section of a stem, board, or other piece of wood taken at right angles to its longitudinal axis.

crosscut—to cut a board, timber, or log generally transverse to the direction of the fibers. A synonym is "buck."

cull—in grading lumber or other wood products, pieces or parts thereof, that do not meet the lowest quality standards requirements.

cup—a distortion of a board in which there is a deviation flatwise from a straight line across the width of the board.

cut stock—a term for softwood lumber indicating the product generally has been manufactured to dimensions suitable for a fabricating operation with little further processing required.

decay—decomposition of wood substance caused by action of wood-destroying fungi, resulting in softening, loss of strength and weight, and often in change of texture and color.

advanced (or typical) decay—the older stage of decay in which the destruction is readily recognized because the wood has become punky, soft and spongy, stringy, ring-shaked, pitted, or crumbly. Decided discoloration or bleaching of the rotted wood is often apparent.

incipient decay—the early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood. It may be accompanied by a slight discoloration or bleaching of the wood.

pocket rot—advanced decay that appears in the form of a hole, pocket, or area of soft rot usually surrounded by apparently sound wood.

defect—any irregularity or imperfection in a tree, log, piece, product, or lumber that reduces the volume of sound wood or lowers its durability, strength, or utility value.

degrade, *n*—a reduction in quality of lumber, logs, or other wood products due to processing.

dense—(*1*) term used in stress grading of certain softwood species to signify a high specific gravity. (*2*) a visual estimate of high specific gravity. To be classified as dense, the softwood species shall average on one end or the other of each piece, not less than six annual rings per inch and one-third or more latewood. Pieces not less than four rings per inch shall be accepted as dense if they average one-half or more latewood.

depth factor—the factor included in deriving the allowable bending stress for rectangular members which takes into account the somewhat lower unit strength developed in larger members as compared to smaller members. Archaic terminology, more correctly termed **size factor.**

diffuse porous wood—certain hardwoods in which the pores exhibit little or no variation in size or distribution throughout the growth ring, only decreasing slightly in size, gradually toward the outer border of the ring.

dimensional stabilization—treatment of wood to reduce swelling and shrinking caused by changes in its moisture content.

dote—See **decay.**

dressed size—See **lumber.**

drying—See **seasoning.**

dry-bulb temperature—temperature of the air as indicated by an accurate thermometer, corrected for radiation if significant.

durability—a general term for permanence or resistance to deterioration. Frequently used to refer to the degree of resistance of a species of wood to attack by wood-destroying fungi under conditions that favor such attack. In this connection the term "decay resistance" is more specific.

duration of load—the duration of stress or the time during which a load acts on a member. In wood, a design consideration for modifying allowable stresses, based on the accumulated loadings anticipated in the life of a structure.

earlywood—the less dense, large-celled, part of the growth layer formed first during the annual growth cycle. A synonym is *springwood.*

end match—matched lumber with a tongue on one end of the piece and a matching groove on the opposite end.

equilibrium moisture content—a moisture content at which wood neither gains nor loses moisture to the surrounding air.

extractives—compounds occurring in plant materials but not forming part of the structural elements, that are removed with neutral solvents such as ether, alcohol, and water.

face—the wide surface of rectangular pieces of lumber. Often the surface that determines the grade of lumber destined for remanufacture.

fiber, wood—a comparatively long (1/25 in. or less to 1/3 in.), narrow, tapering wood cell closed at both ends.

fiber saturation point—the moisture content at which the cell walls are saturated with water (bound water) and no water is held in the cell cavities by capillary forces. It usually is taken as 25 to 30 % moisture content, based on weight when ovendry.

figure—the pattern produced in a wood surface by annual growth rings, rays, knots, deviations from regular grain such as interlocked and wavy grain, and irregular coloration.

fire retardant—having or providing comparatively low flammability or flame spread properties.

flat grain—See **grain.**

flitch—a portion of a log sawed on two or more sides and intended for remanufacture into lumber or sliced or sawed veneer. The term is also applied to the resulting sheets of veneer laid together in sequence of cutting.

form factor—a factor used in the calculation of the bending strength of wood members to compensate for nonrectangular shape. Defined as the ratio of the modulus of rupture of a member of desired shape to that of a "standard" member.

fracture toughness—a conventional fracture mechanics strength parameter indicating the resistance of a material to crack extension.

girder—a horizontal member used to support heavy loads such as other beams along its length.

grade—the designation of the quality of logs or of a manufactured piece of wood.

grain—the direction, size, arrangement, appearance, or quality of the fibers in lumber or other wood products. To have a specific meaning the term must be qualified.

bastard sawn grain—grain pattern in hardwood lumber in which the annual rings make angles of 30 to 60 deg with the surface of the piece.

chipped grain—a machine defect of surfaced lumber, where the grain of the wood has been torn out in small particles by the action of the planer knives.

close grain—(*1*) narrow, inconspicuous annual rings. The term is sometimes used to designate wood having small and closely spaced pores, but in this sense the term "fine textured" is more often used.

(*2*) in stress grading, wood averaging on one end or the other of each piece not less than six nor more than 30 annual rings/in. Pieces averaging at least five or more than 30 rings/in. are accepted as close grain if containing one third or more summerwood.

coarse grain—wide conspicuous annual rings in which there is considerable difference between earlywood and latewood. The term is sometimes used to designate wood with large pores, such as oak, ash, chestnut, and walnut, but in this sense the term "coarse textured" is more often used.

cross grain—fiber deviation from a line parallel to the sides of the piece. Cross grain may be either diagonal or spiral grain or a combination of the two.

curly grain—grain distortion with an irregular curled appearance; "birdseye" is an extreme case of curly grain.

diagonal grain—grain pattern in which the annual rings are at an angle with the axis of a piece as a result of sawing at an angle with the bark of the tree or log. A form of *cross grain.*

edge grain—grain pattern in which the wide surfaces of the sawn piece extend approximately at right angles to the annual growth rings. Lumber is considered edge grained when the rings form an angle of 45 to 90 deg with the wide surface of the piece.

end grain—the grain pattern exposed when ends of logs or timbers, dimension, boards, and other wood products are cut perpendicular to the fiber direction.

fine grain—a synonym for *close grain.*

flat grain—the grain pattern resulting when lumber has been sawed in a plane approximately perpendicular to the radius of the log. Lumber is considered flat grained when the annual growth rings make an angle of less than 45 deg with the surface of the piece.

interlocked grain—wood in which the fibers are inclined in one direction in a number of rings of annual growth, then gradually reverse and are inclined in an opposite direction in succeeding growth rings, then reverse again.

loosened grain—a separation or loosening of the earlywood from the latewood due to defects in the wood or processing such as planing.

medium grain—used in stress grading to denote wood averaging on one end or the other of each piece not less than four annual rings/in.

mixed grain—lumber and other wood products unrestricted or unsegregated as to the grain angle.

open grain—(*1*) common classification related to finishing of woods with large pores, such as oak, ash, and chestnut. Also known as "coarse textured."

(*2*) used in stress grading to denote no limitations on rate of growth as measured by annual rings per inch.

plainsawn—a synonym for *flat grain.*

quartersawn—a synonym for *edge grain.*

raised grain—a condition of the surface of dressed lumber in which the hard latewood is raised above the softer earlywood but not torn loose from it.

rift sawn—a synonym for *edge grain.*

slash grain—a synonym for *flat grain.*

spiral grain—wood in which the fibers take a spiral course about the trunk of a tree instead of the normal vertical course. The spiral may extend in a right-handed or left-handed direction around the tree trunk. Spiral grain is a form of cross grain.

straight-grained wood—wood in which the fibers run parallel to the axis of a piece.

torn grain—a machine defect of surfaced lumber, where the fibers of the wood have been torn out around knots and curly places by the action of the planer knives.

vertical grain—a synonym for *edge grain.*

wavy-grained wood—wood in which the fibers form a pattern of fairly uniform waves or undulations.

green—(*1*) freshly sawed wood, or wood that has received no drying; unseasoned. Lumber that may have become wet to above the fiber saturation point may be referred to as being in the "green condition."

(*2*) wood above a stipulated moisture content, as lumber above 19 % moisture content in accordance with the American Softwood Lumber Standard.

hardness—a term relating to the capacity of wood to withstand denting and abrasion; for purposes of comparison, hardness in wood is often measured as the load in pounds required to embed a 0.444-in. ball to one-half its diameter (Methods D 143).

hardwood dimension—hardwood stock processed to the specified thickness, width, and length, or in multiples thereof.

hardwoods—generally one of the botanical groups of trees that have broad leaves in contrast to the conifers or softwoods. The term has no reference to the actual hardness of the wood.

heartwood—the inner layer of a woody stem wholly composed of nonliving cells and usually differentiated from the outer enveloping layer (sapwood) by its darker color. It is usually more decay resistant than sapwood.

hit-and-miss—a manufacturing imperfection on planed lumber, defined by grade rules as a series of planer skips with surfaced areas between. Permitted depth of misses is usually specified.

hit-or-miss—a manufacturing imperfection on planed, rough, or partially planed lumber, providing a maximum permitted scantness.

holes—openings in or through lumber that may extend partially or entirely through a piece and may be from any cause.

honeycomb—advanced stage of decay caused by *Fomes pini.*

honeycombing—in lumber and other wood products, separation of the fibers in the interior of the piece, usually along the wood rays. The failures often are not visible on the surfaces, although they can be the extensions of surface and end checks.

horizontal shear—shear that occurs in planes parallel to the longitudinal axis of the member; sometimes referred to as longitudinal shear.

impact bending—application of an impact load in bending to obtain a measure of the ability of wood to absorb shock loads.

imperfection—any defect or blemish in or on wood that detracts from its appearance or lowers its utility. In grading rules, a class of limitation on manufacturing practice.

incise—to make slitlike lacerations generally parallel to the grain in the lateral surface of timbers that are resistant to

treatment, so that deeper and more uniform penetration of preservative may be obtained.

increment borer—an augerlike instrument with a hollow bit, used to extract cores from trees for study of growth and age and for other research purposes.

joint—the junction of two or more pieces of wood. Usually implies a structural junction in which stress is transmitted from one piece to another.

juvenile wood—the wood formed adjacent to the pith, characterized by progressive change in cell dimension, different microstructure than mature wood, and greater shrinkage parallel to the grain.

NOTE—In softwoods, juvenile wood is characterized by lower specific gravity and strength. It may vary in quantity from tree to tree and extend from the pith 5 to 20 growth rings.

kiln—a chamber used for drying and conditioning lumber, veneer, and other wood products in which the temperature and relative humidity of the circulated air can be varied and controlled, often steam heated and vented.

kiln schedule—in kiln drying, the time schedule of predetermined or actual dry-bulb and wet-bulb temperatures used in drying a kiln charge of lumber or other wood products.

knife marks—a series of surface imprints or markings made by the machine knives in dressed lumber.

knot[6]—that portion of a branch or limb which has been surrounded by subsequent growth of the wood of the tree. As a knot appears on the cut surface it is merely a section of the entire knot, its shape depending upon the direction of the cut.

branch knots—two or more knots diverging from a common point at or near the pith.

centerline knot—a knot whose centroid lies at the center of the width of any lumber face; sometimes referred to as a center knot.

corner knot—an edge knot containing the intersection of adjacent faces.

decayed knot—a knot that, due to advanced decay, is softer than the surrounding wood.

edge knot—(*1*) a knot located at the edge of the face in a piece of lumber.

(*2*) in stress grading under Practice D 245, a knot whose perimeter falls within one-sixth of the knot width from the edge of the piece. The knot width is measured along a line transverse to the piece.

elsewhere knot—a knot that is not a centerline, edge, or corner knot.

encased knot—a knot whose rings of annual growth are not intergrown with those of the surrounding wood.

firm knot—a knot that is solid across its face, but which contains incipient decay.

fixed knot—a knot that will hold its place in dry lumber under ordinary conditions, but can be moved under pressure, although not easily pushed out.

group knots—two or more single knots grouped together.

hollow knot—an apparently sound knot containing a hole more than 1/4-in. in diameter.

intergrown knot—a knot whose rings of annual growth are completely intergrown with those of the surrounding wood.

knot cluster—two or more knots grouped together as a unit, the fibers of the wood being deflected around the entire unit. Distinct from a group of single knots in which each is a unit.

loose knot—a knot that is not held firmly in place by growth or position and that cannot be relied upon to remain in place.

oval knot—a knot cut at from 45 to 90° to the long axis of the limb.

pith knot—a sound knot having a pith hole not over 1/4 in. in diameter.

round knot—a knot that is cut at approximately right angles to its long axis of the limb.

single knot—a knot having adjoining wood fibers deflected around it alone and not around another knot.

sound knot—a knot that is solid across its face, at least as hard as the surrounding wood, and shows no indication of decay.

spike knot—a knot cut at from 0 to 45° to the long axis of the limb.

star-checked knot—a knot having radial checks.

tight knot—a knot so fixed by growth or position that it will firmly retain its place in the piece.

unsound knot—a knot which is not solid across the face as a result of decay and is not as hard as the surrounding wood.

watertight knot—having sound and watertight wood completely intergrown with the surrounding wood on one surface or on the entire projection of one end of the knot.

latewood—the denser, smaller-celled, later-formed part of a growth layer. A synonym is *summerwood.*

lath—thin, narrow strips of rough wood.

log—a section of the trunk of a tree usually referring to a length suitable for conversion to commercial products.

log run—in relation to lumber manufacture in softwoods, the total yield of a log or group of logs in lumber without any grading; in hardwood, certain lower grades are excluded.

log scale—the measure of the potential lumber content of a log or logs based on particular cuttings and sizes, with the measure varying according to the exact nature of the log scale or log rule involved.

longitudinal—generally, the direction parallel to the grain of wood. Sometimes the long axis of a wood specimen.

lumber—the product of the sawmill and planing mill usually not further manufactured other than by sawing, resawing, passing lengthwise through a standard planing machine, crosscutting to length, and matching.

blanked lumber—lumber planed to a size in excess of the corresponding standard-dressed size to permit remanufacture or special use.

boards—lumber less than 2 in. in nominal thickness. Boards less than 6 in. in width may be classified as strips.

[6] Information covering the interpretation of knot measurement is given in the Appendix.

common lumber—in softwoods, a general term for nonstress graded lumber that has appearance quality less than select grade but is suitable for general construction and utility purposes.

dimension—lumber from nominal 2 in. through 4 in. thick and 2 or more inches wide.

dressed lumber—lumber that is surfaced by a planing machine on one side (S1S), two sides (S2S), one edge (S1E), two edges (S2E), or any combination of sides and edges (S1S1E, S2S1E, S1S2E, or S4S). Dressed lumber may also be referred to as planed or surfaced.

dressed size—the dimensions of lumber after surfacing with a planing machine. Usually 1/4 or 3/4 in. less than nominal size. The American Softwood Lumber Standard lists standard dressed sizes.

factory and shop lumber—lumber that is produced or selected primarily for manufacture into nonstructural products. It is graded on the basis of the percentage of the area that will produce a limited number of cuttings of a specified minimum size and quality.

finish—lumber suitable for millwork or for the completion of the interior of a building. Chosen particularly because of appearance or ability to accept a high quality finish.

framing lumber—lumber used for the structural members of a building, such as studs and joists.

matched lumber—lumber that is edge or end dressed and shaped to make a close tongued-and-grooved joint at the edges or ends when laid edge-to-edge or end-to-end.

patterned lumber—lumber that is shaped to a pattern in addition to being dressed, matched, or shiplapped, or any combination of these workings.

plain end lumber—worked lumber without end matching or with plain trimming and square ends.

planed lumber—See *dressed lumber.*

remanufactured lumber—lumber that has been further processed to change its size or shape after grading.

resawn lumber—the product of sawing any thickness of lumber to develop thinner lumber. The term as used in commercial transactions is mostly to denote the product of resawing dressed and graded lumber.

ripped lumber—the product of sawing any width of lumber to develop narrower lumber. The term as used in commercial transactions is mostly to denote the product of ripping dressed and graded lumber.

rough lumber—lumber as it comes from the saw prior to any dressing operation.

saw-sized lumber—sawn rough lumber of near-exact, uniform, net size, with a plus or minus sawing tolerance permitted.

select lumber—in softwoods a general term for lumber of good appearance and finishing qualities.

shiplapped lumber—lumber that is edge dressed to make a lapped joint.

shop lumber—see *factory and shop lumber.*

stress-graded lumber—lumber of any thickness and width that is graded for its mechanical properties.

surfaced lumber—see *dressed lumber.*

timbers—lumber 5 or more inches in least dimension.

worked lumber—lumber which, in addition to being dressed, has been matched, shiplapped, or patterned.

yard lumber—lumber generally intended for ordinary construction and general building purposes, without further manufacture, but where design properties are not required. Terminology becoming obsolete.

machine bite—a depressed cut at the end of a piece of lumber made by the machine knives in dressing; sometimes called snipe.

machine burn—a darkening or charring of the wood caused by frictional heat generated by machine knives or rolls.

machine gouge—a groove below the regular surface of cut made by machine knives in dressing lumber.

machine offset—an abrupt dressing variation in the edge surface of lumber, occurring usually near the end of the piece without reducing the width or without changing the plane of the wide surface.

machine run—the product of sawing, dressing, or patterning lumber without further grading.

manufacturing imperfections—includes all defects or blemishes that are produced in manufacturing, such as chipped grain, loosened grain, raised grain, torn grain, skips in dressing, hit and miss, variation in sawing, miscut lumber, machine burn, machine gouge, mismatching, and insufficient tongue or groove.

matching—Under **lumber** see *matched lumber.*

mechanical property—any property of wood that relates to its ability to support load or resist deflection.

medium grain—See **grain.**

millrun—the total yield of lumber from a mill or a group of logs without regard to grades.

millwork—generally building materials made of finished wood and manufactured in millwork plants and planing mills often assembled for installation upon delivery to the job site. Includes such items as inside and outside doors, window and door frames, molding, and interior trim.

mineral streak—an olive to greenish-black or brown discoloration of undetermined cause; commonly associated with bird pecks and other injuries. Occurs in streaks usually containing accumulations of mineral matter.

mismatch—an uneven fit in worked lumber when adjoining pieces do not meet tightly at all points of contact or when the surfaces of adjoining pieces are not in the same plane.

moisture content—the amount of water contained in the wood, usually expressed as a percentage of the mass of the ovendry wood.

moisture gradient—a condition of graduated moisture content between successive thickness zones of wood that may be losing or absorbing moisture. During seasoning the gradations are between the relatively dry surface zones and the wet zones at the center of the piece.

moulding—a specially worked wood member used mostly for decoration but often serves a useful purpose in other ways; generally worked from lumber of strip size; may be a plane surface but often curved or patterned.

nominal size—as applied to products such as lumber, traditionally the approximate rough-sawn commercial size by which it is known and sold in the market. Actual rough-sawn sizes may vary from the nominal. Reference to standards or grade rules is required to determine nominal/actual finished size relationships.

old growth—timber in or from a mature, naturally established forest. If the trees have grown during most of their

lives in active competition for sunlight, the bole is usually straight and relatively free of limbs.

open grain—See **grain.**

phloem—inner bark; the principal tissue concerned with the translocation of elaborate foodstuffs. A synonym is "bast."

pile—relatively slender structural element that is driven, or otherwise introduced, into the soil, usually for the purpose of providing vertical or lateral support.

pitch—a term applied to the resin occurring in the wood of certain conifers.

pitch pocket—an opening extending parallel to the annual growth rings containing, or that has contained, pitch, either solid or liquid.

pitch seam—a shake or check filled with pitch.

pitch streak—a well-defined accumulation of pitch in a more or less regular streak in the wood of certain conifers.

pith—the small, soft tissue occurring in the structural center of a tree trunk, branch, twig, or log.

pith fleck—a narrow streak, resembling pith on the surface of a piece; usually brownish, up to several inches in length; resulting from burrowing of larvae in the growing tissues of the tree.

plainsawn—A synonym for *flat grain.*

pole—a timber in the round, often to support power or telephone lines.

pores—in wood anatomy, a term applied to the cross section of a vessel or of a vascular tracheid.

porous woods—another name for hardwoods, which frequently have vessels or pores large enough to be seen readily without magnification.

post—short timber used in upright position for supporting structures of fencing. It may be round, split, or sawn.

preservative—a chemical substance which, when suitably applied to wood, makes the wood resistant to attack by fungi, insects, marine borers, or weather conditions.

pressure-treated wood—wood treated by applying pressure to force the preservative into it.

pulpwood—any wood cut or prepared primarily for the production of wood pulp.

purlin—a wood member, commonly rectangular in cross section and comparatively long and slender, used most often in a horizontal position in heavy roof construction to support rafters and decking.

quartersawn—a synonym for *edge grain.*

radial—coincident with the radius from the pith to the circumference of the tree or log. A radial section is a longitudinal section in a plane that passes through the pith of the tree.

radial surface—a longitudinal surface or plane extending wholly or in part from the pith to the bark.

rate of growth—the rate at which a tree has grown. The unit of measure is the number of annual growth rings per inch, measured radially in the trunk or in lumber cut from the trunk.

rift sawn—a synonym for *edge grain.*

ring-porous woods—hardwoods in which the pores of the earlywood are large compared to the latewood, thus forming a distinct zone or ring of pores.

rolling shear—in wood, shear in a longitudinal-transverse plane, with stresses perpendicular to the orientation of the fibers lying in the plane. This shearing force tends to roll the fibers.

rot—See **decay.**

sap—the moisture in unseasoned wood, containing nutrients and other chemicals in solution.

sapwood—the wood containing some living cells and forming the initial wood layer beneath the bark of the log. The thickness of the sapwood layer varies by species and may be lighter in color than heartwood. Under most conditions the sapwood is more susceptible to decay than heartwood.

saw kerf—(*1*) grooves or notches made in cutting with a saw; (*2*) that portion of a log, timber, or other piece of wood removed by the saw in parting the material into two pieces.

saw-log size—a log large enough to produce lumber or other products that can be sawed. Its size and quality vary with the utilization practices of the region.

seasoning—drying; the term often applied to the process of removing moisture from wood to achieve a moisture content appropriate for the performance expected of the final product.

air-dried—dried by exposure to air, usually in a yard, without artificial heat.

dry—seasoned; in softwood lumber, the abbreviation S-Dry means not in excess of 19 % moisture content at time of surfacing, in accordance with recognized standards.

kiln-dried—dried in a closed chamber in which temperature and relative humidity of the circulated air can be controlled. The drying temperature is usually greater than outside air temperature. In softwood lumber grading rules under the jurisdiction of the Southern Pine Inspection Bureau, the abbreviation KD indicates seasoned in a kiln to a moisture content not in excess of 15 % moisture content.

ovendry—dried in an oven to remove all moisture. The temperature employed usually is 101 to 105°C or 214 to 221°F in accordance with ASTM Methods D 2016 Test for Moisture Content of Wood.

shipping-dry—dried to a moisture content judged low enough to prevent stain, mold, and decay in transit.

second growth—timber that has grown after the removal, whether by cutting, fire, wind, or other agency, of all or a large part of the previous stand. Often limited to that growth following removal of old-growth timber.

shake—(*1*) a longitudinal separation of the wood. Generally two forms of shake are recognized, although variations and combinations may be used in industrial definitions.

heart shake—a shake that starts out at or near the pith and extends radially. Synonyms are *heart crack, rift crack.* A heart shake in which several radial cracks are present is termed a star shake.

ring shake—a shake occurring in the plane of the growth rings in the outer portion of the latewood for partial or entire encirclement of the pith, occasionally moving radially to an adjacent latewood ring. A synonym is "cup shake."

(2) A rectangular, board-like element for roof cover construction, similar to shingles, generally one of three types.

handsplit and resawn shakes—a shake having a split face and a sawn back.

tapersplit shake—a shake having two split faces and a natural, shingle-like taper.

straightsplit shake—a shake having two split faces and with no pronounced taper.

shavings—the thin slices of wood removed in dressing.

shear—relative displacement of adjacent planes in a member.

shear stress—a state of stress where adjacent planes in a member tend to slip on one another.

shingle—a thin, oblong piece of wood with one end thinner than the other, lapped lengthwise in covering roofs and outer walls of buildings produced by sawing.

shrinkage—reduction in dimensions due to lowering the moisture content below the fiber saturation point.

side cut—a board, plank, cant, or timber which does not contain the pith.

sill—generally a horizontal wood member forming the lowest part of the framework of a construction, from relatively small size as in a window frame to a much larger size as in a railroad bridge; a threshold or door sill.

size factor—the factor included in deriving the allowable bending stress for rectangular members which takes into account the somewhat lower unit strength developed in larger members as compared to smaller members.

skip—an unsurfaced area on dressed lumber; sometimes designated as skip dressing.

small timbers—a term used mostly to designate square or near-square dimension and timber sizes over 2 and under 9 in. in nominal thickness.

snipe—See **machine bite.**

softwoods—generally, one of the botanical groups of trees that in most cases have needlelike or scalelike leaves; the conifers; also the wood produced by such trees. The term has no reference to the actual hardness of the wood.

sound wood—wood free of any form of decay, incipient or advanced, and from insect holes.

specific gravity—as applied to wood, the ratio of the ovendry weight of a sample to the weight of a volume of water equal to the volume of the sample at some specific moisture content, as green, air-dry, or ovendry.

spiral grain—See **grain.**

split—a separation of the wood parallel to the fiber direction, due to the tearing apart of the wood cells.

springwood—See **earlywood.**

stain—a discoloration in wood that may be caused by such diverse agencies as microorganisms, metal, or chemicals. The term also applies to materials used to impart color to wood.

blue stain—a bluish or grayish discoloration of the sapwood caused by the growth of certain dark-colored fungi on the surface and in the interior of the wood which is not accompanied by deterioration of the wood. While not caused by a wood-destroying fungi, the presence of blue stain indicates conditions possibly conducive to growth of destructive fungi.

brown stain—a rich brown to deep chocolate-brown discoloration of the sapwood of some pines caused by a fungus that acts much like the blue-stain fungus. See comments on conditions conducive to staining.

chemical brown stain—a brown discoloration of chemical origin that sometimes develops on wood in the course of air seasoning or kiln drying, probably from the oxidation of extractives in the wood.

sapstain—See *blue stain.*

standard match—with a tongue and groove on opposite edges but not centered.

stem—the bole or trunk of a tree.

strength—(*1*) the ability of a member to sustain stress without failure.

(*2*) in a specific mode of test, the maximum stress sustained by a member loaded to failure.

strength ratio—the hypothetical ratio of the strength of a member to the strength it would have if no weakening defects were present.

strength-reducing defects—imperfections affecting strength, such as checks, compression wood, cross grain, decay, knots, shakes, splits, etc.

stress—force per unit of area.

strip—a thin batten or narrow, thin board. Specific descriptions may vary between softwood and hardwood.

structural boards—boards graded for structural applications requiring stress grading for assignment of allowable properties.

stud—one of a series of slender wood structural members used as supporting elements in walls and partitions. In softwood grading, a stress grade to describe lumber suitable for stud use.

stump—the part of a tree remaining above and below ground after the main stem is cut off.

summerwood—See **latewood.**

tangential—strictly, coincident with a tangent at the circumference of a tree or log, or parallel to such a tangent. In practice, however, it often means roughly coincident with a growth ring. A tangential section is a longitudinal section through a tree or limb perpendicular to a radius. Flat-grained lumber is sawed tangentially.

tension parallel to grain—the imposition of a tensile stress which acts in a direction parallel to the fiber direction of the wood.

tension wood—an abnormal form of wood found in the upper side of the bole and branches of leaning trees of some hardwood species and characterized by the presence of gelatinous fibers and excessive longitudinal shrinkage. Tension wood fibers hold together tenaciously so that sawed surfaces usually have projecting fibers, and planed surfaces often are torn or have raised grain. Tension wood may cause warping.

texture—in wood anatomy, the sizes, distribution, and proportional volumes of the cellular elements of which wood is composed; often used interchangeably with grain. Depending on the relative size and distribution of the cellular elements, texture may be coarse (open grain) or fine, even, or uneven.

timbers—See **lumber.**

transverse—directions in wood at right angles to the wood fibers. Includes radial and tangential directions. A transverse section is a section through a tree or timber at right angles to the pitch.

treatment—the act or manner of treating wood; the quantity of preservative or other substance specified or used to treat wood.

tree—a woody plant having one well-defined stem and a more or less definitely formed crown, usually attaining a height of at least 8 ft.

trunk—the main stem or body of a tree.

twist—a distortion caused by the turning or winding of the edges of a board so that the four corners or any face are no longer in the same plane.

variation in sawing—a deviation from the anticipated line of cut in sawing rough lumber or other rough wood surfaces.

vertical grain—See **grain.**

vessels—wood cells of comparatively large diameter that have open ends and are set one above the other so as to form continuous tubes. The openings of the vessels on the surface of a piece of wood are usually referred to as pores.

wane—bark or lack of wood from any cause on edge or corner of a piece.

warp—any variation from a true or plane surface. Warp includes **bow, crook, cup,** and **twist,** or any combination thereof.

wavy dressing—more pronounced imprints or markings made by machine knives in dressing than specified for knife marks.

weathering—the mechanical or chemical disintegration and discoloration of the surface of wood that is caused by exposure to light, the action of dust and sand carried by winds, and the alternate shrinking and swelling of the surface fibers with the continual variation in moisture content brought by changes in the weather. Weathering does not include decay.

wet-bulb temperature—the equilibrium temperature of a liquid vaporizing into a gas. With water and air, wet-bulb and dry-bulb temperatures give a measure of the relative humidity.

white speck—in western softwoods, pockets of decay caused by *Fomes pini.*

wide ring—a rate of growth of less than four annual rings per inch, that is, a growth rate faster than that described by *medium grain.*

wood—the tissues of the stem, branches, and roots of a woody plant lying between the pith and cambium, serving for water conduction, mechanical strength, and food storage, and characterized by the presence of tracheids or vessels.

wood-destroying organisms—principally the decay-producing fungi, beetles, termites, carpenter ants, marine borers, etc.

wood substance—the moisture-free material of which wood is composed.

NOTE—In laboratory tests, wood substance is usually on an extractive-free basis, but in common usage it usually includes all material remaining after oven-drying. There is little variation in the specific gravity of wood substance among temperate-zone species. Variation among species is caused primarily by the proportions of wood substance and air.

workability—the degree of ease and smoothness of cut obtainable on wood with hand or machine tools.

working stresses—See **allowable properties.** Archaic.

xylem—the portion of the tree trunk, branches, and roots that lies between the pith and the cambium.

APPENDIX[7]

(Nonmandatory Information)

X1. THE SIZE OF A KNOT

(Supplementing Definition of a Knot)

X1.1 The ASTM standards for timber give very definite knot sizes that are to be permitted in any given grade and size of timber and a very concise and accurate definition of a knot. But it is not always easy to trace the outline of the knot on the surface of a timber and segregate the knot from the cross grain around the knot, which is a part of the body of the tree.

X1.2 Sometimes there is a difference in color between the end grain of the limb wood and the surrounding wood. Sometimes there is a marked change in color that merely marks the heartwood of a live knot, and the sapwood of the knot may have the same color as the surrounding wood.

X1.3 Again, we find knots in which there is practically no difference in color. The body of the tree is usually enlarged at a knot so that, when a knot is sawed through, the ring growth of the body wood looks very much like a part of the knot. How then are knot sizes to be determined?

X1.4 There are two ways of determining the limits of a live knot when color or general appearance does not clearly demonstrate the boundary of the knot:

X1.4.1 The rings on the top of a limb are usually narrower than those on the bottom; and on a tangentially cut surface these rings at the top are narrower than those showing immediately above the knot in the body of the tree; also the rings in the body of the tree get wider as you measure away from the knot. The growth ring at the top of the knot can be traced around the knot to outline the size of the knot. When the knot is cut at an angle there will, as a rule, still be a place to one side of the top where the relatively narrow ring

[7] Prepared by John A. Newlin, Specialist in the Mechanics of Wood, Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, maintained at Madison, WI, in cooperation with the University of Wisconsin.

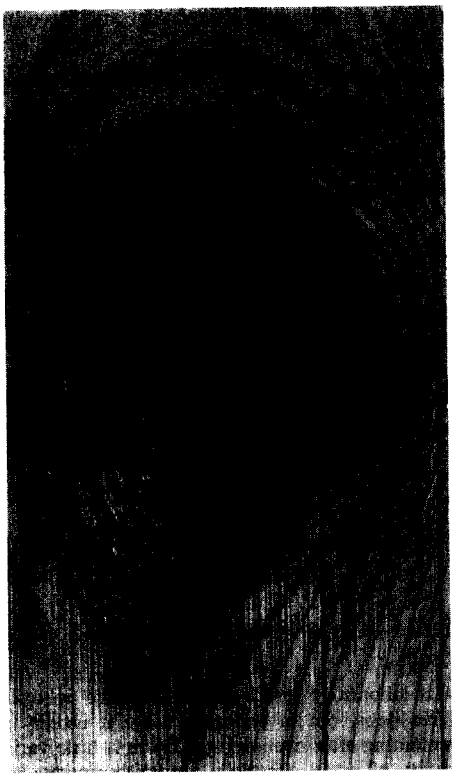


FIG. X1.1

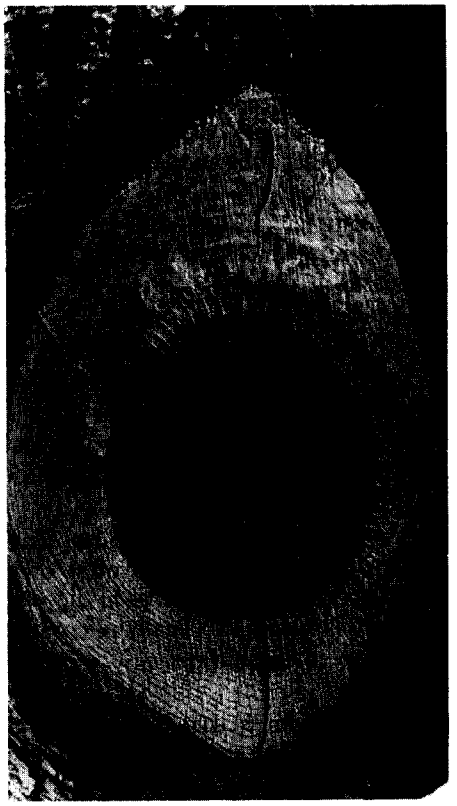


FIG. X1.2

growth of the knot is suddenly changed to the wider growth rings of the tree trunk (see *A*, Fig. X1.1). On the side of the knot opposite these narrow growth rings, the growth rings will usually be found to get wider all the way from the pith center out and it is often very difficult to establish the limit of the knots on that side except by tracing the growth rings from the other side of the knot.

X1.4.2 Checks on the face of a knot run radially from the pith center and those running to the sides never run beyond the knot without an abrupt change in direction.

X1.5 To one trying to determine the size of a knot, the oaks give a great deal of trouble due to two principal causes: First, color cannot be depended upon to outline the knot, and second, the body of the oak tree is usually greatly enlarged at a limb and a large amount of irregular or burly growth is introduced by a cut through the knot.

X1.6 On the top of the oak knot it will usually be found that the very definite growth rings of the knot change very abruptly to burly irregular grain (see *A*, Fig. X1.2), often with bark pockets (see *A*, Fig. X1.3). This is the body wood above the knot. The radial checking in the oak knot is often very prominent and can be used to determine the limits of the knot. The checks follow the rays and run approximately radially from the pith center of the knots. The checks running to the bottom of the knot may run approximately straight far beyond the limit of the knot and occasionally those running to the top may run through the burly wood above the knot in more or less of a straight line, but the checks running to the sides of the knot, while they may stop short of the limit of the knot, never run without an abrupt change of direction beyond the limit of the knot (see *B*, Figs. X1.1 and X1.2).

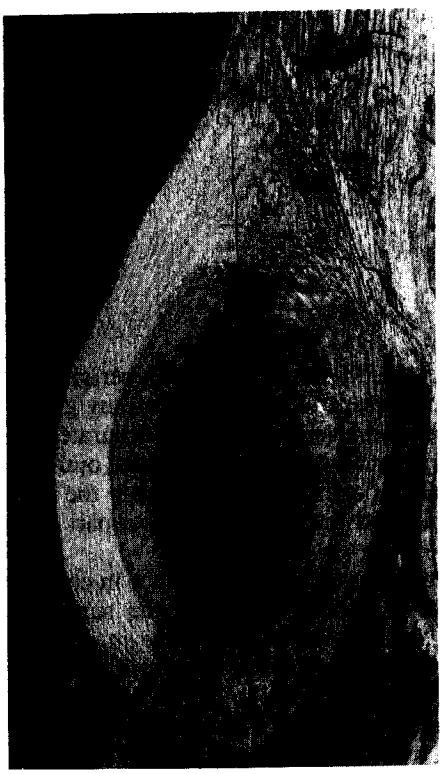


FIG. X1.3