



Designation: **F537–01 (Reapproved 2007) F537 – 01 (Reapproved 2014)**

Standard Specification for Design, Fabrication, and Installation of Fences Constructed of Wood and Related Materials¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers all wood fences, including fences combined with wood and other materials.

1.2 This specification covers three classifications of wood fences. This specification is based on fundamental construction principles combined with long-standing traditional fence building skills, and covers the design, fabrication, and installation practices of wood fences.

1.3 This specification also provides a systematic method of purchase, inspection with basis for rejection, and certification of manufactured wood fences by the fence industry.

1.4 The values stated in inch-pound units are to be regarded as the standard. Acceptable industry-wide SI equivalents are being developed.

2. Referenced Documents

2.1 ASTM Standards:²

[A641/A641M Specification for Zinc-Coated \(Galvanized\) Carbon Steel Wire](#)

[A809 Specification for Aluminum-Coated \(Aluminized\) Carbon Steel Wire](#)

[B221 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes](#)

[D2605 Specification for Volatile Petroleum Solvent \(LPG\) for Preparing Pentachlorophenol Solutions \(Withdrawn 1992\)³](#)

[D3225 Specification for Low-Boiling Hydrocarbon Solvent for Oil-Borne Preservatives \(Withdrawn 2006\)³](#)

[D3506 Specification for Inhibited Grade Methylene Chloride for Preparing Pentachlorophenol Solutions \(Withdrawn 1992\)³](#)

[F1043 Specification for Strength and Protective Coatings on Steel Industrial Fence Framework](#)

[F1667 Specification for Driven Fasteners: Nails, Spikes, and Staples](#)

2.2 Federal Standards:

[TT-W-572B Fungicide: Pentachlorophenol⁴](#)

2.3 Canadian Standards Association Document:

[B111-74 Specification for Wire Nails, Spikes, and Staples⁵](#)

2.4 National Forest Products Association Standard:

[National Design Specification for Stress Grade Lumber and Its Fastenings⁶](#)

2.5 Voluntary Product Standards:

[PS 20-70 Softwood Lumber⁷](#)

[PS 1-74 Softwood Plywood⁷](#)

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.15 on Other Fence Systems and Components.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁵ Available from Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario, Canada M 9W 1R3.

⁶ Available from National Forest Products Association, 1619 Massachusetts Ave., N.W., Washington, DC 20036.

⁷ Available from U.S. Department of Commerce, National Bureau of Standards, Washington, DC 20234.

2.6 *American Plywood Association Standard:*

Specification for Plywood Design⁸

2.7 *American Wood Preservers Association Standards:*

C1 **All Timber Products, Preservative Treatment by Pressure Process**⁹

C2 **Lumber, Timbers, Bridge Ties, Mine Ties, Preservative Treatment by Pressure Process**⁹

C5 **Fence Post, Preservative Treatment by Pressure Process**⁹

C9 **Plywood, Preservative Treatment by Pressure Process**⁹

C16 **Wood Used on Farms, Preservative Treatment by Pressure Process**⁹

C23 **Round Poles and Posts Used For Building Construction, Preservative Treatment by Pressure Process**⁹

M 4 Care of Pressure Treated Wood Products⁹

3. Terminology

3.1 *Definitions:*

3.1.1 *back rails*—rails on which cover material is directly attached.

3.1.2 *boards*—lumber that is up to 1 in. in nominal thickness and 2 in. or wider in nominal width.

3.1.3 *cover material*—the face or fill material attached to a fence structural frame.

3.1.4 *custom fence design*—any fence design that is significantly different from those described in this specification. Custom fence designs are also required to meet all requirements regarding materials, fabrication, installation, workmanship, and structural equivalency as set forth within this specification.

3.1.5 *panel products*—all modular products available in standardized rectangular panels, many of which are suited to exterior applications such as privacy fencing. Examples are plywood, fiberglass, and corrugated metals.

3.1.6 *pickets*—narrow wood members that are sawn, split, sliced, milled, natural round or half-round, and are approximately 2 to 4 in. in face or coverage width.

3.1.7 *posts*—the vertical structural support members of the fence frame.

3.1.8 *rails*—the horizontal structural support members of the fence frame.

3.1.9 *slats or weave boards*—the horizontal or vertical members used in basketweave type fences normally $\frac{3}{8}$ to $\frac{3}{4}$ in. thick and 3 in. or wider in nominal width.

3.1.10 *standard fence design*—any fence structural frame or fence-type classification covered within this specification.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *boards or pickets*—fence boards or pickets are specified by the desired shape or manufacture of the upright end when installed vertically as described in 3.2.2 through 3.2.9.

3.2.2 *California clipped corners*—corners similar to 3.2.8, except the clip angle is steeper at approximately 65°.

3.2.3 *diamond point*—a board or picket similar to the standard point (3.2.9), except it consists of additional angular cuts, front and back, so that the top appears as a triangle from four angles of view, or pyramid shaped.

3.2.4 *flattop*—a simple flat or 90° square cut end.

3.2.5 *gothic*—a picket or board in which the shape is formed by two arc-shaped cuts that meet at center to form a graceful point at the top.

3.2.6 *handsplit*—pickets, posts, and rails which are split by machine or by hand using an axe or froe, etc.

3.2.7 *pencil point*—a picket or board that is conical in shape, and common to round and half-round pickets.

3.2.8 *standard clipped corners (or dog-eared corners)*—corners which are clipped diagonally (approximately 45°).

3.2.9 *standard point*—a picket or fence board cut to a point at approximately 45° angles.

3.2.10 *posts*—fence posts are specified by the desired shape or manufacture of their above ground tops as described in 3.2.11 through 3.2.15.

3.2.11 *chamfered posts*—in round or square posts, the shallow diagonal cut or easing of the otherwise square-cut end. Usually measures from $\frac{3}{4}$ to $1\frac{1}{2}$ in. along the chamfer.

3.2.12 *diamond-point posts*—the pyramid-shaped ends of post which are formed by angle cuts of approximately 45°.

3.2.13 *domed posts*—rounded ends of either round or square posts.

3.2.14 *flattop fence posts*—the square cut ends of post.

3.2.15 *pencil-point posts*—conically shaped round post tops.

⁸ Available from American Plywood Association, 1119 A St., Tacoma, WA 98401.

⁹ Available from American Wood Preservers Association, P.O. Box 849, Stevensville, MD 21666.

4. Classification of Standard Fence Types

4.1 The generic classifications of wood fencing in 4.2 through 4.5 have gained common recognition throughout the fence industry and are adapted to this specification as a means of identifying a basic fence type. These classifications may be used in all cases as part of the purchase agreement between buyers and sellers of wood fencing; except a detailed description, drawing, or rendering of a custom fence design may be substituted where necessary.

4.2 *Type I—Rail Fences:*

4.2.1 *Split Rail*—The common country fence of alternating layers of handsplit rails laid up in zigzag tiers.

4.2.2 *Split or Sawn Post and Rail, or Both*—The rustic fence made up of split or sawn rails (two to four rails) installed into slotted split or sawn posts.

4.2.3 *Round Post and Rail*—A fence similar to that described in 4.2.2, except posts and rails are round or natural shaped; normally produced in two, three, and four rail fences. The rails are machined at ends to form a paddle-shaped scarf joint to be installed into post slots or formed into doweled ends for installing into posts with round connections.

4.2.3.1 *Herringbone Pattern Round Post and Rail*—A fence as described in 4.2.3, except it is normally a three-rail fence with small round wood inserts (doweled) which are installed between the upper two rails to form the familiar herringbone pattern.

4.2.3.2 *English Hurdle Fence*—A standard post and rail fence as described in 4.2.2 and 4.2.3, except that two smaller rails are installed diagonally from the fence posts (usually below the bottom rail connection) extending upwards to just above the fence top rail where they intersect and join a third decorative rail of the same approximate size, which extends downward to just below the bottom rail at a perpendicular angle.

4.2.4 *Post and Board*—The fence often referred to as corral fence is normally constructed using sawn wood posts, although round wood posts are sometimes used, with boards serving as rails. They are commonly constructed in two, three, or four board configurations.

4.2.4.1 *Crossbuck Post and Board*—A fence as described in 4.2.4, except that two boards diagonally cross each other between two standard top and bottom board rails.

4.2.4.2 *Crossbuck Post and Rail*—A fence as in 4.2.4.1, except rails are 2-in. or thicker nominal lumber.

4.2.4.3 *Hurdle Post and Board*—A fence having the same geometric arrangement as the English hurdle fence in 4.2.3.2, except all rails are sawn boards.

4.2.4.4 *Hurdle Post and Rail*—A fence as described in 4.2.4.3, except top and bottom rails are 2 in. or thicker nominal lumber.

4.3 *Type II—Board Fences:* Every design within this type may be supported by sawn wood posts, round wood posts, or metal posts.

4.3.1 *Solid Board Fence*—A fence that is constructed of ordinary wood fence boards which are usually installed vertically, but occasionally horizontally or diagonally, over a rather conventional fence frame of from two to four rails between posts.

4.3.2 *Spaced Board Fence*—A fence as described in 4.3.1, except that open space is provided between the boards either for eye appeal or for ventilation.

4.3.3 *Shadow Box*—A fence that is constructed like a solid board fence (see 4.3.1), except that fence boards are installed alternately from one side of the fence rails to the other, providing interesting shadow lines as well as excellent ventilation. This fence is commonly offered in either vertical or horizontal panels.

4.3.4 *Louver*—A fence which is similar to common board fences (4.3.1) in frame configuration, except that fence boards are installed angularly between the fence rails with the effect of directing sunlight and air in a desirable way. These fences may be constructed with the board louvers installed vertically or horizontally.

4.3.5 *Weave*—A fence similar to the shadow box (4.3.3), except each individual fence board, normally 1 in. nominal in thickness, is alternately attached to one side of the top rail and the opposite side of the bottom rail. It may be constructed vertically as described, or horizontally (minus rails) by alternating installation of the boards directly to the fence posts.

4.3.6 *Basket Weave*—A fence similar to the weave (4.3.5), except basket boards (commonly $\frac{3}{8}$ to $\frac{3}{4}$ in. in thickness) are woven alternately between from one to five small wood members (sometimes 1 by 2, 1 by 3, or 1 by 4-in. nominal), which extend through the height of the weave perpendicularly. The fence may contain either a vertical or horizontal weave, but in either form, the top and bottom rails may be required for rigidity. The basket weave fence requires high quality wood because of its relative thinness.

4.4 *Type III—Picket Fences:* Every design within this type may be supported by sawn wood posts, round wood posts, or metal posts.

4.4.1 *Sawn Picket*—A fence in which the pickets are from 2 to 4-in. nominal width and are installed vertically. The pickets may be installed over two to four back rails of sawn lumber. The pickets may be installed solid or by specified spacing where desired for light and ventilation.

4.4.2 *Grape Stake Picket*—A fence that is sometimes referred to by the picket type, either handsplit or machine sliced. This is a popular fence in the durable species and is usually constructed with handsplit or machined back rails and posts. It is most often installed with solid picket cover, but can be utilized as a spaced picket fence.

4.4.3 *Stockade Picket*—A fence that is similar to other picket fences, except the pickets are natural, machine milled, round, or sliced to half-round; and are available with bark removed, or with bark on for an added rustic effect. This fence is popular in common wood species, and may be installed to round wood posts and round or half-round back rails, sawn posts, and back rails; or back rails attached to metal posts.

4.4.4 *Wire-Bound Picket*—This fencing is wire-bound, wooden picket fencing, in roll form. It is used for applications such as but not limited to, snow, shade, safety, sand, and screening. The fence is fabricated with a 2- or 4-in. maximum spacing between pickets as specified by the purchaser. Each picket is held firmly by five pairs of zinc-coated wires. Each pair of wires is tightly twisted by rotating a twister head a minimum of 2½ complete revolutions (900° of rotation) for 2-in. spacing and 5 complete revolutions (1800° of rotation) for the 4-in. spacing.

4.4.4.1 The twist rotation shall be in opposite directions between each succeeding picket. The wire shall have a minimum coated diameter of 0.099 in. (12½ gage) and a minimum zinc coating of 0.30 oz/ft² (Specification **A641/A641M**, Class 1) or a minimum aluminum coating of 0.32 oz/ft² (Specification **A809**) as selected by the purchaser. It shall have a minimum tensile strength of 70 000 psi in accordance with Specification **A641/A641M** or Specification **A809**, Medium Temper. The wire spacing of top and bottom pairs of wires shall be not less than 3 in. and not more than 6 in. from the ends of the pickets, with the remaining pairs of wires spaced equidistant between the top and bottom wires.

4.4.4.2 The length of roll of fabricated fence shall be 50 ft ± 6 in. The pickets shall be made of spruce, hemlock, cedar, redwood, fir, or pine, air-dried and rough sawn. The pickets may be stained, painted with a red oxide coating, or pressure-treated in accordance with **9.4** as specified. Picket dimension shall be: length, either 48 or 72 ± ¾ in.; width, 1½ ± ¼ in.; and thickness, ¾ ± ¼ in.

4.5 *Type IV—Solid Panel Fences*: Every design within this type may be supported by sawn wood posts, round wood posts, or metal posts.

4.5.1 *Plywood Panel Fences*—A fence which includes any common post and back rail construction with an exterior grade of plywood that is installed on or within the frame.

4.5.2 *Other Panel Product Fences*—Other panel products suitable for exterior use and manufactured in standard panel sizes may be installed within any fence frame that provides adequate lateral support for the panel. Examples include corrugated fiberglass and corrugated metals.

5. Ordering Information

5.1 Complete information describing the desired fence product shall be provided with all purchase orders or inquiries. The information described in **5.1.1** through **5.1.10** shall be included as detailed within this specification:

5.1.1 *Fence-Type Classification or Description*—Provide the standard fence-type classification, as described in Section 4, or substitute a detailed description, drawing, or architectural rendering, depending on the complexity of a custom design, and the requirements of the fence supplier.

5.1.2 *Structural Frame Identification Number*—Provide the fence structural frame identification index number as provided in **Tables 1-3** (see also Section 7). Also, specify the maximum post spacing in feet, center to center of posts and the height of the fence, which is the minimum measurement from ground level to the top of the cover material or top of the top rail, whichever is the

TABLE 1 Open Frame Post and Rail Fences

Fence Type Classification	Structural Frame Identification Index	Nominal Post Size, in.	Nominal Top Rail Size, in.	Nominal Center Rail(s), in.	Nominal Bottom Rail Size, in.	Post Spacings, ft	Above Ground Height of Fence, ft	Total Number of Rails per Section
Split post and rail	No. 1	3½ by 3½	1½ by 1½	...	1½ by 1½	6	3	2
	No. 2	4 by 4	2 by 3	...	2 by 3	8	4	2
	No. 3	4 by 4	2 by 3	2 by 3	2 by 3	8	4	3
	No. 4	4 by 5	2 by 4	...	2 by 4	10	5	2
	No. 5	4 by 5	2 by 4	2 by 4	2 by 4	10	5	3
	No. 6	5 by 5	2 by 3	2 by 3	2 by 3	8	6	3
	No. 7	5 by 5	2 by 4	...	2 by 4	10	6	2
	No. 8	5 by 5	2 by 4	2 by 4	2 by 4	10	6	3
Round post and rail	No. 9	4 diameter	...	3 diameter	...	8	1, 2	1
	No. 10	5 diameter	...	4 diameter	...	8 to 10	1, 2	1
	No. 11	4 diameter	3 diameter	...	3 diameter	8	2, 3, 4	2
	No. 12	4 diameter	3 diameter	3 diameter	3 diameter	8	3, 4, 5	3
	No. 13	5 diameter	4 diameter	...	4 diameter	8 to 10	3, 4, 5	2
	No. 14	5 diameter	4 diameter	4 diameter	4 diameter	8 to 10	4, 5, 6	3
	No. 15	5 diameter	4 diameter	4 diameter	4 diameter	8 to 10	5, 6, 7	4
Sawn post and board	No. 16	3 by 4	1 by 4	...	1 by 4	8	2	2
	No. 17	4 by 4	1 by 4	1 by 4	1 by 4	8	3, 4, 5	3, 4, 5
	No. 18	4 by 4	1 by 6	1 by 6	1 by 6	8	4, 5, 6	3, 4, 5

TABLE 2 Sawn Wood Fence Frames

Fence Type Classification	Structural Frame Identification Index	Nominal Post Size, in.	Nominal Top Rail Size, in.	Nominal Center Rail(s), in.	Nominal Bottom Rail Size, in.	Post Spacings, ft.	Above Ground Height of Fence, ft	Total Number of Rails per Section
Fence frames for use with cover materials (up to and including solid, 100 %, cover or fill designs)	No. 19	3 by 4	2 by 3	...	2 by 3	6	3, 4	2
	No. 20	4 by 4	2 by 3	...	2 by 3	8	3, 4	2
	No. 21	4 by 4	2 by 3	2 by 3	2 by 3	8	4, 5, 6	3
	No. 22	4 by 4	2 by 4	...	2 by 4	8	4, 5, 6	2
	No. 23	4 by 4	2 by 4	2 by 4	2 by 4	8	6	3
	No. 24	4 by 4	2 by 6	...	2 by 6	8	6	2
	No. 25	4 by 4	4 by 4	...	4 by 4	8	6	2
	No. 26	4 by 6	2 by 4	2 by 4	2 by 4	6	7	3
	No. 27	4 by 6	2 by 6	...	2 by 6	6	7	2
	No. 28	4 by 6	4 by 4	...	4 by 4	6	7	2
	No. 29	6 by 6	2 by 6	2 by 6	2 by 6	6	8	3
	No. 30	6 by 6	4 by 4	4 by 4	4 by 4	6	8	3
	No. 31	6 by 6	2 by 4	2 by 4	2 by 4	6	8	4
	No. 19A	3 by 4	1 by 4	...	1 by 4	6	3	2
	No. 20A	3 by 4	1 by 4	1 by 4	1 by 4	6	4, 5	3
	No. 21A	4 by 4	1 by 4	1 by 4	1 by 4	8	4, 5, 6	3

TABLE 3 Metal Fence Posts and Frames

Fence Type Classification	Structural Frame Identification Index	Nominal Outside Diameter or Dimensions of Metal Posts, in.	Nominal Top Rail Size-Wood, in.	Nominal Center Rail-Wood, in.	Nominal Bottom Rail-Wood, in.	Post Spacings, ft	Above Ground Height of Fence, ft	Total Number of Rails per Section
Metal/wood fence frames for use with cover materials (galvanized steel pipe)	No. 1M	1.90	2 by 3	...	2 by 3	8	3 to 4	2
	No. 2M	1.90	2 by 3	2 by 3	2 by 3	8	4 to 5	3
	No. 3M	1.90	2 by 4	...	2 by 4	8	4 to 5	2
	No. 4M	2.375	2 by 3	2 by 3	2 by 3	8	4, 5, 6	3
	No. 5M	2.375	2 by 4	...	2 by 4	8	4, 5, 6	2
	No. 6M	2.375	2 by 4	2 by 4	2 by 4	8	5 to 6	3
Same usage as above but post and rails are metal channels	No. 7M	1.875 by 1.625	2 by 3	2 by 3	2 by 3	8	3 to 4	2
	No. 8M	1.875 by 1.625	2 by 3	...	2 by 3	8	4 to 5	3
	No. 9M	1.875 by 1.625	2 by 4	2 by 4	2 by 4	8	4 to 5	2
	No. 10M	2.25 by 1.70	2 by 3	2 by 3	2 by 3	8	4, 5, 6	3
	No. 11M	2.25 by 1.70	2 by 4	...	2 by 4	8	4, 5, 6	2
	No. 12M	2.25 by 1.70	2 by 4	2 by 4	2 by 4	8	5 to 6	3
	No. 13M	2.375 × 2 aluminum	2.375 × 2 aluminum	...	2.375 × 2 aluminum	6 to 10	3 to 6	2
	No. 14M	2.375 × 2 galvanized steel	2.375 × 2 galvanized steel	...	2.375 × 2 galvanized steel	6 to 10	3 to 6	2

greater when options are provided for a particular fence frame in the tables. For open post and rail fences, specify the desired number of rails where shown to be optional in **Table 1**. The fence frames listed in **Tables 1-3** and **Section 7** provide many common fence frame configurations and may be used for simplified specifying. Alternatively, fence frames of significantly different design may be used if they provide structural integrity equal or superior to those described in **Section 7**, or if justified by structural engineering as provided in NFPA Specification for Stress Grade Lumber and Its Fastenings and APA Specification for Plywood Design.

5.1.3 Architectural Class or Grade of Materials—Include the architectural class of all sawn posts, rails, or boards as provided in **Section 6** or their acceptable equivalent commercial lumber grade as provided in **Tables 4-7**. If handsplit, machine-sliced, or sawn pickets are to be used, specify the architectural class in accordance with **Section 6**. All other wood products are required to meet their minimum quality standards as established within **Section 6**.

5.1.4 Species of Wood—It is normally desirable for the fence purchaser to specify the commercial species of wood to be used in the fence or its various component parts, as it relates vitally to the appearance, durability, and general performance of the fence structure (see **Section 8**).

TABLE 4 Lumber for Fence Boards (2 in. and Wider)

Species	Architectural Class I	Architectural Class II	Architectural Class III	Grade Rule Writing Agencies ^A
Western Red Cedar	select	quality	utility	ICA
	select	quality	utility	NLGA
Western Cedars (Incense and Red)	select merchantable	standard/construction	utility	WCLIB, WWPA, NLGA
	2 and btr common	3 common	4 common	WWPA, NLGA
Cypress	1 common	2 common	3 common or peck	SCMA, NHLA
Douglas Fir-Larch	select merchantable	standard/construction	utility	WCLIB, WWPA, NLGA
Douglas Fir-Larch	2 and btr common	3 common	4 common	WWPA, NLGA
Hem-Fir (Hemlock-White Fir)	select merchantable	standard/construction	utility	WCLIB, WWPA, NLGA
	2 and btr common	3 common	4 common	WWPA, NLGA
Western or Idaho White Pine	sterling	standard	utility	WWPA, NLGA
Western Pines	2 and btr common	3 common	4 common	WWPA, NLGA
Norway Pine	premium	premium	standard	NELMA
Eastern White Pine	premium	premium	standard	NELMA
Eastern White Pine	2 and btr common	3 common	4 common	NLGA
Northern Pine and Norway Pine (NHPMA)	2 and btr common	3 common	4 common	NHPMA, NELMA, NLGA
Southern Pine	No. 1 boards	No. 2 boards	No. 3 boards	SPIB
Eastern Hemlock and Tamarack	2 and btr common	3 common	4 common	NHPMA, NELMA
Aspen-Alder	2 and btr common	3 common	4 common	NHPMA, NELMA, NLGA, WWPA
Balsam Fir and Eastern Spruce	2 and btr common	3 common	4 common	NHPMA, NELMA, NLGA
Englemann Spruce	2 and btr common	3 common	4 common	WWPA
Sitka Spruce	select merchantable	standard/construction	utility	WCLIB, NLGA
Spruce-Pine-Fir	2 and btr common	3 common	4 common	NLGA
Redwood	select heart or select	construction heart or construction common	merchantable	RIS
Redwood				RIS
Northern White Cedar	2 and btr common	3 common	4 common	NELMA, NLGA
Alpine Fir	2 and btr common	3 common	4 common	WWPA, NLGA
All hardwoods	No. 1 construction	No. 2 construction	No. 3 construction	NLHA, SHLMA

^A For identification of agencies, refer to [Appendix X2](#).

TABLE 5 Lumber for Posts and Rails (2 to 4 in. Thick and 2 to 4 in. Wide)

Species	Architectural Class I	Architectural Class II	Architectural Class III	Grade Rule Writing Agencies ^A
Western Red Cedar	select	quality	utility	ICA
Western Cedars (Incense and Red)	construction/No. 2	standard, No. 3, or stud	utility	WWPA, WCLIB, NLGA
Cypress	1 common	2 common	3 common	SCMA, NHLA
Douglas Fir-Larch	construction/No. 2	standard, No. 3, or stud	utility	WWPA, WCLIB, NLGA
Hemlock-Fir	construction/No. 2	standard, No. 3, or stud	utility	WWPA, WCLIB, NLGA
Western Pine	construction/No. 2	standard, No. 3, or stud	utility	WWPA, NLGA
Eastern White Pine	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NHPMA, NLGA
Western or Idaho White Pine	construction/No. 2	standard, No. 3, or stud	utility	WWPA, NLGA
Northern Pines	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NHPMA, NLGA
Southern Pine	construction/No. 2	standard, No. 3, or stud	utility	SPIB
Eastern Hemlock, Tamarack	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NHPMA
Aspen-Alder	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NHPMA, NLGA
Balsam Fir, Eastern Spruce	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NHPMA, NLGA
Engelmann Spruce	construction/No. 2	standard, No. 3, or stud	utility	WWPA
Sitka Spruce	construction/No. 2	standard, No. 3, or stud	utility	WCLIB, NLGA
Spruce, Pine, Fir	construction/No. 2	standard, No. 3, or stud	utility	NLGA
Redwood	select, select heart, or No. 2 open grain	construction common, construction heart, or No. 3 open grain, standard stud	merchantable utility	RIS
Alpine Fir	construction/No. 2	standard, No. 3, or stud	utility	WWPA, NLGA
All hardwoods	No. 1 dimension	No. 1 dimension	No. 2 dimension	NHLA, SHLMA
Northern White Cedar	construction/No. 2	standard, No. 3, or stud	utility	NELMA, NLGA

^A For identification of agencies, refer to [Appendix X2](#).

5.1.5 *Preservative Pressure Treatment*—Specify the pressure treatment, where applicable, in accordance with AWP Standards C1, C2, C5, C9, C16, C23, and M 4 (see Section 9).

5.1.6 *Sizes and Details for Cover Material(s)*—Sizes of boards, pickets, and other fence cover materials (such as basketweave stock) shall be included in all purchase orders and inquiries. Unless otherwise noted, all fence boards shall be taken to be 1 in. rough nominal in thickness. Details of cover material selection should be included where necessary (for example, nominal face widths of fence boards or pickets should be specified, including the style in which they are laid-up). Sizes are provided in Section 10.

TABLE 6 Lumber for Posts and Rails (2 to 4 in. Thick and 6 in. and Wider)

Species	Architectural Class I	Architectural Class II	Architectural Class III	Grade Rule Writing Agencies ^A
Western Red Cedar	select	quality	utility	ICA
Western Cedars (Incense and Red)	No. 1	No. 2	No. 3	WWPA, WCLIB, NLGA
Cypress	1 common	2 common	3 common	SCMA, NHLA
Douglas Fir-Larch	No. 1	No. 2	No. 3	WWPA, WCLIB, NLGA
Hemlock-Fir	No. 1	No. 2	No. 3	WWPA, WCLIB, NLGA
Western Pine	No. 1	No. 2	No. 3	WWPA, NLGA
Eastern White Pine	No. 1	No. 2	No. 3	NELMA, NHPMA, NLGA
Western or Idaho White Pine	No. 1	No. 2	No. 3	WWPA, NLGA
Northern Pines	No. 1	No. 2	No. 3	NELMA, NHPMA, NLGA
Southern Pine	No. 1	No. 2	No. 3	SPIB
Eastern Hemlock, Tamarack	No. 1	No. 2	No. 3	NELMA, NHPMA
Aspen-Alder	No. 1	No. 2	No. 3	NELMA, NHPMA, WWPA, NLGA
Balsam Fir, Eastern Spruce	No. 1	No. 2	No. 3	NELMA, NHPMA, NLGA
Engelmann Spruce	No. 1	No. 2	No. 3	WWPA
Sitka Spruce	No. 1	No. 2	No. 3	WCLIB, NLGA
Spruce, Pine, Fir	No. 1	No. 2	No. 3	NLGA
Redwood	No. 1 open grain, select/select heart	No. 2 open grain, construction common/construction heart	No. 3 open grain, merchantable	RIS
Northern White Cedar	No. 1	No. 2	No. 3	NELMA, NLGA
Alpine Fir	No. 1	No. 2	No. 3	WWPA, NLGA
All hardwoods	No. 1 dimension	No. 1 dimension	No. 2 dimension	NHLA, SHLMA

^A For identification of agencies, refer to [Appendix X2](#).

TABLE 7 Lumber for Large Posts (5 in. and Thicker and 5 in. and Wider)

Species	Architectural Class I	Architectural Class II	Architectural Class III	Grade Rule Writing Agencies ^A
Western Red Cedar	select	quality	utility	ICA
Western Cedars (Incense & Red)	select structural	No. 1	No. 2	WWPA
Cypress	1 common	2 common	3 common	SCMA, NHLA
Douglas Fir-Larch	select structural	No. 1 structural	standard	WCLIB, NLGA
Douglas Fir-Larch	select structural	No. 1	No. 2	WWPA
Hemlock-Fir	select structural	No. 1 structural	standard	WCLIB, NLGA
Hemlock-Fir	select structural	No. 1	No. 2	WWPA
Western Pines	select structural	No. 1	No. 2	WWPA
Western Pines	select structural	No. 1	standard	NLGA
Eastern White Pine	select structural	No. 1	No. 2	NELMA, NHPMA
Eastern White Pine	select structural	No. 1	standard	NLGA
Northern Pines	select structural	No. 1	standard	NLGA
Northern Pines	select structural	No. 1	No. 2	NHPMA
Northern Pines	select structural	No. 1	No. 2	NELMA
Southern Pine	No. 1 dense stress or dense structural "65"	No. 1 stress rated or No. 1 timber	No. 2 stress-rated or No. 2 timber	SPIB
Eastern Hemlock, Tamarack	select structural	No. 1	No. 2	NELMA
Aspen-Alder	select structural	No. 1	No. 2	NHPMA
Aspen-Alder	select structural	No. 1	No. 2	NELMA, NHPMA, WWPA
Balsam Fir, Eastern Spruce	select structural	No. 1	standard	NLGA
Balsam Fir, Eastern Spruce	select structural	No. 1	No. 2	NHPMA, NELMA
Engelmann Spruce	select structural	No. 1	standard	NLGA
Sitka Spruce	select structural	No. 1	No. 2	WWPA
Spruce, Pine, Fir	select structural	No. 1	standard	WCLIB, NLGA
Redwood	select, select heart or select structural open grain	construction common, construction heart, or No. 1 open grain	merchantable, No. 2 open grain	RIS
All hardwoods	No. 1 dimension	No. 1 dimension	No. 2 dimension	NHLA, SHLMA

^A For identification of agencies, refer to [Appendix X2](#).

5.1.7 *Manufacture*—Special shapes or dressed ends of vertical fence boards, pickets, or posts shall be specified by the terminology provided in Section 3. Round post and rail fences may be specified with paddle-shaped scarf joints in cases where rail scarfs are fitted into slotted posts; or rails may be manufactured with doweled ends for installation into posts with special round-hold connections. Other special manufacturing details may be specified by including a detailed description, drawing, or rendering of the fence.

5.1.8 *Post Embedment*—The required fence post installation shall be specified as compact soil embedment, gravel or sand-gravel embedment, or set in concrete collar footings in accordance with Section 11. However, if the fence is installed by the purchaser, only the required post length need be specified, based on the depth of embedment as determined in accordance with Section 11.

5.1.9 *Fastenings and Connections*—This aspect of fence construction may be specified with considerable detail or may be omitted, in which case all fastenings and connections shall comply with Section 11.

5.1.10 *Finish*—When and if a special finish is desired, the color, method of application, and number of coats shall be specified (see Section 12).

6. Quality of Materials of Manufacture

6.1 *Quality Classification of Sawn Posts and Rails*—The following quality classifications of sawn lumber posts and rails may be achieved by ripping or cross cutting commercial grades of lumber to meet the requirements as listed. Compliance can also be achieved by using the minimum commercial grades of lumber which are acceptable alternatives and in reasonable accordance with these architectural quality classifications. Tables 4-7 relate commercial lumber grades by size and use categories to the following fence industry component-part quality classifications:

6.1.1 *Architectural Class I, Sawn Posts and Rails*—This classification is recommended where the highest combination of both strength and appearance is required. Allowable growth characteristics and limiting provisions are described in 6.1.1.1 through 6.1.1.7.

6.1.1.1 Stained sapwood allowed, stained heartwood in 25 % of the piece.

6.1.1.2 Seasoning checks not limited except through checks at end limited as splits; allowable splits equivalent in length to the width of the piece.

6.1.1.3 Knots, sound and tight, approximately one third the face width; small unsound or not firmly fixed knots allowed.

6.1.1.4 Skips, hit and miss.

6.1.1.5 Slope of grain, not to exceed a 1-in. deviation in 8 in. of length.

6.1.1.6 No spike knot or other growth characteristic shall displace more than one third of a cross-sectional area.

6.1.1.7 Wane, one sixth of any face; or one fourth of any face up to half the length; except an occasional piece may have wane up to one half the thickness and one third the width for one fourth of the length.

6.1.2 *Architectural Class II, Sawn Posts and Rails*—This classification provides high strength in a fence, while providing a rustic appearance. Allowable growth characteristics and limiting provisions are described in 6.1.2.1 through 6.1.2.10.

6.1.2.1 Stain and other rustic colorations due to normal weathering or seasoning not limited.

6.1.2.2 Seasoning checks not limited except through checks at end limited as splits; allowable splits equivalent in length to 1½ times the width of the piece.

6.1.2.3 Knots, unsound or not firmly fixed approximately one third the face width.

6.1.2.4 Holes, knot holes, or holes from any cause, approximately 1 in. or equivalent smaller for each 2 ft of length.

6.1.2.5 Skips, hit and miss.

6.1.2.6 Small spots or streaks of unsound wood, or peck, equal to one sixth the width permitted.

6.1.2.7 Light shake permitted; through shakes, in 2 through 4-in. material, up to 2 ft long permitted away from ends. If through at edges or ends, limited as splits.

6.1.2.8 Slope of grain, not to exceed 1-in. deviation in 8 in. of length.

6.1.2.9 No spike knot or other growth characteristic shall displace more than one third of a cross-sectional area.

6.1.2.10 Wane, one third of any face; except, that an occasional piece may have wane up to two thirds the thickness and one half the width for one fourth the length.

6.1.3 *Architectural Class III, Sawn Posts and Rails*—The most rustic of all classifications but suitable and even desirable for many wood fence designs. Allowable growth characteristics and limiting provisions are described in 6.1.3.1 through 6.1.3.10.

6.1.3.1 Stained wood permitted.

6.1.3.2 Seasoning checks not limited, except through checks at end limited as splits; allowable splits equivalent in length to twice the width of the piece, but in no case may exceed one sixth of the length.

6.1.3.3 Knots, unsound or not firmly fixed not larger than one half the face width.

6.1.3.4 Holes, knot holes, or holes from any cause, not larger than one third of the face width.

6.1.3.5 Skips, hit or miss up to 1/8-in. scant.

6.1.3.6 Unsound wood, honeycomb, or peck permitted in spots or streaks but shall not displace more than one third of a cross-sectional area.

6.1.3.7 Medium shake permitted; occasional through shakes permitted when tight and nearly parallel to edges, and limited in length as splits, measured on the through side.

6.1.3.8 Slope of grain, not to exceed a 1-in. deviation in 4 in. of length.

6.1.3.9 No spike knot or other growth characteristic, singularly or in combination, shall displace more than one half of a cross-sectional area.

6.1.3.10 Wane, one half of any face; except that an occasional piece may have wane up to two thirds the thickness for one fourth the length.

6.1.4 *Definitions of Growth Characteristics*—For definitions relating to allowable growth characteristics and limiting provisions as allowed in 6.1.1 through 6.1.3, refer to **Appendix X1** of this specification.

6.2 *Quality Standards for Split Posts and Rails*—Split posts and rails shall be graded on the basis of strength and appearance. Tolerances for dimensional variation are also provided since it is impossible for each post or rail to be exactly alike due to its hand-crafted method of manufacture; therefore the dimensions are average and approximate within tolerances shown.

6.2.1 A $-\frac{1}{2}$ -in. tolerance in girth shall be allowed for variation in the finished product.

6.2.2 All longitudinal shaping shall be developed by splitting with axe, froe, wedge, or machine. Cut, torn, or rough grain shall not be classified as defects.

6.2.3 Knots shall not exceed one half of the narrowest dimension in size.

6.2.4 Spiral grain shall not exceed a one-quarter twist within the length of the piece.

6.2.5 Kinks, bends, crooks, or sweep shall not be greater than the equivalent of the narrowest dimension, measured as a deviation from a straight line drawn along the center from end to end.

6.2.6 No outer bark, sap rot, char, or unsightly discolorations shall be permitted. Limited heart rot or peck in streaks or pockets shall be permitted. Rustic colorations due to normal weathering and seasoning shall be permitted.

6.2.7 Scars, wounds, or splits shall not exceed one fourth the depth of the member at the area affected.

6.3 *Quality Standards for Round and Half-Round Posts and Rails*—These posts and rails shall be graded on the basis of strength and appearance. Tolerances for diameter variation are also provided since it is impossible for each natural round post or round and half-round rails to be exactly alike; therefore, diameters are average and approximate within the tolerances shown.

6.3.1 A $-\frac{1}{4}$ -in. or a $+\frac{1}{2}$ -in. variation in the nominal small-end diameter shall be allowed.

6.3.2 Natural taper shall be permitted.

6.3.3 Knots or limbs shall be trimmed flush and shall be limited to a maximum of a 50 % displacement within any 6 in. of length.

6.3.4 Kinks, bends, or crook shall be limited to an amount equivalent in inches to half the average diameter, measured as a deviation from a straight line drawn along the center from end to end.

6.3.5 No end rot, saw cut, or major defect shall be permitted. No outer bark shall be permitted, except for small spots or streaks limited to a maximum of 10 % of the total surface area. Rustic colorations due to normal weathering and seasoning shall be permitted.

6.3.6 Seasoning checks or cracks are normal characteristics and shall be limited to one half the diameter.

6.3.7 Length of round posts may be ± 2 in. Length of rails may be ± 1 in.

6.4 *Quality Classification of Sawn Fence Boards*—The following quality classifications of sawn lumber fence boards may be achieved by ripping or cross-cutting ordinary commercial grades of lumber to meet the requirements as listed. Compliance can also be achieved by using the minimum commercial grades of lumber which are acceptable alternatives and in reasonable accordance with these architectural quality classifications. **Tables 4-7** relate commercial lumber grades by size and use categories to the following fence industry component-part quality classifications:

6.4.1 *Architectural Class I, Sawn Fence Boards*—This classification provides first-rate fence boards of high strength and appearance quality. In addition to disallowing such through-defects as knot holes, other allowable growth characteristics and limiting provisions are described in 6.4.1.1 through 6.4.1.9.

6.4.1.1 Light stain allowed; medium stain allowed on occasional pieces if otherwise superior quality.

6.4.1.2 Small seasoning checks permitted, with an occasional medium check not through.

6.4.1.3 Short splits, limited to one on each end.

6.4.1.4 Knots, sound and tight, approximately one third the face width.

6.4.1.5 Skips, hit and miss.

6.4.1.6 Scattered pin holes.

6.4.1.7 Shake, fine.

6.4.1.8 Spike knots, approximately one half the face width or equivalent; but no spike knot or other growth characteristic shall displace more than one third of a cross-sectional area.

6.4.1.9 Wane, not permitted.

6.4.2 *Architectural Class II, Sawn Fence Boards*—This classification provides good strength and appearance qualities, while allowing occasional through-defects and offering a decidedly more rustic look. Allowable growth characteristics and limiting provisions are described in 6.4.2.1 through 6.4.2.11.

6.4.2.1 Medium stain allowed; heavy stain allowed on occasional pieces if otherwise superior quality.

6.4.2.2 Medium seasoning checks permitted.

6.4.2.3 Short splits permitted, or one tight medium split.

6.4.2.4 Knots, sound and tight up to one half the face width but not over $4\frac{1}{2}$ in. in diameter or equivalent; knots unsound or not firmly fixed limited to approximately one third the face width but not over $2\frac{1}{2}$ in. in diameter or equivalent.

- 6.4.2.5 Skips, hit or miss.
- 6.4.2.6 Pin holes not limited.
- 6.4.2.7 Shake, light. Through shakes limited to one fourth the length.
- 6.4.2.8 Spike knots, approximately three fourths of face width; but, no spike knot or other growth characteristic shall displace more than one half of a cross-sectional area.
- 6.4.2.9 Wane, one half of the thickness, one third of the width.
- 6.4.2.10 Small spots or streaks of unsound wood, or peck, equal to one sixth the width and not more than one eighth of the area.
- 6.4.2.11 Holes, knot holes, or holes from any cause, approximately 1 in. or equivalent for each 3 ft of length.
- 6.4.3 *Architectural Class III, Sawn Fence Boards*—The most rustic of all fence board classifications but highly suitable and even desirable for many wood fence designs. Allowable growth characteristics and limiting provisions are described in 6.4.3.1 through 6.4.3.11.
- 6.4.3.1 Heavy stain permitted.
- 6.4.3.2 Large seasoning checks permitted.
- 6.4.3.3 Splits, approximately one fourth the length.
- 6.4.3.4 Knots, unsound or not firmly fixed up to approximately one half the face width.
- 6.4.3.5 Skips, hit or miss up to 1/8-in. scant.
- 6.4.3.6 Pin holes or small holes not limited.
- 6.4.3.7 Medium through shake permitted.
- 6.4.3.8 Spike knots, or other growth characteristics, shall not displace more than approximately one half of a cross-sectional area.
- 6.4.3.9 Wane, approximately one half the thickness and one third the width except heavy wane permitted on back. When through face, limited as holes.
- 6.4.3.10 Unsound wood, honeycomb, or peck permitted in spots or streaks over one third the surface area, but not displacing more than approximately one half of a cross-sectional area.
- 6.4.3.11 Holes, knot holes, or holes from any cause, not larger than approximately one third the face width. Knot holes, or loose knots, or both of maximum size are limited to one for each 4 ft of length, or equivalent smaller.
- 6.4.4 *Definitions of Growth Characteristics*—For definitions related to allowable growth characteristics and limitations described within 6.4.1 through 6.4.3, refer to **Appendix X1**.
- 6.5 *Quality Standards for Machined or Hand-Split Pickets*—These pickets are available in two quality levels, Architectural Class I and II; both will provide more than adequate performance while offering distinctly different appearance characteristics. Faces shall have 100 % longitudinal shaping by splitting with axe, froe, wedge, or machine.
- 6.5.1 *Class I*—Allowable growth characteristics and limiting provisions are described in 6.5.1.1 through 6.5.1.6.
- 6.5.1.1 Pickets shall be free of rot and bark with one clear split face. They may have saw marks on back.
- 6.5.1.2 Pickets shall have straight and parallel edges full width within a $\pm 1/16$ -in. tolerance.
- 6.5.1.3 Pickets shall be split 9/16 in. thick; split end or top shall have a minimum thickness of 7/16 in.; minimum thickness at butt shall be not less than 3/16 in. at one point or one edge, average minimum 5/16 in.; maximum thickness at any point not to exceed 1 1/8 in., including dimension at spike knot.
- 6.5.1.4 Pickets shall be square and trimmed to a length tolerance of 1/2 in. plus or minus.
- 6.5.1.5 Twist and knot curls shall not exceed 1/2 in.; further, two pickets standing side by side shall not show a hole or noticeable gap through, when viewed from a distance of approximately 10 ft.
- 6.5.1.6 A 6-in. bow or sweep in the flat surface that will pull out by bundling or nailing is allowed.
- 6.5.2 *Class II*—Allowable growth characteristics and limiting provisions are described in 6.5.2.1 through 6.5.2.6.
- 6.5.2.1 Rot spots or streaks of bark not to exceed one third of the edge thickness.
- 6.5.2.2 Small knots or holes not to exceed 1/2 in. in face.
- 6.5.2.3 Curved edges or edge sweep not to exceed 1/4 in.; width tolerance may be $\pm 1/8$ in.
- 6.5.2.4 Thickness on split end allowed to be 9/32 in., minimum; allowable butt thickness, 1/8 in., minimum; maximum thickness not to exceed 1 1/2 in.
- 6.5.2.5 Length tolerance permitted is $\pm 3/4$ in.
- 6.5.2.6 Twist and knot curls allowed.
- 6.6 *Quality Standards for Machine-Sliced Pickets*—These pickets are available and acceptable in two qualities, Class I and II; both will provide more than adequate performance while offering distinctly different appearance characteristics.
- 6.6.1 *Class I*—Allowable growth characteristics and limiting provisions are described in 6.6.1.1 through 6.6.1.4.
- 6.6.1.1 Pickets shall be free of rot and bark with one clear sliced face. They may have saw marks on back.
- 6.6.1.2 Pickets shall have straight and parallel edges full width with a tolerance of $\pm 1/16$ in.
- 6.6.1.3 Pickets shall be sliced 1 1/16 in. thick. They shall have a minimum thickness of 7/16 in.
- 6.6.1.4 All pickets shall be square end trimmed to a length tolerance of $\pm 1/8$ in.
- 6.6.2 *Class II*—Allowable growth characteristics and limiting provisions are described in 6.6.2.1 through 6.6.2.4.
- 6.6.2.1 Sound knots not to exceed two thirds of the width.