

I.S. 6A – 11

Industry Standard for

**Architectural
Stile and Rail
Doors**



**WINDOW & DOOR
MANUFACTURERS ASSOCIATION**

WDMA

THE WINDOW & DOOR MANUFACTURERS ASSOCIATION

401N. Michigan Avenue, Suite 2200, Chicago, IL 60611

WDMA Environmental Stewardship Committee

Statement of Beliefs

- The membership of the Window & Door Manufacturers Association (WDMA) supports the intent of environmental stewardship aimed at protecting the earth's resources including sound environmental practices to protect our air, water, land and the human, animal and plant life of our planet.
- WDMA encourages our members to make the most efficient use of materials and resources, to recycle or reuse materials where economically feasible, and to conduct business in a manner that supports environmental stewardship.
- WDMA supports and defines sustainable forest management as the stewardship of forests that promotes the health, productivity and potential to fulfill relevant ecological, economic and social functions at the local, national and global levels, both today and for future generations. We support programs that promote the use of best forestry management practices and sustainable forestry activity.
- We encourage and support our members to improve their practice of environmental stewardship and will work to assist them and the broader community in the implementation of sound environmental practices.

Approved by the WDMA Board of Directors
May 18, 2006

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FOREWORD

WDMA Door Division

The architectural wood stile & rail door manufacturer and material supplier members of the WDMA Door Division combine to promote the use of architectural wood doors, to maintain quality standards and to provide other informational services.

Acceptance, specification and other use of this standard is completely voluntary, as the WDMA does not in any way control or regulate the method or manner of manufacture or production of industry products by its various members.

Because of constant technological changes and product improvements in component parts used by wood door manufacturers, industry standards referenced in this document may become outdated. This standard is under constant review so that situations such as these can be evaluated, recognized, and incorporated as quickly as possible. It is the intent of this standard to define wood doors consistent with industry practices and technical advances. This version (2011) takes precedence over previous versions.

Architectural Wood Stile & Rail Doors

An architectural wood stile & rail door is the pinnacle of wood door manufacturing. Architectural wood stile & rail doors are part of the building's permanent furniture. The requirements for their manufacture are therefore indicative of their place as the building's permanent, visible, operable equipment. Architectural Stile and Rail Doors include only those assembled from engineered stile, rail and panel components, all of which remain visible on the face of the assembled door. Door face materials contoured to simulate this construction are useful in other products, but not included in this standard.

Introduction

WDMA I.S.6A is a general industry standard that establishes expectations for the performance and aesthetics of architectural wood stile & rail doors. These combine in producing a wood stile & rail door for a particular opening. Function and performance are primarily controlled by the wood door construction. Aesthetics are primarily controlled by species, veneer cut, matching of veneers and finish selected.

Performance

WDMA standards require the designation of a performance duty level in addition to an aesthetic grade. Performance duty levels are based on the amount and severity of use. There are three levels of duty based on performance values of eight different attributes as defined in Section P. It is the responsibility of the specifier to select the duty level for each application. Duty levels include:

Extra Heavy Duty	Typically involves doors where use is considered heavy and frequent, and requires the highest minimum performance standards.
Heavy Duty	Typically involves doors where usage is moderate, and requires intermediate minimum performance standards.
Standard Duty	Typically involves doors where frequency of use is low, and requires the lowest minimum performance standards.¶
NOTE: If the performance duty level is not specified, Heavy Duty is the default.	

Aesthetics

Aesthetics are influenced by several factors, as indicated in Section A. However, objective attributes are defined through the use of two grading levels. It is the responsibility of the specifier to select the best aesthetic grade for each application.

Premium	Uses AA grade faces that are assembled using book and center balance match; other face options are available but must be specified. Typically specified for use in those areas of a project where the very highest level of quality is required.
Custom	Uses A grade faces that are assembled using book and running match; other face options are available but must be specified. Typically specified for most high-quality, architectural woodwork. Since Custom grade satisfies the aesthetic needs for the majority of projects, this is the default grade if aesthetic grade is not specified.
Note: If the Aesthetic Grade is not specified, Custom grade is the default.	

Purpose

The purpose of this publication is to:

- Define the aesthetic grades and performance duty levels of architectural wood stile & rail doors available through this standard.
- Provide general information, standards, and tests that will ensure all products complying with this standard can be evaluated on an equal basis.
- Provide a logical, simple system of references, keyed to guide specifications, which will enable the architect to specify wood stile & rail doors thoroughly, precisely, and accurately.
- Provide information necessary for the specifier to identify products and by which products are to be evaluated.
- This standard applies to architectural wood stile & rail doors intended for interior application. Doors specified to meet this standard are not recommended for exterior use.

GUIDE SPECIFICATIONS CHECKLIST

The following is a listing of the basic information required in a specification for Architectural or Commercial stile & rail wood doors. The WDMA recommends that these pieces of information appear in any specification for those products. Providing this minimal amount of information will assure clear communication regarding the construction of the doors specified.

Door Grade: (Section A-1) <ul style="list-style-type: none"><input type="checkbox"/> Premium<input type="checkbox"/> Custom	Louver Type (if used): (Section D-1) <ul style="list-style-type: none"><input type="checkbox"/> Slat<input type="checkbox"/> Chevron<input type="checkbox"/> Special
Veneer Grade: (Section A-7) <ul style="list-style-type: none"><input type="checkbox"/> A (Default Custom)<input type="checkbox"/> AA (Default Premium)<input type="checkbox"/> B (Optional Custom)	Door Glass (if used): (Section C-5) <ul style="list-style-type: none"><input type="checkbox"/> Open (glass & stops by others)<input type="checkbox"/> Provide Wood Glass Stops (consult manufacturer)<input type="checkbox"/> Provide Metal Vision Panels<input type="checkbox"/> 1/4" Clear Tempered<input type="checkbox"/> Safety Fire-Rated<input type="checkbox"/> Special
Veneer Cut (Transparent Only): (Section A-3) <ul style="list-style-type: none"><input type="checkbox"/> Plain Sliced<input type="checkbox"/> Quartered<input type="checkbox"/> Rift (Oak Only)	Performance Duty Level: (Section P-1) <ul style="list-style-type: none"><input type="checkbox"/> Extra Heavy Duty<input type="checkbox"/> Heavy Duty<input type="checkbox"/> Standard Duty
Veneer Species (Transparent Only): (Section A-7) <ul style="list-style-type: none"><input type="checkbox"/> As Specified	Fire Door: (Section C-8) <ul style="list-style-type: none"><input type="checkbox"/> UL 10B Neutral Pressure<input type="checkbox"/> UL 10C Positive Pressure<ul style="list-style-type: none"><input type="checkbox"/> Category A<input type="checkbox"/> Category B
Veneer Piece Match (Transparent Only): (Section A-4)	Special Function Doors: (Section C-9) <ul style="list-style-type: none"><input type="checkbox"/> Sound Resistant (STC) STC Level _____
Note: Slip is recommended for Rift Oak and all other Quartered species. <ul style="list-style-type: none"><input type="checkbox"/> Book<input type="checkbox"/> Slip	Environmental Doors: (Section C-10) <ul style="list-style-type: none">Certified Wood:<ul style="list-style-type: none"><input type="checkbox"/> FSC<input type="checkbox"/> SFI<input type="checkbox"/> SCS<input type="checkbox"/> Other _____Environmental Rating Program:<ul style="list-style-type: none"><input type="checkbox"/> LEED<input type="checkbox"/> Green Globes<input type="checkbox"/> Other
Door Type: (Section D-1) <ul style="list-style-type: none"><input type="checkbox"/> Panel<input type="checkbox"/> Glass<input type="checkbox"/> Louver<input type="checkbox"/> Combination	Machining Requirements: <ul style="list-style-type: none"><input type="checkbox"/> Factory Machined for Hardware<input type="checkbox"/> Field Machined for Hardware
Panel Type (if used): (Section C-4) <ul style="list-style-type: none"><input type="checkbox"/> Raised<input type="checkbox"/> Rim Banded (Custom or Premium)<input type="checkbox"/> Special (Custom or Premium)<input type="checkbox"/> Membrane Pressed (Custom or Premium)<input type="checkbox"/> Flat (Custom or Premium)	Finish Requirements: (Section F-1) <ul style="list-style-type: none">Finish System:<ul style="list-style-type: none"><input type="checkbox"/> TR-2 / OP-2<input type="checkbox"/> TR-4 / OP-4<input type="checkbox"/> TR-6 / OP-6<input type="checkbox"/> 1 coat prime<input type="checkbox"/> 2 coat primeFinish Application:<ul style="list-style-type: none"><input type="checkbox"/> Factory<input type="checkbox"/> Field
Raised Panel Profile (if used): (Section C-4) <ul style="list-style-type: none"><input type="checkbox"/> Scoop<input type="checkbox"/> Hip/Bevel<input type="checkbox"/> Special	
Sticking Type: (Section C-6) <ul style="list-style-type: none"><input type="checkbox"/> Quarter Round<input type="checkbox"/> Ovolo<input type="checkbox"/> Roman Ogee<input type="checkbox"/> Mission / Square<input type="checkbox"/> None<input type="checkbox"/> Special	
Applied Moulding Type (if used): (Section C-5) <ul style="list-style-type: none"><input type="checkbox"/> Special Inlay<input type="checkbox"/> Special Overlay (Lip)	

GLOSSARY

Astragal	A moulding or trim attached to the meeting edges of adjacent door leaves in order to prevent swing through and to conceal the gap at the meeting edges of the doors. Also may be used for sound control and bullet resistance.
Balanced Match	Two or more veneer components or leaves of equal size (prior to edge trimming) to make up a single face.
Bar	A narrow, horizontal, vertical, or diagonal wood member extending the total length or width of a glazed opening, used to separate individual pieces of glazing.
Barber Pole	An effect in book matching of veneers. Because the “tight” and “loose” sides alternate in adjacent veneer leaves, they may accept stain or reflect light differently. This noticeable but acceptable color variation is not considered a manufacturing defect.
Bark Pocket	Comparatively small area of bark around which normal wood has grown.
Bevel	A machined angle other than a right angle, i.e., a 3 degree bevel that is equivalent to a 1/8 inch drop in a 2 inch span (1 mm. in 16 mm).
Beveled Edge	An edge of the door which forms an angle of less than 90 degrees with the face of the door, such as a 3 degree beveled edge.
Bird Peck	A mark or wound in a tree or piece of wood caused by birds pecking on the growing tree in search of insects.
Bladder Pressed Panel	See “Membrane Pressed Panel”.
Blind Mortise and Tenon	A method of construction of stile and rail wood doors where openings are machined into, but not through the stiles and where the ends of the rails are so machined as to fit these openings.
Blended Repair Tapering	A repair referring to end splits, repaired with wood or filler similar in color to blend well with adjacent wood.
Blending	Color change that is detectable at a distance of 1.8 m to 2.4 m (6 feet to 8 feet) but which does not detract from the overall appearance of the door.
Blister	Spot or area where veneer does not adhere.
Blocking	A material used to replace core material in specific locations to provide improved screw holding for the attachment of hardware. Blocking is only required where the screw holding power of the core is less than required by the applicable performance duty level.
Book Match	Adjacent leaves of veneer from a flitch or log are opened like a book and spliced to make up the face with matching occurring at the spliced joints. The fibers or the wood slanting in opposite directions in the adjacent leaves create a characteristic light and dark (barber pole) effect when the surface is seen from an angle.
Book Size	The height and width of a door prior to prefitting.
Bow	A flat-wise deviation from a straight line drawn from top to bottom; a curvature along the length of the door.
Brashness	A condition of wood characterized by a low resistance to shock and by abrupt failure across the grain without splintering.
Bullet Resistant Doors	Doors that resist penetration by shots of varying caliber. Resistance may be rated as resistant to medium power, high power small arms and high power rifles.
Burl	A swirl, twist or distortion in the grain of the wood, which usually occurs near a knot or crotch. A burl can often be associated with abrupt color variation and/or a cluster of adventitious buds.
Burl, Bending	A swirl, twist or distortion in the grain of the wood which usually occurs near a knot or crotch but does not contain a knot and does not contain abrupt color variation.
Butt Joint	A joint formed by square edge surfaces (ends, edges, and faces) coming together; end butt joint, edge butt joint.
Cathedral Grain	A grain appearance characterized by a series of stacked and inverted “V”, or cathedral type of springwood (early wood) summerwood (late wood) patterns common in plain sliced (flat cut) veneer (see “split heart”).
Center Match (Center Balance Match)	An even number of veneer components or leaves of equal size (prior to edge trimming) matched with a joint in the center of the panel to achieve horizontal symmetry.
Certified Wood	Wood products that have been qualified by an independent third party agency as satisfying their proprietary requirements for responsible environmental practices.
Chatter	Line appearing across the face at right angles to the grain giving the appearance of one or more corrugations resulting from bad setting of sanding equipment.
Checks	Small slits running parallel to grain wood, cause chiefly by strains produced in seasoning and drying.
Clustered	When a defect described in the grading rule is sufficient in number and sufficiently close together to appear to be concentrated in one area.
Comb Grain	A quality of rift cut Oak veneer with exceptionally straight grain and closely spaced growth increments resembling the appearance of long stands of combed hair. This veneer cut is somewhat difficult and expensive to acquire.
Compatible	When relating solid lumber components to face veneer, the solid lumber is not the same species as the face; however, it must be similar in overall color, grain, character and contrast as the face veneer.
Component (of Face Veneer)	An individual piece of veneer or leaf that is joined to other pieces to achieve a full length and width face.
Composite Panel	A door panel composed of a wood derivative such as MDF. Used for opaque finishes.

GLOSSARY

Conspicuous	See 'burl, conspicuous' and 'knots, conspicuous pin'
Coped Construction	The end of rails, mullions, muntins or bars so machined that they will fit and cover the contour of the sticking.
Core	The innermost layer or section in component construction. For typical constructions see: "Particleboard Core", "Medium Density Fiberboard Core", "Structural Composite Lumber Core", "Stave Lumber Core", "Laminated Veneer Lumber Core", "Fire Resistant Composite Core" and other special core types.
Core Fire Resistant	A fire resistant core material generally used in wood doors requiring fire ratings of ¾ hour or more. Also includes engineered composite wood products meeting the minimum requirements of WDMA.
Cross Bar (Veneer)	Irregularity of grain resembling a dip in the grain running at right angles, or nearly so, to the length of the veneer.
Cross Break	Separation (break) of the wood cells across the grain. Such breaks may be due to internal strains resulting from unequal longitudinal shrinkage, or to external forces.
Cross Figures	A series of naturally occurring figure effects characterized by mild or dominant patterns across the grain in some faces. For example, a washboard effect occurs in fiddle back cross figure; and cross wrinkles occur in the mottle figure.
Cross banding	A ply placed between the core and face typically of hardwood veneer or engineered wood product.
Cup	A deviation from a straight line drawn from side to side; a curvature along the width of the door.
Dead Knots (Open Knots)	Openings where a portion of the wood knot has dropped out or where cross checks have occurred to present an opening.
Decay	The decomposition of wood substance by fungi.
Defect, Open	Checks, splits, open joints, knotholes, cracks, loose knots, wormholes, gaps, voids, or other opening interrupting the smooth continuity of the wood surface.
Delamination	Separation of piles or layers of wood or other material through failure of the adhesive bond.
Discolorations	Stains in wood substances. Some common veneer stains are sap stains, blue stains, stain produced by chemical action caused by the iron in the cutting knife coming into contact with the tannic acid in the wood, and those resulting from the chemical action of the glue.
Door, Bifold	Doors so hinged as to fold against the door jamb. Bifold doors are normally classified as either two or four leaf units.
Door, Combination	A door assembly of stiles and rails that will include multiple door types within a single door. These door types would typically include combinations of flat or raised panels, lites and/or louvers.
Door Frame	A group of components (wood, aluminum or steel) that are assembled to form an enclosure and support for a door. Also known as door jambs.
Door, French	A door assembly of stiles and rails (and possibly muntins and bars) surrounding a single or multiple glazed opening.
Door, Louver	A door assembly of stiles and rails where the interior is filled with slat or chevron louvers.
Door, Panel	A door assembly of stiles, rails and one or more panels. Intermediate rails or mullions are used to separate panels. Panels can be raised or flat.
Doweled Construction	A method of construction of stile and rail wood doors where holes are machined into, but not through, the stiles and where matching holes are machined into the ends of the rails. Glue and dowels are inserted into these holes to attach the rail to the stile.
Doze	A form of incipient decay characterized by dull and lifeless appearance of the wood, accompanied by a lack of strength and softening of the wood.
Edge Band	A strip of solid wood that is visible after construction of the door. This may be an outside vertical edge, or an inside profiled edge (sticking).
Engineered Construction	A method of constructing a wood stile and rail door that minimizes the use of solid lumber components. Stiles, rails and mullions have solid lumber edges only (where visible), and have face veneers over a composite core. Panels are also produced using face veneers and/or composite cores.
Engineered Materials	A general term used to describe any wood or plant fiber composite panel. Such products as Particleboard, MDF, SCL and LVL are described as Engineered Fiber. Typically they are made from wood or plant fiber or wood pieces and have specific quality requirements.
Face Width	The total width of the stile, rail or panel minus the width of the moulding patterns. The most common way of showing dimensions on a stile and rail door elevation.
Face Veneer	The outermost exposed wood veneer surface of a veneered wood door
Few	A small number of characteristics without regard to their arrangement in the piece.
Fill (Putty Repairs)	A repair to an open defect usually made with fast drying plastic putty. The repairs should be well made with non-shrinking putty of a color matching the surrounding area of the wood, to be flat and level with the face and panel, and to be sanded after application and drying

GLOSSARY

Fire Rated Doors	A door which has been constructed in such a manner that when installed in an assembly will pass a fire test under neutral (UL 10B) or positive (UL 10C) pressure criteria and can be rated as resisting fire for 20 minutes (1/3 hour), 45 minutes (3/4 hour) (C), 1 hour (B), or 1-1/2 hours (B). The door must be tested and carry an identifying label from a qualified inspection agency. All of these fire ratings are now available with stile and rail wood doors.
Fire Resistant Composite Core	A core, typically incorporating minerals rather than wood fiber as the primary component, designed to improve fire resistance and thermal transmission,
Flake	See "Fleck, Ray".
Flat- Cut	See "Plain Sliced".
Fleck, Ray (Flake)	Portion of a ray as it appears on the quartered or rift cut surface. Fleck can be dominant appearance in oak and is sometimes referred to as flake.
Flitch	A complete bundle of veneer sheets laid together in sequence as they are cut from a given log or section of log.
Gaps	Open slits in the inner ply or plies or improperly joined veneer when joined veneers are used for inner plies.
Glass Stop	A small wood moulding (bead) applied to the perimeter of glazed openings to secure the glazing materials within a door.
Grain	The direction, size, arrangement and appearance of the fibers in wood or veneer.
Grain Slope	Expression of the angle of the grain to the long edges of the veneer component.
Grain Sweep	Expression of the angle of the grain to the long edges of the veneer component over a 12" length from each end of the door.
Gum Pockets	Well defined opening between rings of annual growth containing gum or evidence of prior gum accumulations. Mainly found in Cherry.
Gum Spots & Streaks	Gum or resinous material of color spots caused by prior resin accumulations sometimes found on wood surfaces. Mainly found in Cherry.
Hairline	A thin, perceptible line showing at the joint of two pieces of wood.
Half- round	A method of veneer cutting similar to rotary cutting, except that the piece being cut is secured to a "stay log" a device that permits the cutting of the log on a wider sweep than when mounted with its center secured in the lathe to produce rotary sliced veneer. A type of half- round cutting is used to achieve plain- sliced or flat- cut veneer.
Hardboard	Homogeneous panels manufactured primarily from inter-felted lignocellulosic (wood) fibers consolidated under heat and pressure with density of 31 lb./ft. ³ (497 kg/m ³) or more.
Hardwood	General term used to designate lumber or veneer produced from temperate zone deciduous or tropical broad leaved trees in contrast to softwood, which is produced from trees which are usually needle bearing or coniferous. The term does not infer hardness in its physical sense.
Heartwood	The dormant center of a tree generally distinguishable from the outer portion (sapwood) by its darker color.
High Density Fiberboard (HDF)	No longer defined under ANSI 208.2, HDF is a marketing term to define MDF grades above Grade 150
Holes, Worm	Holes resulting from infestation by worms greater than 1/16 inch in diameter and not exceeding 5/8 inch in length.
Inconspicuous	Barely detectable with the naked eye at a distance of 6 ft. to 8 ft.
Indentations	Areas in the face that have been compressed as the result of residue on the platens during pressing or handling damages through the factory.
Intumescent	A material that expands when exposed to specific temperatures, to fill any gap between the door and frame or between doors.
Joint	The line of juncture between the edges or ends of two adjacent components (veneer, stiles, rails, mullions, muntin bars...).
Joint, Edge	Joint running parallel to the grain of the wood
Joint, Open	Joint in which two adjacent components that do not fit tightly together.
Kiln-Dried	Lumber dried in a closed chamber in which the removal of moisture is controlled by artificial heat and usually by relative humidity.
Knife Cuts per inch (KCPI)	A measure of the smoothness of machined lumber. Can be determined by holding the surfaced board at an angle to a strong light source and counting the visible ridges per inch, usually perpendicular to the profile. The surface is smoother with more knife marks per inch.
Knife Marks	Very fine lines that appear across the panel veneer or wood solids that can look as though they are raised resulting from some defect in the lathe knife that cannot be removed with sanding.
Knot	Cross section of tree branch or limb with grain usually running at right angles to that of the piece of wood in which it occurs.
Knot Holes	Void produced when knots drop from the wood in which they were originally embedded
Knots, Blending Pin	Sound knots 6.4 mm (1/4 in) or less that generally do not contain dark centers. Blending pin knots are barely detectable at a distance of 1.8 m to 2.4 m (6 ft. to 8 ft.), do not detract from the overall appearance of the piece, and are not prohibited from appearing in all grades.

GLOSSARY

Knots, Conspicuous Pin	Sound knots 6.4 mm (1/4") or less in diameter containing dark centers.
Knots, Open (Knot Holes)	Openings where a portion of the wood substance of the knot was dropped out, or where cross checks have occurred to produce an opening.
Knots, Sound Tight	Knots that are solid across their face and fixed by growth to retain their place.
Laminated Veneer Lumber Core (LVLC)	Manufactured by laminating veneer with all grain laid-up parallel. It can be manufactured by using various species of wood fiber in various thicknesses.
Lap (Veneer)	A condition where the pieces of veneer are so misplaced that one piece overlaps the other and does not make a smooth joint.
Loose Side	In knife-cut veneer, that side of the sheet that was in contact with the knife as the veneer was being cut, and containing cutting checks (lathe checks) because of the bending of the wood at the knife edge.
Louver	A panel constructed of wood or metal slats installed in an opening to allow light, air and noise. Common types are slat and Chevron – an inverted "V" wood louver (vented or non-vented).
Matching Edge Band	An edge band that is the same species as the face veneer.
Medium Density Fiberboard (MDF)	The generic name for a panel manufactured from lignocellulosic fibers combined with a synthetic resin or other suitable binder and bonded together under heat and pressure in a hot press by a process in which the added binder creates the entire bond.
Medium Density Overlay (MDO)	Typically MDO is kraft paper saturated with resin and cured under high heat and pressure to make a hard, smooth, paintable surface.
Medium Density Fiberboard Core (MDFC)	Wood fiber and/or agri-fiber based materials that comply with ANSI A208.2.
Meeting Edges	Two adjacent door edges not separated by a mullion or transom bar. These are found in pair, Dutch door and door & transom applications.
Membrane (Bladder) Pressed Panel	Insert panel produced by moulding to profile a wood or composite core (usually MDF or particleboard) then pressing veneer to the core using a flexible pressing surface.
Mineral	See "Streaks, Mineral".
Mineral Stain	Olive and greenish-black streaks believed to designate areas of abnormal concentration of mineral matter; common in hard maple, hickory, and basswood: also called "Mineral Streak".
Mineral Streaks	Sharply contrasting elongated discoloration of the wood substance.
Moulding (Inlay)	Profiled wood trim pieces that surround the perimeter of panels or glazing, but does not protrude above the surface of the surrounding stiles and rails.
Moulding (Overlay)	Profiled wood trim pieces that surround the perimeter of panels or glazing, and protrudes above the surface of the surrounding stiles and rails.
Mortise and Tenon	See "Blind Mortise and Tenon"
Mullion	A vertical member used to separate panels. Also known as a "mull".
Muntin	A short bar, either horizontal or vertical, used to separate individual pieces of glazing material, but which does not extend the full width or length of the glazed opening. Also known as "munt".
Natural	When referring to color and matching, veneers containing any amount of sapwood and/or heartwood, i.e. natural birch, maple, ash.
Neutral Pressure	A fire door test procedure where the neutral pressure plane is at or near the top of the door. Sometimes referred to as negative pressure.
Nominal	A term that designates a stated dimension as being approximate and subject to allowances for variation.
Not Restricted	Allowed, unlimited.
Occasional	A small number of characteristics that are arranged somewhat diversely within the face.
Panel, Flat	A door panel in which the perimeter does not contain a machined profile (panel raise). Constructed with veneer on the face and a composite core for a stained finish, or MDF for a painted finish.
Panel, Raised	A door panel whose faces are raised above the perimeter and whose edges are shaped to fit into grooves in the stiles, rails and mullions. These panels are typically bladder pressed or rim banded for a stained finish or MDF for a painted finish.
Particleboard	A panel or core product composed of small particles of agri-fiber or wood fiber that are bonded together with synthetic resin adhesives in the presence of heat and pressure.
Particleboard Core	Wood fiber and/or agri-fiber based materials that comply with ANSI A208.1.
Patches	Matching wood pieces carefully inserted and glued into the door face after defective portions have been removed.
Plain Sliced	Veneer sliced parallel to the pith of the log and approximately tangent to the growth rings to achieve flat cut veneer. Plain sliced veneer can be cut using either a horizontal or vertical slicing machine or by the half-round method using a rotary lathe. Also known as flat cut.

GLOSSARY

Plank Matched	A face containing specially selected and assembled dissimilar (in color, grain and width) veneer strips of the same species, and sometimes grooved at the joints between strips, to simulate lumber planking. Plank matched faces are not available pair matched or set matched.
Pleasing Match	A face containing components, which provide a pleasing overall appearance. The grain of the various components need not be matched at the joints. Sharp color contrasts at the joints of the components are not permitted.
Ply	A single sheet of veneer or several strips lay with adjoining edges that may or may not be glued, which forms one veneer lamination in a glued panel. In some constructions, a ply is used to refer to other wood components such as particleboard or MDF.
Positive Pressure	A fire door test procedure where the neutral pressure plane is located at or near 40" from the sill.
Prefitting	Trimming of the door for width and/or height.
Puttied	See "Fill".
Quartered (Quarter-Sliced, Quarter Cut)	Veneer produced by cutting in a radial direction to the pith to achieve a straight (vertical) grain pattern. In some species, principally red oak and white oak, ray fleck is produced, the amount of which may be unlimited.
Ray	Ribbon-shaped strand of tissue extending in a radial direction across the grain, so oriented that the face of the ribbon is exposed as a fleck on the quarter surface. Also known as "wood ray".
Rail	A horizontal structural member of a stile and rail door. Fits between the stiles.
Rail, Bottom	The bottom rail of a stile and rail door
Rail, Intermediate	A rail, other than the top and bottom rail, used to separate panels, or to separate panels from glazing materials in a combination door. Also referred to as "cross rail".
Rail, Lock	An intermediate rail located at approximately adjacent to the lock.
Rail, Top	The uppermost rail of a stile and rail door.
Ray Fleck	See "Fleck, Ray".
Repairs	A patch, shim, or filler material inserted and/or glued into veneer or a panel to achieve a sound surface.
Repairs, Blending	Wood or filler insertions similar in color to adjacent wood so as to blend well.
Rift Cut	Veneer produced by cutting at a slight right angle to the radial to produce a parallel grain pattern and quartered appearance without excessive ray fleck. Oak veneer only.
Rim Banded (Mitered) Panel	Insert panel with a solid lumber edge banded around the core then veneered and profiled.
Rough Cut	Irregular shaped areas of generally uneven corrugation on the surface of veneer.
Running Match	The veneer face is made from components running through the flitch consecutively. Any portion of the component left over from a face used as the beginning component or leaf in starting the next veneer face.
Ruptured Grain	A break or breaks in the grain or between springwood and summerwood caused or aggravated by excessive pressure on the wood by seasoning, manufacturing, or natural processes. Ruptured grain appears as a single or series of distinct separations in the wood such as when springwood is crushed leaving the summerwood to separate in one or more growth increments.
Rustic	Lacking excessive refinement, having a rough surface or finish.
Safety Glazing Materials	Glazing materials so constructed, treated or combined with other material as to minimize the likelihood of cutting or piercing injuries resulting from human contact with the material. The most common types used in doors are tempered or laminated.
Sanding (Chatter, Dust, Burns)	The degree of defects allowed in sanding of the face.
Sapwood	The living wood of lighter color occurring in the outer portion of a tree.
Shake	A separation along the grain of wood in which the greater part occurs between the rings of annual growth.
Sharp Contrast	For the purpose of this standard, this term means the veneer of lighter than average color should not be joined at the edges with veneer of darker than average color, and that two adjacent pieces of veneer should not be widely dissimilar in grain, figure and natural character markings.
Show Through (Telegraphing)	A defect caused by the outline and/or surface irregularities, such as frame parts, core laps, voids, etc. that is visible through the door skin.
Sliced	Veneer produced by thrusting a log or sawed flitch into a slicing machine, which shears off veneer in sheets.
Slight	Visible on observation, but does not interfere with the overall aesthetic appearance.
Slip Matched	A sheet from a flitch is slid across the sheet beneath and, without turning, spiced at the joints (see "Figure 1" for illustration).
Smooth, Tight Cut	Veneer cut to minimize lathe checks.
Sound Transmission Class (STC)	A single number rating system derived from measured values of sound transmission loss or the acoustical performance of a building element, such as a door, window or wall. The higher the STC value, the better the rating and the better the acoustical performance value. Tested in accordance with ASTM E413 and E90.

GLOSSARY

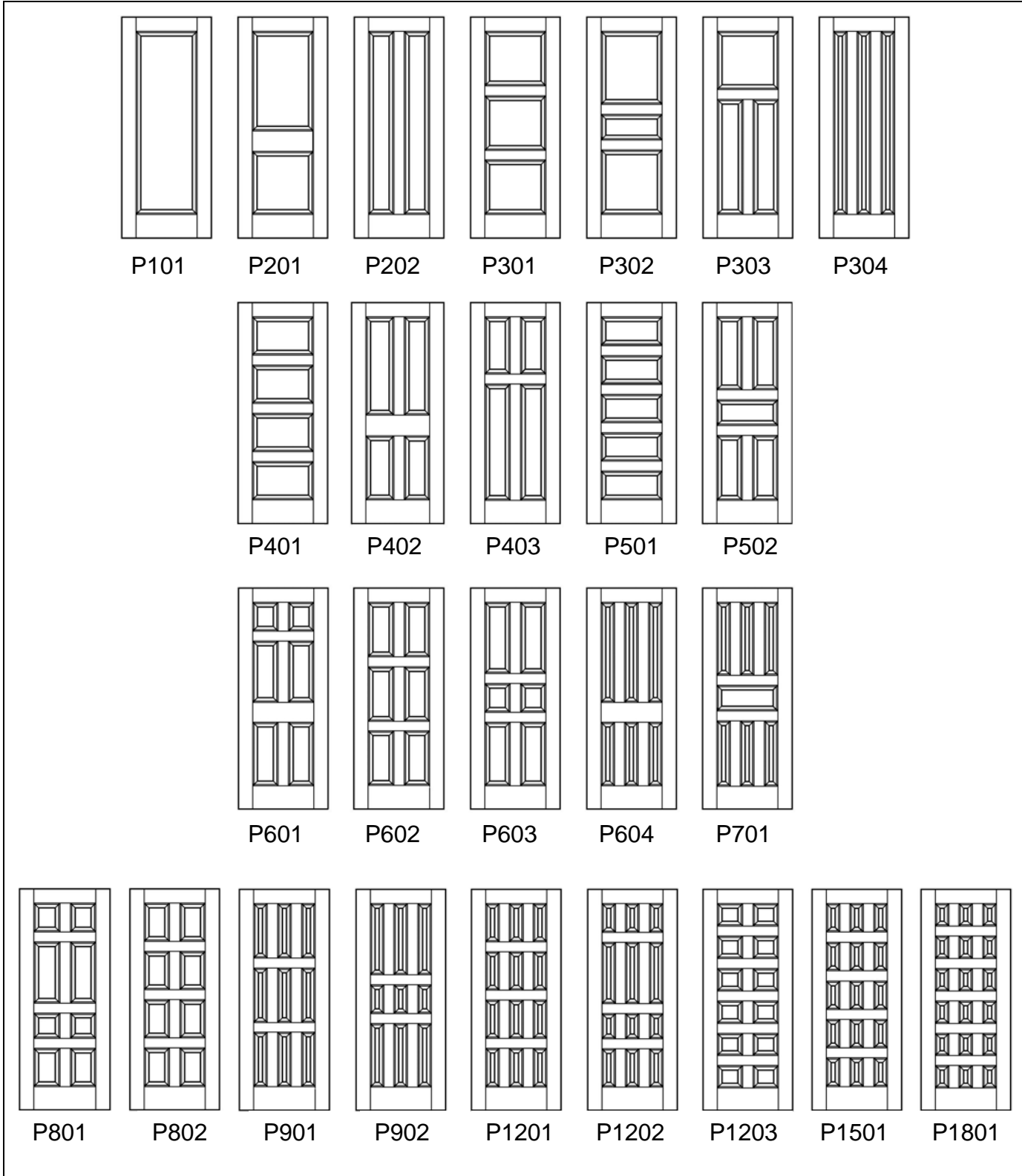
Split Heart	A method of achieving an inverted “V” or cathedral type of springwood (early wood)/summerwood (latewood), plain-sliced flat-cut) figure by joining two face components of similar color and grain. A cathedral type figure must be achieved by a single component in “AA” grade; the split heart method is allowed in grades “A” and “B”. Each half of a split heart shall be subject to the minimum component width requirements for grade “A” and “B” faces.
Splits	Separations of wood fiber running parallel to the grain.
Splits, Hairline	A perceptible separation or absence of wood fiber running parallel with the grain.
Standard Door	By industry practice, a standard door is book size in both width and height.
Stave Lumber Core (SLC)	Made with any combination of blocks or strips of wood, not more than 2-1/2” (64 mm) wide, of one species of wood glued together (in butcher block fashion), with joints staggered in adjacent rows.
Sticking	A profile machined on to the edges of stiles, rails, mullions, muntins or bars, adjacent to the panels, glazing materials or louvers.
Stile	The outermost vertical member of a stile and rail door.
Streaks, Mineral	Sharply contrasting elongated discoloration of the wood substance.
Structural Composite Lumber Core (SCLC)	An engineered wood product that is made by fusing a network of wood strands together with a water-resistant adhesive to produce a strong, solid and stable product that has true structural properties with excellent screw holding properties and very high split resistance.
Sugar	Color streaks or spots attributed to discoloration involving sap in maple veneer.
Sweep	See grain
Tape	Strips of gummed paper used to hold the edges of the veneer together at the joints prior to gluing.
Telegraphing	See “Show Through”.
Tight Side	In knife-cut veneer, that side of the sheet that was farthest from the knife as the sheet was being cut and containing no cutting checks (lathe checks).
Transom	The panel above a door or set of doors.
Twist	A deviation in which one or two corners of the door are out of plane with the other corners of the door.
Veneer (Wood)	A thin sheet of wood, rotary cut, sliced, or sawed from a log, bolt, or flitch.
Veneered Construction	See “Engineered Construction”
Vine Streaks (Mark)	Scars in the wood generally caused by the stems of clinging vines or by their hair-like roots, which cling to the tree trunk. Live vine streaks produce round scars. Dead vine streaks contain either dead residue of the vine, or the remaining pocket similar to bark pocket. Most vine streaks run across the grain, and therefore, all vine streaks are considered defects in accordance with restrictions described in veneer grading rules.
Voids	See “Gaps”.
Warp	Any distortion in the plane of a door itself and not its relationship to the frame or jamb in which it is to be hung. The term warp includes bow, cup and twist; see definitions for descriptions.
White	When referring to color and matching, veneers containing all sapwood, ranging in color from pink to yellow.
Wood Filler	An aggregate of resin and strands, shreds, or flour of wood, which is used to fill openings in wood and proved a smooth, durable surface.
Worm Track or Scar	Marks caused by various types of wood attacking larvae. Often appear as sound discolorations running with or across the grain in straight to wavy streaks. Sometimes referred to as ‘pith flecks’ in certain species of maple, birch and other hardwoods because of a resemblance to the color of pith.

D-1: COMMON STILE AND RAIL DOOR DESIGNS

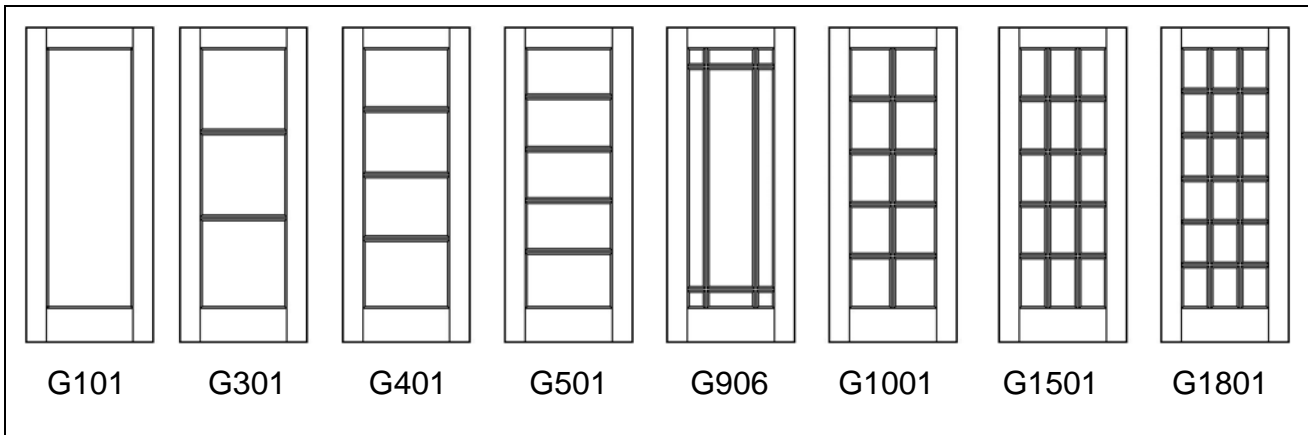
This section is a sample of design ideas. It makes no pretense of being complete. It's here for the reader to use as a starting place. The exercise of personal creativity is the essence of architectural stile and rail doors.

Panel Doors

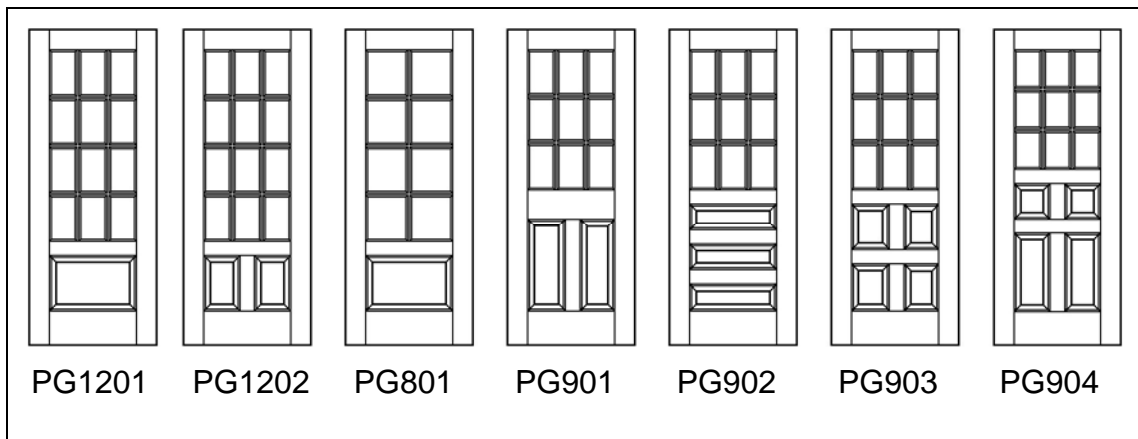
(Glass lites available in place of panels)



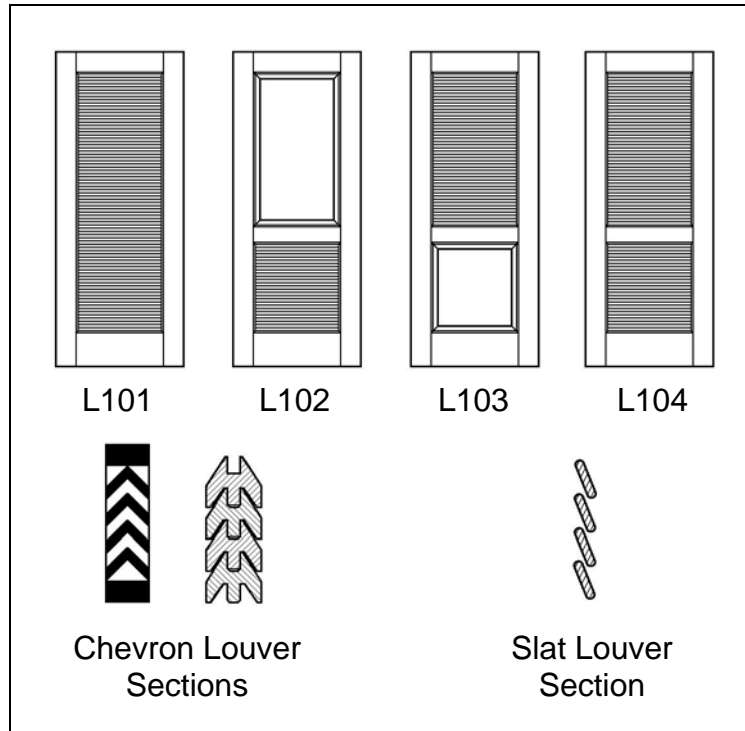
Glass Doors



Glass & Panel Doors

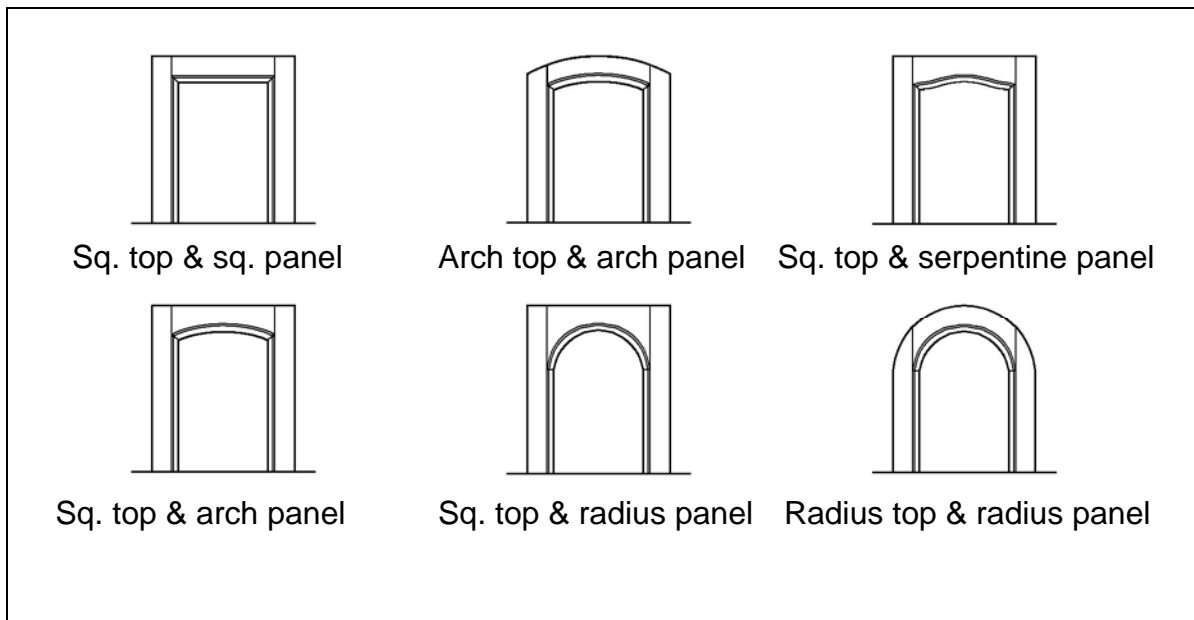


Louver Doors



Door Top Options

(Specify door style for panel doors. Tops may not be available on all door designs)



AESTHETICS

A-1: Aesthetic Grades for Architectural Wood Stile & Rail Doors

The design professional can specify with confidence using WDMA I.S.6A guidelines. WDMA's Architectural Wood Stile & Rail Door Standard addresses both the aesthetic and performance attributes of the door. Both are important to achieve desired appearance and function.

Wood stile & rail door aesthetics are specified by choosing a Premium grade or Custom grade door. These designations determine the basic appearance of the door with respect to veneer grade, matching requirements, solid lumber aesthetics, joint requirements, and other attributes that determine the appearance of individual doors and doors in pairs.

Premium	The highest grade commercially available in both material and fabrication. This grade is intended for the finest commercial, industrial and institutional buildings.
Custom	The standard grade in both material and fabrication. This grade is intended for high-quality work.
Note: If the Aesthetic Grade is not specified, Custom grade is the default.	
Note: Economy grade has been discontinued as it is seldom specified for architectural wood stile and rail doors.	

It is also possible for a specifier to alter the basic Premium grade or Custom grade requirements to either upgrade or downgrade certain aspects of the door appearance, such as:

Special Flitch Selection	Applied Mouldings	Finer Finishes
Sketch Face Panels	Special Veneer Matches	
Minimum Veneer Piece Width	Special Color Ranges (face and/or edge)	

There are other ways to modify the aesthetics of the door as well, such as by the addition of applied mouldings, lite mouldings, louvers and other appurtenances.

The design professional is encouraged to consult directly with the manufacturer during the development of the design and specifications for these important projects.

A-2: Face Selection

Specifiers need to determine and specify the following:

Veneers for Transparent Finishes

Species: There are numerous domestic and foreign wood species available from which to select veneer type, including those defined in Section A-7.

Matching: Many different visual effects can be obtained by face veneer matching. The various considerations in matching are described in the following sections:

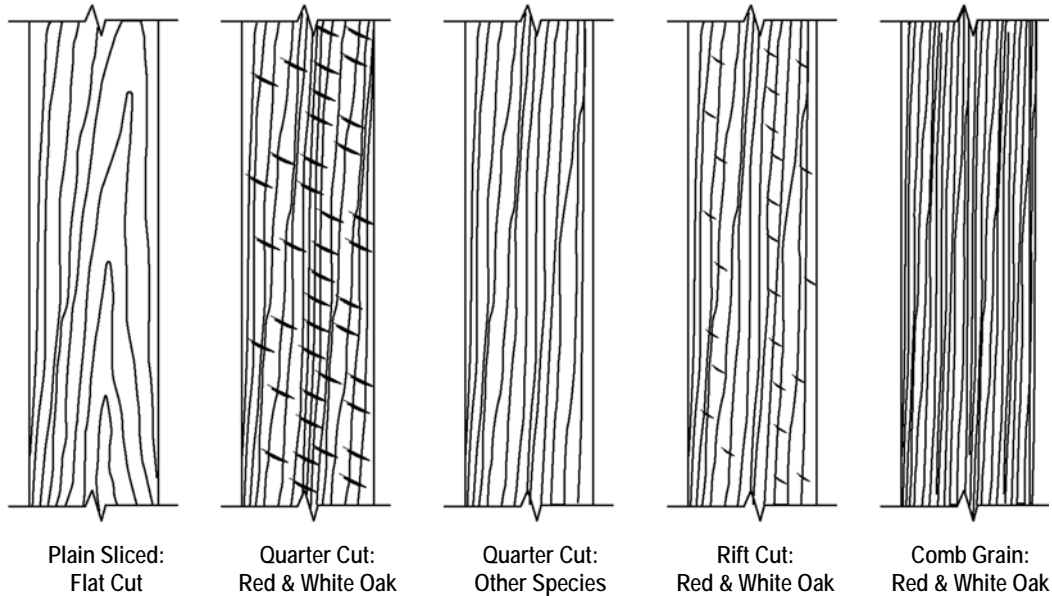
- A-3: Appearance of Individual Pieces of Face Veneer.
- A-4: Matching Between Individual Face Veneer Pieces.
- A-5: Assembly of Spliced Face Veneer on Panels.

Materials for Opaque Finishes

For both Premium and Custom grade, medium density overlay (MDO), medium density fiberboard (MDF), or hardboard faces can be used for applications with opaque finishes. In addition, closed-grain wood veneer or other composite material is permitted in Custom grade. When using wood veneer, extra preparation is required prior to job site finishing because of the natural characteristics of wood.

A-3: Appearance of Individual Veneer Leaves

The beauty of veneer is in the natural variations of texture, grain, figure, color, and the way it is assembled on a door. The way in which a log is cut, in relation to the annual growth rings, determines the appearance of veneer. Face veneers will have the natural variations in grain inherent in the species and cut. Natural variations of veneer grain and pattern will vary from these illustrations. The illustrations above represent a typical appearance produced with the different types of cut. However, veneers leaves will have natural variations in grain and pattern that are inherent in the species and cut.



Plain Sliced: (Flat Cut)

Slicing is done parallel to a line through the center of the log, resulting in cathedral and straight grained patterns result. The individual pieces of veneer are kept in the order they are sliced, permitting a natural grain progression when assembled as veneer faces.

Quarter Cut

By slicing the log roughly parallel to the radius line through the log segment, a series of stripe is produced that vary in width from species to species. Ray fleck (flake) is a characteristic of this cut in red and white oak.

Rift-Cut (only in Red & White Oak)

The cut slices slightly across the medullary rays, accentuating the vertical grain and minimizing the ray fleck (flake). Rift grain is restricted to red and white oak.

Comb Grain (limited availability) (only in Red & White Oak)

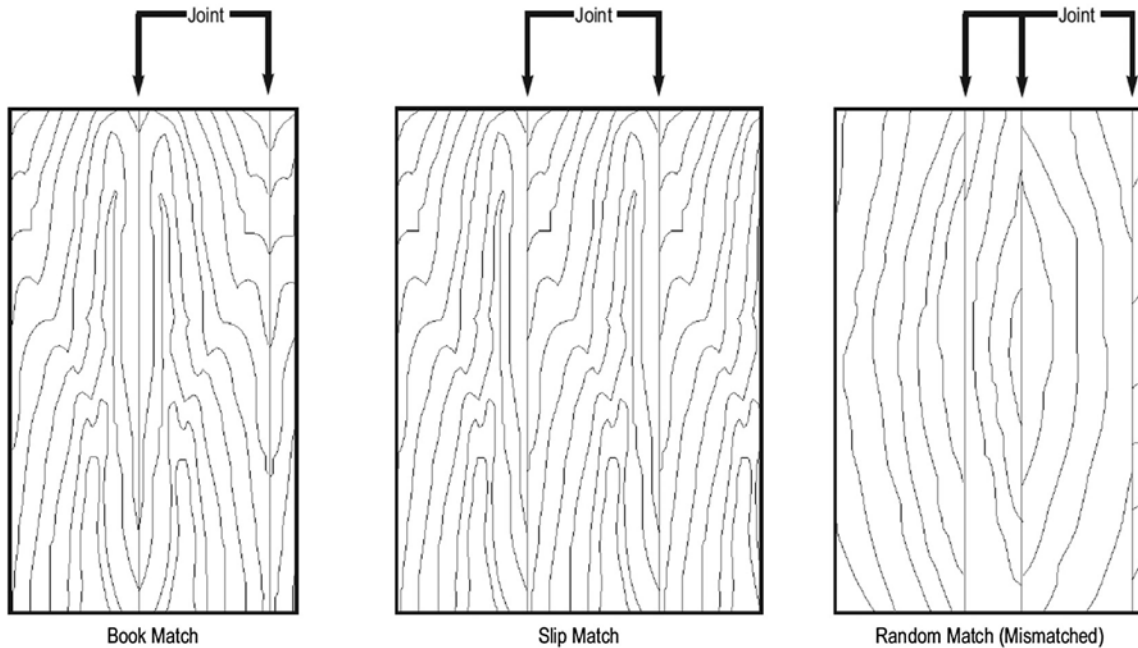
This is a rift-cut veneer distinguished by the tightness and straightness of the grain along the entire length of the veneer. Slight angle in the grain is allowed. Comb grain is restricted to red and white oak. There are occasional cross bars and ray fleck (flake) is minimal.

Rotary

Not recommended for stile and rail doors.

A-4: Matching Between Individual Veneer Leaves

The ways by which veneer leaves can be pieced together create a variety of looks for the assembled veneer. The type of match must be specified; if not specified, book match will be provided.



Illustrations reprinted with permission from the Architectural Woodwork Institute, Reston, Virginia

Note: The type of match must be specified. If no specification is made, book match will be provided since it is the most commonly used match for A grade faces.

Book Match

The most commonly used match in the industry, every other piece of veneer is turned over so adjacent pieces are like two adjacent pages in an open book. The veneer joints match and create a mirrored image pattern at the joint line, yielding a maximum continuity of grain. Book matching is used with Rotary, Plain Sliced, Quarter, Rift Cut or Comb Grain veneers.

Barber Pole Effect in Book Match

Because the “tight” and “loose” sides alternate in adjacent pieces of veneer, that are book matched, the leaves may accept stain or reflect light differently, which may cause a noticeable color variation called barber poling. See slip match for further information on color variation. Barber pole is not considered a manufacturing defect.

Slip Match

Adjoining pieces of veneer are placed in sequence without turning over every other piece. The grain figure repeats, but joints won't have a mirrored effect. Slip matching is RECOMMENDED and often used in Quarter, Rift-Cut and Comb Grain veneers to eliminate the barber pole effect. However, it may cause a sloping appearance of the veneer, especially in taller doors.

Random Matched (Mismatched – not commonly used for doors)

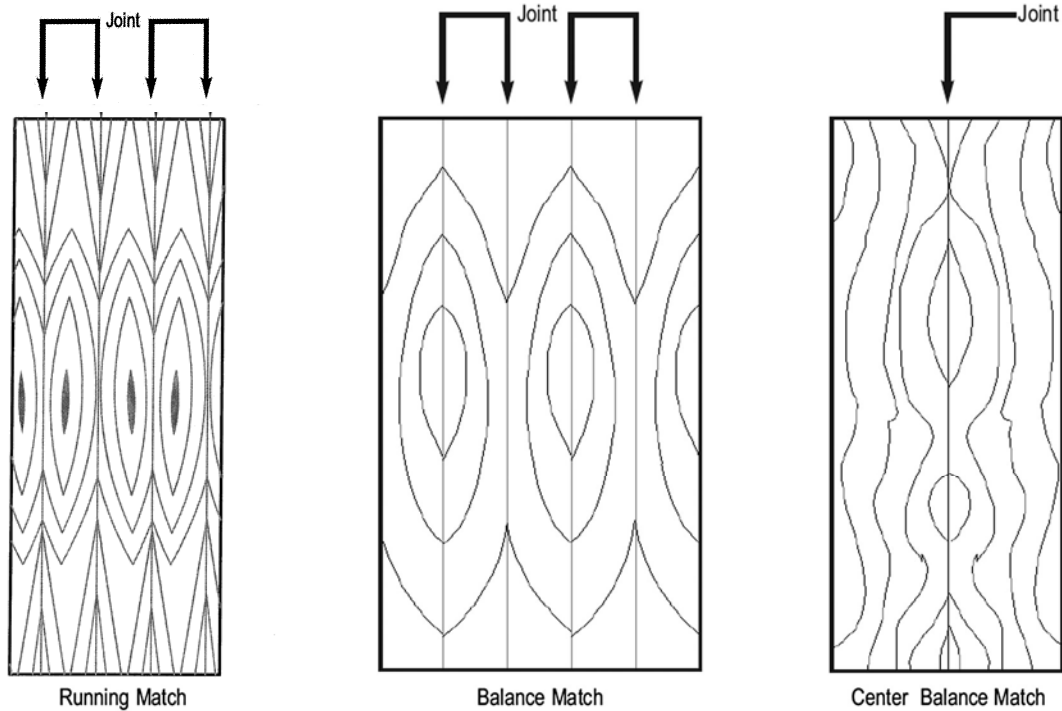
A face containing veneer leaves of the same species which are selected and assembled without regard to color or grain, resulting in variations, contrasts and patterns of color and grain. Pleasing appearance is not required.

Plank Matched (not illustrated)

A face containing specially selected and assembled veneer leaves from a single specie. The leaves are dissimilar (in color, grain and width) veneer strips of the same species, and sometimes grooved at the joints between strips, to simulate lumber planking.

A-5: Assembly of Spliced Veneer Leaves on Door Panel Face

The way matched veneer leaves are assembled within a given door face can also help achieve a desired look. The type of assembly match must be specified. If no specification is made, Running Match is the default.



Running Match

Each panel is assembled from as many veneer leaves as necessary. The inside leaves will be equal in width to one another, the outside veneer leaves will be of unequal width. This provides a non-symmetrical appearance in each door panel and results in high yield.

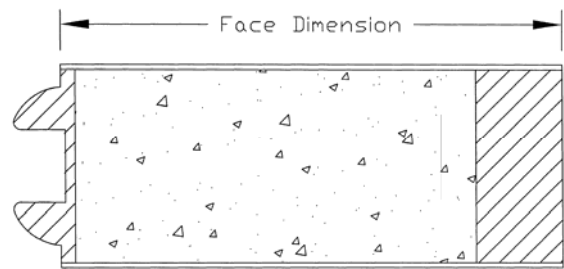
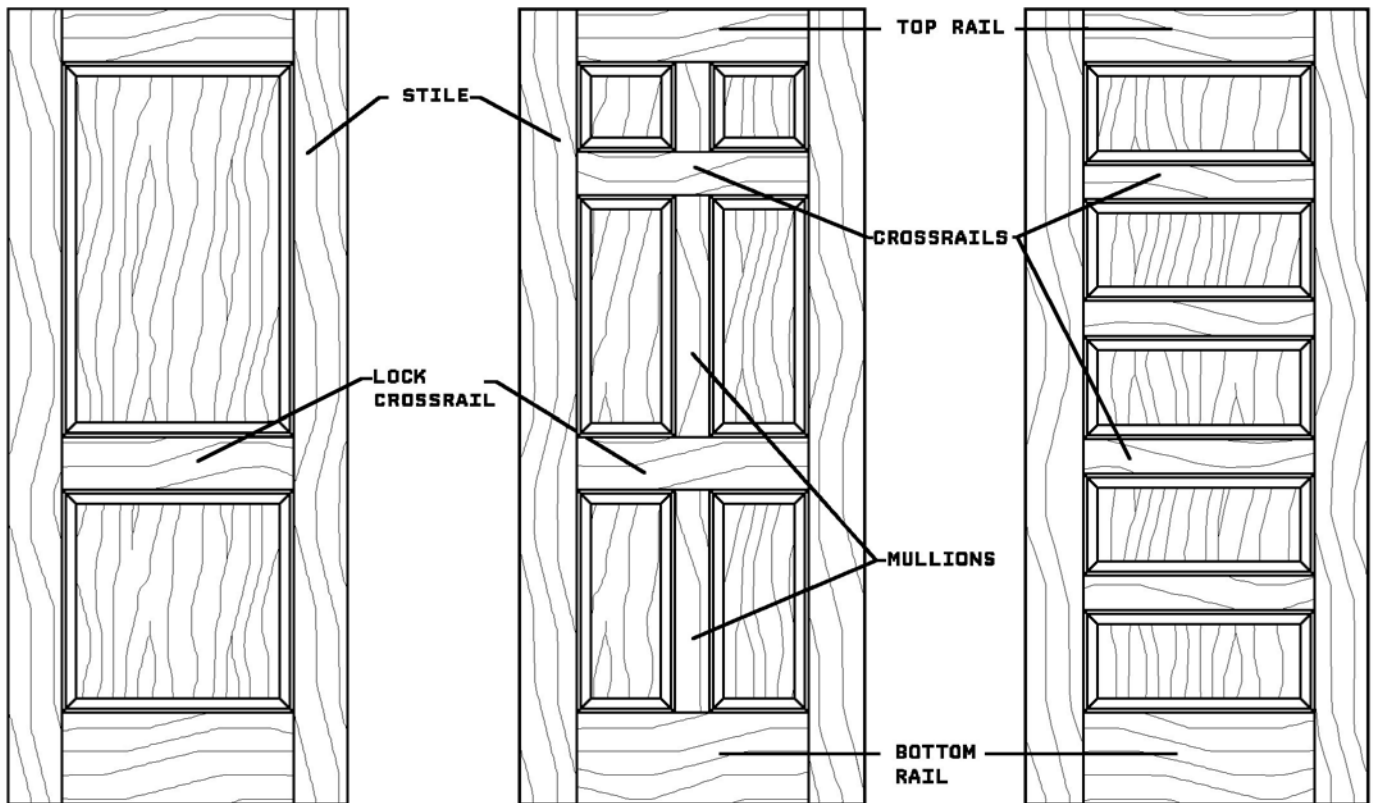
Balance Match

Each panel is assembled from leaves of uniform width before trimming, resulting in a symmetrical appearance and medium yield.

Center Balance Match

Each panel is assembled from an even number of veneer leaves of uniform width before trimming. Thus there is a veneer joint in the center of the panel, producing symmetry but resulting in low yield.

A-6: Typical Panel Layout and Grain Patterns, unless otherwise specified



Nominal Face Dimensions

Recommended Component Face Widths

These are recommended face dimensions to avoid conflicts with typical architectural hardware. Each manufacturer may have different dimensional standards. Consult manufacturer for hardware conflicts.

COMPONENTS	Nominal face dimensions prior to trim.
Stiles	6 inch (152 mm)
Mullions and Crossrails	3 inch (76 mm)
Bottom Rail	10 inch (254 mm)* Clear surface area

* ADA Compliance - Door surfaces within 10 inches of the floor or ground must be a smooth surface on the push side extending the full width of the door. Any parts creating a horizontal or vertical joint on the surface shall be within 1/16 inch in depth. If cavities are created by added kick plates they must be capped.

A-7: Door Face Veneer Characteristics

STILE, RAIL AND PANEL FACE DESCRIPTION - Ash, Beech, Birch, Maple and Poplar

(Adapted from HPVA with permission) WHEN SPECIFYING NATURAL, VENEERS CONTAIN UNLIMITED AMOUNTS OF SAPWOOD AND/OR HEARTWOOD

Cut	Plain-Sliced (Flat Cut) and Quarter Cut					
Grade Description	AA			A		
Color and Matching						
	Sap (White)	Heart (Red/Brown)	Natural	Sap (White)	Heart (Red/Brown)	Natural
Sapwood	Yes	No	Yes	Yes	No	Yes
Heartwood	No	Yes	Yes	No	Yes	Yes
Color Streaks or Spots	Slight			Slight		Yes
Color Variation	Slight		Yes	Slight		Yes
Sharp Color Contrasts at Splice Joints	Yes, if Slip, Plank or Random matched			Yes, if Slip, Plank or Random matched		
Type Of Matching (a)						
Book Matched	Yes			Yes		
Slip Matched	Specify			Specify		
Plousing Matched	not applicable			not applicable		
Nominal Minimum Plain Sliced	5 inches (127 mm)			4 inches (102 mm)		
Width of Leaves (b) Quarter	3 inches (76 mm)			3 inches (76 mm)		
Rotary	5 inches (127 mm)			4 inches (102 mm)		
Natural Characteristics (except as listed below, natural characteristics are not restricted)						
Small Conspicuous Burls & Pin Knots-Combined Avg. Number	1 per 5 sq. ft. (2 per sq. m)			1 per 3 sq. ft. (4 per sq. m)		
Conspicuous Burls - Max. Size	1/4 inch (6.4 mm)			3/8 inch (9.5 mm)		
Conspicuous Pin Knots Avg. Number Max. Size: Dark Part Total	No			1 per 8 sq. ft. (4 per 3 sq. m) 1/8 inch (3.2 mm) 1/4 inch (6.4 mm)		
Scattered Sound and Repaired Knots - Combined Avg. No. Max. Size - Sound Max. Size - Repaired Avg. No. - Repaired	No			No		
Mineral Streaks	No; Maple, slight			Slight		
Bark Pockets	No			No		
Worm Tracks	Slight			Slight		
Vine Marks	Slight			Slight		
Cross Bars	Slight			Slight		
Manufacturing Characteristics						
Rough Cut / Ruptured Grain	No			No		
Blended Repaired Tapering Hairline Splits	Two 1/32 inch x 3 inch (Two 0.8 mm x 76 mm) (on ends only)			Two 1/16 inch x 6 inch (Two 1.6 mm x 152 mm)		
Repairs	Very Small Blending			Small Blending		
Special Characteristics (except as listed below, special characteristics are not restricted)						
Quarter Cut	1 inch in 12 inches (25.4 mm in 305 mm) maximum grain slope, 2 1/2 inches in 12 inches (63.5 mm in 305 mm) maximum grain sweep					

Unfilled worm holes, open splits, open joints, open bark pockets, shake or doze not allowed in above grades.

- Notes:
- One piece Rotary Cut faces may be used on birch doors with "A" Grade faces.
 - Outside components will be a different size to allow for edge trim loss and certain types of matching.

STILE, RAIL AND PANEL FACE DESCRIPTION - African and Honduras Mahogany, Anegre, Makore, Sapele

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat-Cut) and Quarter-Cut	
Grade Description	AA	A
Color and Matching		
Sapwood	No	No
Heartwood	Yes	Yes
Color Streaks or Spots	Slight	Slight
Color Variation	Slight	Slight
Sharp Color Contrasts at Splice Joints	Yes, if Slip, Plank or Random matched	Yes, if Slip, Plank or Random matched
Type Of Matching		
Book Matched	Yes	Yes
Slip Matched	Specify	Specify
Plearing Matched	not applicable	not applicable
Nominal Minimum Plain Sliced	5 inches (127 mm)	4 inches (102 mm)
Width of Leaves (a) Quarter	3 inches (76 mm)	3 inches (76 mm)
Rotary	5 inches (127 mm)	4 inches (102 mm)
Natural Characteristics (except as limited below, natural characteristics are not restricted)		
Small Conspicuous Burls & Pin Knots-Combined Avg. Number	1 per 5 sq. ft. (2 per sq. m)	1 per 3 sq. ft. (4 per sq. m)
Conspicuous Burls - Max. Size	1/4 inch (6.4 mm)	3/8 inch (9.5 mm)
Conspicuous Pin Knots		
Avg. Number	No	1 per 8 ft. sq. (4 per 3 sq. m)
Max. Size: Dark Part		1/8 inch (3.2 mm)
Total		1/4 inch (6.4 mm)
Scattered Sound and Repaired Knots - Combined Avg. No.	No	No
Max. Size - Sound		
Max. Size - Repaired		
Avg. No. - Repaired		
Mineral Streaks	No	Slight
Bark Pockets	No	No
Worm Tracks	No	No
Vine Marks	Slight	Slight
Cross Bars	Occasional	Occasional
Manufacturing Characteristics		
Rough Cut / Ruptured Grain	No	No
Blended Repaired Tapering Hairline Splits	Two 1/32 inch x 3 inch (Two 0.8 mm x 76 mm) (on ends only)	Two 1/16 inch x 6 inch (Two 1.6 mm x 152 mm)
Repairs	Very Small Blending	Small Blending
Special Characteristics (except as limited below, special characteristics are not restricted)		
Quarter Cut	1 inch in 12 inches (25.4mm in 305 mm) maximum grain slope, 2-1/2 inches in 12 inches (63.4 mm in 305 mm) maximum grain sweep	

Unfilled worm holes, open splits, open joints, open bark pockets, shake or doze not allowed in above grades.

Note a. Outside components will be a different size to allow for edge trim loss and certain types of matching.

STILE, RAIL AND PANEL FACE DESCRIPTION - Red and White Oak

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat Cut), Quarter Cut and Rift and Comb Grain			
Grade Description	AA		A	
	Red Oak	White Oak	Red Oak	White Oak
Color and Matching				
Sapwood	No	No	5%	5%
Heartwood	Yes	Yes	Yes	Yes
Color Streaks or Spots	Yes		Yes	
Color Variation	Slight		Slight	
Sharp Color Contrasts at Splice Joints	Yes, if Slip, Plank or Random matched		Yes, if Slip, Plank or Random matched	
Type of Matching				
Book Matched	Yes		Yes	
Slip Matched	Specify		Specify	
Pleasing Matched	not applicable		not applicable	
Nominal Minimum Plain Sliced Width of Leaves (a) Quarter/Rift Rotary	5 inches (127 mm) 3 inches (76 mm) 5 inches (127 mm)		4 inches (102 mm) 3 inches (76 mm) 4 inches (102 mm)	
Natural Characteristics (except as limited below, natural characteristics are not restricted)				
Small Conspicuous Burls & Pin Knots-Combined Avg. Number	1 per 4 sq. ft. (3 per sq. m)		1 per 2-2/3 sq. ft. (4 per sq. m)	
Conspicuous Burls - Max. Size	1/4 inch (6.4 mm)		3/8 inch (9.5 mm)	
Conspicuous Pin Knots Avg. Number Max. Size: Dark Part Total	No		1 per 3 sq. ft. (4 per sq. m) 1/8 inch (3.2 mm) 1/4 inch (6.4 mm)	
Scattered Sound and Repaired Knots - Combined Avg. No. Max. Size - Sound Max. Size - Repaired Avg. No. - Repaired	No		No	
Mineral Streaks	No		Slight, Blending	
Bark Pockets	No		No	
Worm Tracks	No		No	
Vine Marks	No		Slight	
Cross Bars	Slight		Slight	
Manufacturing Characteristics				
Rough Cut / Ruptured Grain	No		No	
Blended Repaired Tapering Hairline Splits	Two 1/32 inch x 3 inch (Two 0.8 mm x 76 mm) (on ends only)		Two 1/16 inch x 6 inch (Two 1.6 mm x 152 mm)	
Repairs	Very Small Blending		Small Blending	
Special Characteristics (except as limited below, special characteristics are not restricted)				
Ray Fleck (Flake)	Slight, Blending Quarter cut unlimited		Slight, Blending Quarter cut unlimited	
	Rift not to exceed 3/8 inch (9.5 mm) in width			
	Comb not to exceed 3/32 inch (2.4 mm) in width			
Slope and Sweep <i>Quarter & Rift Comb Grain</i>	1 inch in 12 inches (25.4 mm in 305mm) max. grain slope, 2-1/2 inch in 12 inches (63.5 mm in 305mm) max. grain sweep			
	1/2 inch in 12 inches (12.7 mm in 305mm) max. grain slope, 1/2 inch in 12 inches (12.7 mm in 305mm) max. grain sweep			

Unfilled worm holes, open splits, open joints, open bark pockets, shake or doze not permitted in above grades.

Note: a. Outside components will be a different size to allow for edge trim loss and certain types of matching.

STILE, RAIL & PANEL FACE DESCRIPTION – Pecan and Hickory

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat-Cut) and Quarter Cut	
Grade Description	AA	A
Color and Matching		
Sapwood	Yes	Yes
Heartwood	Yes	Yes
Color Streaks or Spots	Yes	Yes
Color Variation	Yes	Yes
Sharp Color Contrasts at Splice Joints	Yes, if Slip, Plank or Random matched	Yes, if Slip, Plank or Random matched
Type Of Matching		
Book Matched	Yes	Yes
Slip Matched	Specify	Specify
Pleasuring Matched	not applicable	not applicable
Nominal Minimum Plain Sliced	5 inches (127 mm)	4 inches (102 mm)
Width of Leaves (c) Quarter/Rift	3 inches (76 mm)	3 inches (76 mm)
Rotary	5 inches (127 mm)	4 inches (102 mm)
Natural Characteristics (except as limited below, natural characteristics are not restricted)		
Small Conspicuous Burls & Pin Knots-Combined Avg. Number	1 per sq. ft. (11 per sq. m)	2 per sq. ft. (22 per sq. m)
Conspicuous Burls - Max. Size	1/4 inch (6.4 mm)	3/8 inch (9.5 mm)
Conspicuous Pin Knots (b)		
Avg. Number	1 per 2 sq. ft. (6 per sq. m)	2 per 1 sq. ft. (22 per sq. m)
Max. Size: Dark Part	1/8 inch (3.2 mm)	1/8 inch (3.2 mm)
Total	1/4 inch (6.4 mm)	1/4 inch (6.4 mm)
Scattered Sound and Repaired Knots - Combined Avg. No.		
Max. Size - Sound	No	No
Max. Size - Repaired		
Avg. No. - Repaired		
Mineral Streaks	Slight	Slight
Bark Pockets	No	Small, Occasional
Worm Tracks	No	Slight
Vine Marks	Slight	Occasional
Cross Bars	Slight	Occasional
Manufacturing Characteristics		
Rough Cut / Ruptured Grain	No	No
Blended Repaired Tapering Hairline Splits	Two 1/32 inch x 3 inch (Two 0.8 mm x 76 mm) (on ends only)	Two 1/16 inch x 6 inch (Two 1.6 mm x 152 mm)
Repairs	Very Small Blending	Small Blending
Special Characteristics (except as limited below, special characteristics are not restricted)		
Bird Peck (c)	No	Slight
Knife Marks	Knife marks may occur in these high density species.	
Quarter Cut	1 inch in 12 inches (24.4 mm in 305 mm) maximum grain slope, 2-1/2 inches in 12 inches (63.4 mm in 305 mm) maximum grain sweep	

Unfilled worm holes, open splits, open joints, open bark pockets, shake or doze not allowed in above grades.

- Notes:
- Outside components will be a different size to allow for edge trim loss and certain types of matching.
 - For Pecan and Hickory, conspicuous pin knots means sound knots 1/4 inch (6.4 mm) or less in diameter with dark centers larger than 1/16 inch (1.6 mm). Blending pin knots are sound knots 1/4 inch (6.4 mm) or less in diameter with dark centers 1/16 inch (1.6 mm) or less and are allowed in all grades of Pecan and Hickory.
 - To achieve a more rustic appearance, bird peck shall be specified.

STILE, RAIL & PANEL FACE DESCRIPTION - Walnut and Cherry

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat-Cut) and Quarter Cut	
Grade Description	AA	A
Color and Matching		
Sapwood	No	No (a)
Heartwood	Yes	Yes
Color Streaks or Spots	Slight	Slight
Color Variation	Slight	Slight
Sharp Color Contrasts at Splice Joints	Yes, if Slip, Plank or Random matched	Yes, if Slip, Plank or Random matched
Type Of Matching		
Book Matched	Yes	Yes
Slip Matched	Specify	Specify
Plasing Matched	not applicable	not applicable
Nominal Minimum Plain Sliced	5 inches (127 mm)	4 inches (102 mm)
Width of Leaves (c) Quarter/Rift	3 inches (76 mm)	3 inches (76 mm)
Rotary	5 inches (127 mm)	4 inches (102 mm)
Natural Characteristics (except as limited below, natural characteristics are not restricted)		
Small Conspicuous Burls & Pin Knots-Combined Avg. Number	1 per 4 sq. ft. (3 per sq. m)	1 per 1-1/3 sq. ft. (8 per sq. m)
Conspicuous Burls - Max. Size	1/4 inch (6.4 mm)	3/8 inch (9.5 mm)
Conspicuous Pin Knots (c)		
Avg. Number	1 per 5 sq. ft. (3 per sq. m)	1 per 2 sq. ft. (6 per sq. m)
Max. Size: Dark Part	1/8 inch (3.2 mm)	1/8 inch (3.2 mm)
Total	1/4 inch (6.4 mm)	1/4 inch (6.4 mm)
Scattered Sound and Repaired Knots - Combined Avg. No.		
Max. Size - Sound	No	No
Max. Size - Repaired		
Avg. No. - Repaired		
Mineral Streaks	Slight	Slight
Bark Pockets	No	No
Worm Tracks	No	No
Vine Marks	Slight	Occasional
Cross Bars	Slight	Occasional
Manufacturing Characteristics		
Rough Cut / Ruptured Grain	No	No
Blended Repaired Tapering Hairline Splits	Two 1/32 inch x 3 inch (Two 0.8 mm x 76 mm) (on ends only)	Two 1/16 inch x 6 inch (Two 1.6 mm x 152 mm)
Repairs	Very Small Blending	Small Blending
Special Characteristics (except as limited below, special characteristics are not restricted)		
Gum Spots	Occasional gum spots permitted in Cherry	Occasional gum spots permitted in Cherry
Quarter Cut	1 inch in 12 inches (25.4 mm in 305 mm) maximum grain slope, 2-1/2 inches in 12 inches (63.4 mm in 305 mm) maximum grain sweep.	

Unfilled worm holes, open splits, open joints, open bark pockets, shake or doze not allowed in above grades.

- Notes:
- Sap is allowed in grades A however, the percentage must be agreed upon between buyer and seller.
 - Outside components will be a different size to allow for edge trim loss and certain types of matching.
 - For Walnut and Cherry, conspicuous pin knots mean sound knots 1/4 inch (6.4mm) or less in diameter with dark centers larger than 1/16 inch (1.6mm). Blending pin knots are sound knots 1/4 inch (6.4mm) or less in diameter with dark centers of 1/16 inch (1.6mm) or less and are allowed in all grades of Walnut and Cherry.

STILE, RAIL AND PANEL FACE DESCRIPTION –Western Red Alder

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat-Cut)		
Grade Description	A	B	C/ Rustic
Color and Matching			
Sapwood	Yes	Yes	Yes
Heartwood	Yes	Yes	Yes
Color Streaks	Slight	Slight	Yes
Color Variation	Slight	Slight	Yes
Nominal Minimum Width of Leaves	3 inches (76 mm)	3 inches (76 mm)	3 inches (76 mm)
Type of Matching			
Plank Matched for pleasing appearance	Yes	Yes	Yes
Book Matched for color and grain at the joints	Specify	Specify	Specify
Natural Characteristics			
Conspicuous Burls- Max. Size	1/2 inch (12.7 mm)	Yes	Yes
Pin Knots	Yes	Yes	Yes
Bark Pockets	No	Few - Maximum Size 1/4 inch x 2 inches (6.4mm x 50.8mm)	Unlimited in number Maximum size 1/4 inch x 4 inches ((6.4mm x 102mm)
Sound Knots - Max Size (may contain dark centers)	1/2 inch (12.7 mm)	2 inches (50.8 mm)	Yes
Repaired Knot Holes - Number; Maximum Size	Two; 1/4 inch (6.4mm) Max Dia.	Six; 3/4 inch (19 mm) Max. Dia.	Unlimited; 1 1/2 inches (38 mm) Max. Dia.
Manufacturing Characteristics			
Rough Cut	No	Small Areas Allowed	Small Areas Allowed
Stain	No	Slight	Yes
Blended Repaired Tapering Hairline Splits	Two; 1/16 inch x 6 inches (1.6mm x 152 mm) on panel ends	Three; 1/8 inch x 10 inches (3.2 mm x 254 mm) on panel ends	1/8 inch x 12 inches (3.2mm x 305mm)
Repairs	Blending	Blending	Yes
Special Characteristics	-	Open Knots	-

- Notes:
- a. The general color of individual components shall not be significantly lighter or darker than that of the other components in the face.
 - b. Book Matched Grade B – one row of unlimited 3/4 inch (19 mm) open knots is allowed.

STILE, RAIL AND PANEL FACE DESCRIPTION - White Pine

(Adapted from HPVA with permission)

Cut	Plain-Sliced (Flat-Cut) and Quarter Cut		
Grade Description	A (Face)	B (Face)	C (Face) (a)
Color and Matching			
Sapwood	Yes	Yes	Yes
Heartwood	Yes	Yes	Yes
Color Streaks	Slight	Yes	Yes
Color Variation	No	Slight	Yes
Stain, Blue and Brown	No	Slight	Yes
Type of Matching			
Plank Matched for pleasing appearance	-	-	-
Book Matched for color and grain at the joints	Yes	Yes	NA
Natural Characteristics			
Burls	Yes	Yes	Yes
Pin Knots	Yes	Yes	Yes
Sound Knots; Max. Size	2 inches (50.8mm)	3 1/2 inches (89 mm)	Yes
Spike Knots; Max. Size	2 inches (50.8mm)	3 1/2 inches (89 mm)	Yes
Repaired Knot Holes; Max. Size	3/4 inch (19 mm)	1-1/2 inches (38 mm)	Unlimited
Pitch Streaks	Small	Small	Yes
Pitch Pockets	Few to 1/8 inch x 1 inch (3.2mm x 25.4 mm)	Few to 1/8 inch x 2 inches (3.2 mm x 50.8 mm)	Yes
Crows Foot	Slight	Occasional/ Yes	Yes
Manufacturing Characteristics			
Rough Cut	No	Slight	Yes
Blended Repaired Tapering Hairline Splits	Yes	Yes	Yes (b.)
Repairs	Blending	Blending	Yes
Cross Bars	-	Open Knots	

Unfilled wormholes, open splits, open joints, ruptured grain, or doze not allowed in grades A and B above

- Notes:
- a. All knotty White Pine complying with this Standard shall meet the C (Face) grade requirements unless otherwise specified.
 - b. Open hairline checks and splits up to 12 inches (305mm) long and 1/8 inch (3.2mm) wide allowed.

STILE, RAIL & PANEL FACE DESCRIPTION - Douglas Fir and *Redwood

(Adapted from HPVA with permission)

*Very limited availability

Cut	Sliced - Vertical Grain	
Grade Description	A	A
	Douglas Fir	Redwood
Color and Matching		
Sapwood	Limited - No bright Sapwood	Yes
Heartwood	Yes (a.)	Yes (a.)
Color Streaks	No	No
Color Variation	Slight	Slight
Stain, Blue and Brown	No	No
Type of Matching		
Book Matched - matched for color and grain at the joints	Yes	Yes
Slip Matched - for color	Yes	Yes
Natural Characteristics		
Burls	Small	Small
Pin Knots	No	Yes
Sound Knots; Max. Size	No	No
Spike Knots; Max. Size	No	No
Repaired Knot Holes; Max. Size	No	No
Pitch Streaks	Small	No
Pitch Pockets	No	No
Crows Foot	No	No
Manufacturing Characteristics		
Rough Cut	No	No
Blended Repaired Tapering Hairline Splits	Yes	Yes
Repairs	Blending	Blending
Cross Bars	No	No

Note: a. Heartwood must have 6 or more annual rings per inch (6 per 25 mm).

A-8: Design

Minimum Panel Thickness

DOOR FEATURES	Premium and Custom Grade	
	Flat Panel	Raised Panel
Minimum Thickness for 1-3/8 inch [35 mm] Thick Door	¼ inch [6mm]	3/4 inch [19 mm]
Minimum Thickness for 1-3/4 inch [44 mm] Thick Door	1/2 inch [13mm]	1-1/8 inches [29 mm]
Minimum Thickness for 2-1/4 inch [57 mm] Thick Door	5/8 inch [16mm]	1-1/2 inches [38 mm]

Design and Fabrication

ASSEMBLY CONSIDERATIONS	Premium Grade	Custom GRADE
Stiles, Rails, and Mullions	Moulded profiles (sticking) shall be at the option of the manufacturer, unless full-size details are shown in bid documents. Involve your WDMA Manufacturer early in the design process.	
Raised panel rims	Mitered and glued to panel body under pressure. Membrane pressed panels allowed if specified.	Mitered and glued to panel body under pressure. Membrane pressed panels allowed.
Panel product centers	Panel core shall be covered by veneer or concealed by rim moulding.	Panel core shall be covered by veneer or concealed by rim moulding.
Applied mouldings	Plant fastened; spot glued, fine finish nailed, filled and sanded	Plant fastened; spot glued, fine finish nailed. Nail holes shall be filled and sanded by final finisher.

Exposed Surface Quality (Minimum Requirements)

DOOR FEATURES	Premium Grade		Custom Grade	
	Transparent	Opaque	Transparent	Opaque
Flat Surfaces	150 grit	150 grit	150 grit	150 grit
Moulded Surfaces	120 grit	120 grit	20 KCPI	20 KCPI
Shaped Surfaces	120 grit	120 grit	20 KCPI	20 KCPI
Sanding Scratches	Not visible from a distance of 3 feet.	Not a defect	Not visible from a distance of 6 feet.	Not a defect

NOTES: No tear outs or hit-or-miss finish allowed. No knife nick marks allowed. Glue and filler, if used, must be inconspicuous and sanded as smoothly as the surrounding surface.

Plant Assembled Joint Tolerances

Maximum Allowable Gaps	Premium Grade and Custom Grade
Face joints between stiles, rails, mullions	0.015 inch (.4mm) wide
Applied moulding miters	0.020 inch (.5mm) wide
Moulding applied to door surfaces	0.020 inch (.5mm) wide
Flushness of face joints between stiles, rails, mullions	±0.005 inch (.13mm)

A-9: Exposed Vertical Edges

Vertical Edges, Opaque or Transparent Finish

Doors may have an eased edge at intersection of edges and face veneers.

- Voids are not permitted between veneer layers and solid wood edges.
- Premium - Matching species, whole piece, lumber or veneer.
- Custom – Matching or compatible species, lumber or veneer Edges may be jointed for opaque finishes. Joints must be tight and not visible after painting.
- Opaque finish requires closed grain hardwood.

A-10: Other Exposed Solid Lumber:

- All solid lumber (sticking, moulding, lumber rims, muntin bars...) shall have a similar sanding appearance as the door face.
- Premium - Matching species.
- Custom – Matching or compatible species.
- Opaque finish requires closed grain hardwood.

PERFORMANCE

P-1: Performance Standards for Architectural Wood Stile & Rail Doors

Performance is a very important aspect of specifying Architectural Wood Stile & Rail Doors and is directly related to the use of the door. The following table identifies the tests that are conducted and the criteria that must be reached in order to qualify a given door assembly for each specific Performance Duty Level

Performance Attribute	Performance Duty Level		
	Extra Heavy Duty	Heavy Duty	Standard Duty
Adhesive Bond Durability, WDMA TM-6	Type I or Type II	Type I or Type II	Type I or Type II
Cycle Slam, WDMA TM-7	1,000,000 cycles	500,00 cycles	250,000 cycles
Hinge-Loading, WDMA TM-8	550 lbs. (2440 N)	475 lbs. (2110 N)	400 lbs. (1780 N)
Door Finishes Various ASTM test methods	TR-6/OP-6 or equal *	TR-4/OP-4 or equal *	TR-2/OP-2 or equal *
Screwholding, WDMA TM-10			
Stile and Rail Face	550 lbs. (2440 N)	475 lbs. (2110 N)	400 lbs. (1780 N)***
Vertical Door Edge	550 lbs. (2440 N)	475 lbs. (2110 N)	400 lbs. (1780 N)
Horizontal Door Edge **	300 lbs. (1330 N)	240 lbs. (1060 N)	180 lbs. (810 N)
Telegraph, Section T-1	Maximum 0.010 inch in any 3 inch span (0.25 mm in any 76 mm span)		
Warp Tolerance, Section T-2	Maximum 0.25 inch in any 3'-6" x 7'-0" (6.35 mm in any 1050 mm x 2100 mm) door section		
Squareness, Section T-3	Diagonal variance 1/8 inch (3.2 mm)		

* See Section F7. Other formulations may exhibit similar performance characteristics, but must meet or exceed the performance levels for the systems specified to be considered as equal.

** Horizontal door edge screwholding applies when hardware is to be attached.

*** If screw holding power is less than 400 lbs. (1780 N) in a Standard Duty door, thru-bolts are recommended for operable hardware.

P-2: Example Duty Level Applications

Extra Heavy Duty Typically involves doors where use is considered heavy and frequent, and requires the highest minimum performance standards.	Heavy Duty Typically involves doors where usage is moderate, and requires intermediate minimum performance standards.	Standard Duty Typically involves doors where frequency of use is low, and requires the lowest minimum performance standards.
Classroom	Assisted Living Room Entry	Closet
Patient Rooms	Office - Interior Passage	Wardrobe
Bathroom - Public	Stairwell	Bathroom - Private
Dorm Room	Mechanical Service	Small, low usage Office
Assembly areas	Hallway	
Auditorium Entry	Storage	
Detention/Correctional	Apartment/Condo Entry	
Bullet Resistant	X-Ray	
Gymnasium/Locker Room	Acoustic	
Surgical Entry	Medical Examination Room	
Trauma Centers		
Hotel/Motel Room Entry		

P-3: Dimensional Information

The following dimensional information and tolerances are determined at the time of shipment. Exposure of the door to variations in temperature and moisture during shipment, storage, and prior to building occupancy may affect the size of door components and their interface.

Doors

Width:	±1/16 in. (±1.6 mm) not prefit ±1/32 in. (±0.8 mm) factory prefit
Height:	±1/16 in. (±1.6 mm)
Thickness:	±1/16 in. (±1.6 mm)

Hardware Machining

Hinge Mortises

Location:	±1/32 in. (±0.8 mm)
Height:	+1/32 in., -0 in. (+0.8 mm, -0 mm)
Depth:	+0.025 in., -0 in. (+0.6 mm, -0 mm)
Backset:	+0 in., -1/32 in. (+0 mm, -0.8 mm)

Lock Fronts

Location:	±1/32 in. (±0.8 mm)
Height:	+1/32 in., -0 in. (+0.8 mm, -0 mm)
Width:	+1/32 in., -0 in. (+0.8 mm, -0 mm)
Depth:	+0.025 in., -0 in. (+0.6 mm, -0 mm)

Typical Prefit Clearances

Non-fire rated Doors

Top & Hinge Edges	1/8 inch (3 mm) clearance
Lock Edge, Single Door	1/8 inch (3 mm) clearance
Meeting Edges, Pairs	1/16 inch (1.6 mm) per leaf
Bottom Edge	3/4 inch (20 mm) maximum from floor 3/8 inch (10 mm) maximum from top of raised sill

Non-fire rated Transoms, Side Lites & Dutch Doors

Width	Per manufacturer's specifications
Height	Per manufacturer's specifications

Fire Rated Openings

See NFPA 80 Standard for Fire Doors and Other Opening Protectives

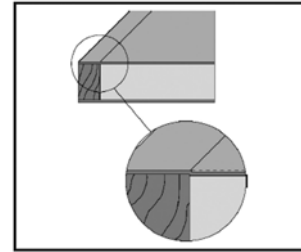
P-4: Flame Spread Smoke Development

Doors covered by this standard are exempt from Flame Spread Smoke Development requirements in the Model Building Codes.

TESTS

T-1: Show Through or Telegraph

Telegraphing of vertical and horizontal edges and cores is considered a defect when the face of the door varies from a true plane in excess of 0.010 inch in any 3 inch (0.25 mm in any 76 mm span), using a straight edge and feeler gauge or other accurate measuring methods.



T-2: Flatness or Warp

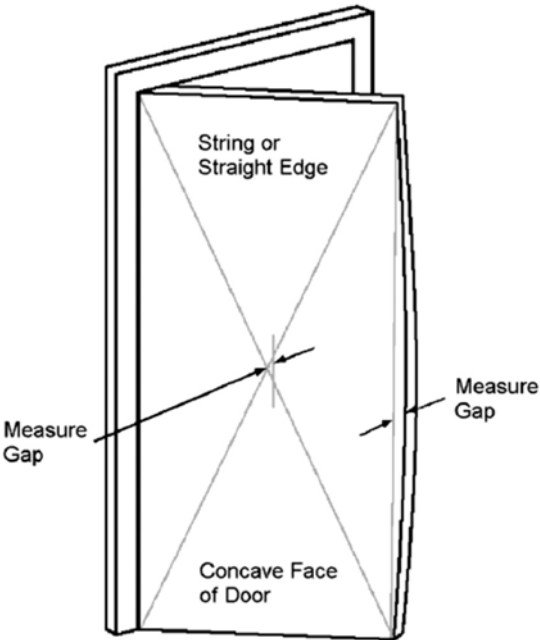
Warp is a variation from a plane surface within the door itself. It does not refer to the door in relation to the frame or jamb in which it was hung. Bow, cup, and twist are terms which describe warp in a door and are defined as follows:

Bow is a curvature along the door height, or a deviation from a flat plane from end to end.

Cup is a curvature across the door width or a deviation from a flat plane from side to side.

Twist is a distortion in which one corner is out of the plane of the other three corners.

Warp is usually a result of unequal stresses within the door from one face to the other caused by changes in humidity and temperature conditions or uneven conditions from one face to the other. Buildings shall be humidity and temperature controlled before doors are delivered and installed. Required conditions are 25% to 55% relative humidity and 50° to 90° F (10° to 32° C) temperature range. Improper handling, stacking, and storage can also contribute to warp. Doors shall be stored flat on a level surface off the floor with cross supports.

HOW TO MEASURE WARP	
Use a taut string or straight-edge and measure on the concave face of door – diagonally, horizontally, or vertically. Measure at the point of maximum distance between the taut string or straight-edge and the face of the door.	
	<p>Measurement must be made on the concave face of the door.</p> <p>Door shall be open when measuring for warp (lock not latched into strike).</p> <p>One person can measure warp using a string and taping one or both ends onto the face of the door, holding it taut.</p> <p>Don't measure warp in relationship to the door frame.</p> <p>Often a door may not fit into the frame properly but is not warped. In these cases, check the frame – it must be set plumb and square and jambs must not be twisted or out of alignment.</p> <p>Action on any claim for warp may be deferred for up to one year after project completion to permit doors to acclimate to temperature and humidity conditions.</p> <p>ALLOWABLE WARP TOLERANCE FOR WOOD DOORS</p> <p>1-3/4 inch (44 mm) or thicker doors: 3'-6" x 7'-0" (1050 mm x 2100 mm) or smaller, 1/4 inch (6.4 mm) maximum. Larger than 3'-6" x 7'-0" (1050 mm x 2100 mm), 1/4 inch (6.4 mm) maximum in any 3'-6" x 7'-0" (1050 mm x 2100 mm) section.</p> <p>1-3/8 inch (35 mm) doors: 3'-0" x 7'-0" (900 mm x 2100 mm) or smaller, 1/4 inch (6.4 mm) maximum. Larger sizes not addressed in this standard</p>

T-3: Squareness

All four corners of a door shall be square (right angles). Also, the length of the diagonal measurement on the face of the door from the upper right corner to the lower left corner shall be within 1/8 inch (3.2 mm) of the length of the diagonal from the upper left corner to the lower right corner.

T-4: Sanding

Sanding is checked for compliance by sanding a sample piece of the same species with the required grit of abrasive.

- A product is sanded sufficiently smooth when knife cuts are removed and any remaining sanding marks are or will be concealed by applied finishing coats.
- Handing marks and/or grain raising due to moisture or humidity in excess of the ranges set forth in this standard shall not be considered as a defect.

T-5: Joint Gaps

Maximum gaps between exposed components shall be tested with a feeler gauge at points designed to join where members contact or touch. Joints length shall be measured with a ruler with minimum 1/16 inch (1 mm) divisions and calculations made accordingly.

CONSTRUCTION

General

Architectural Stile & Rail Doors are customarily manufactured 1-3/4 inches (44 mm) thick; however, other thicknesses are available, such as 1-3/8 inches (35 mm), and 2-1/4 inches (57 mm).

C-1: Face Veneer Requirements

Veneers for Transparent Finishes:

Specie and Grade must be specified. In the absence of Grade specifications, Custom Grade will be furnished. All face veneers for transparent finish to meet requirements of Sections A-3 through A-7.

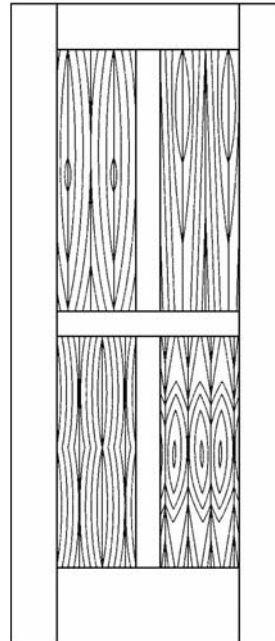
If doors are intended to be installed adjacent to or are intended to become part of other architectural woodwork, veneer criteria shall conform to HPVA veneer panel grades.

Premium Grade Doors:

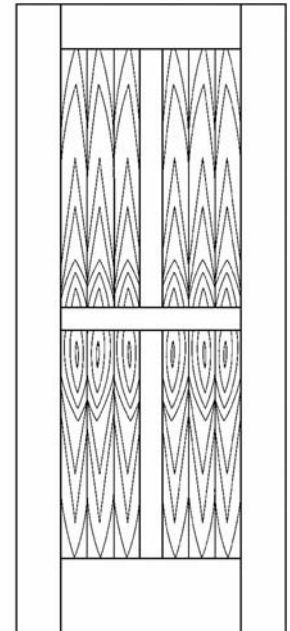
Grade "AA" faces, book and center balance match within each panel face, are standard for Premium grade doors. Veneer is required to be of sufficient thickness to preclude sand through, show through of core, and glue bleed through. Other veneer options are available but must be specified.

Custom Grade Doors:

Grade "A" faces, book and running match within each panel face, are standard for Custom grade doors. Veneer is required to be of sufficient thickness to preclude sand through, show through of core, and glue bleed through. Other veneer options are available but must be specified.



CUSTOM GRADE STILE AND RAIL DOOR WITH BOOK AND RUNNING MATCH PANELS. NO PANEL-TO-PANEL MATCH



PREMIUM GRADE STILE AND RAIL DOOR WITH BOOK AND CENTER BALANCE MATCH PANEL FACES. PANELS WITHIN A DOOR ARE SEQUENCE AND CONTINUOUS MATCHED

Stile, Rail and Panel Face Materials for Opaque Finishes:

Premium/Custom Grade: Closed grain hardwood veneer, MDO, hardboard, or other composite materials. When using hardwood veneer, extra preparation is required prior to job site finishing because of the natural characteristics of wood.

Panel Matching Considerations

DOOR FEATURES	Premium Grade		Custom Grade	
	Transparent	Opaque	Transparent	Opaque
Veneer match between adjacent leaves on a single panel face	Book Match	Mill Option	Book Match	Mill Option
Veneer match within each panel face	Center Balance	Mill Option	Running	Mill Option
Veneer sequence between adjacent panels (Blueprint match available.)	Sequence match side-to-side and continuous vertically	Mill Option	Selected for compatibility of color	Mill Option
Veneered panel sequence between doors (Blueprint match available.)	Selected for compatibility of color	Mill Option	Selected for compatibility in general appearance	Mill Option
Solid Lumber Panel	Not permitted		Not permitted	

- Note on Special Matching: Book Match and Continuous Match or Slip Match and Continuous Match or Special Sketch Faces must be specified and detailed in the architectural drawings.
- Fiberboard or MDO Panel is permitted for opaque finish only, in any grade.

C-2: Typical Stile, Rail and Mullion Core Options

Below is a list of general core constructions used in wood flush doors. Other core can be used, providing the final door construction meets or exceeds the performance duty levels specified in Section P-1.

Particleboard Core:

Wood fiber and/or agri-fiber based materials that comply with ANSI A208.1.

Medium Density Fiberboard Core (MDFC):

Wood fiber and/or agri-fiber based materials that comply with bar A208.2.

Structural Composite Lumber Core (SCLC):

An engineered wood product that is made by fusing a network of wood strands together with a water-resistant adhesive to produce a strong, solid and stable product that has true structural properties with excellent screw holding properties and very high split resistance.

Stave Lumber Core (SLC):

Made with any combination of blocks or strips of hardwood, not more than 2-1/2 inches (64 mm) wide, of one species of wood glued together (in butcher block fashion), with joints staggered in adjacent rows.

Laminated Veneer Lumber Core (LVLC):

Manufactured by laminating veneer with all grain laid-up parallel. It can be manufactured by using various species of wood fiber in various thicknesses.

Fire Resistant Composite Core:

Fire resistant composite core for fire doors per manufacturer's label service listing.

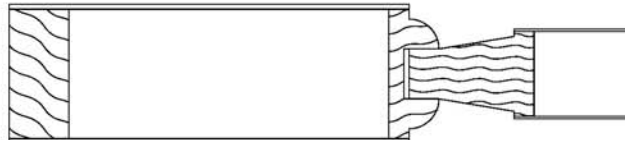
Special Core Types:

Special core constructions are applicable for Sound Resistant (STC), and Bullet Resistant doors. Consult individual manufacturers for details.

C-3: Adhesives

Glue lines for face veneer assembly, between the various plies of the face, between the facing and core assembly, and between edging and core in bonded core assemblies must be either Type I or Type II that meet the requirements specified in WDMA TM-6 Adhesive Bond Durability Test Method.

C-4: Typical Panel Constructions



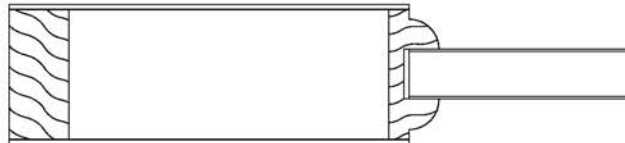
Rim banded veneer raised panel
Premium or Custom grades (hip/bevel panel raise)



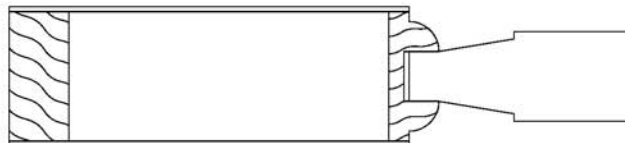
Rim banded veneer raised panel
Premium or Custom grades (scoop panel raise)



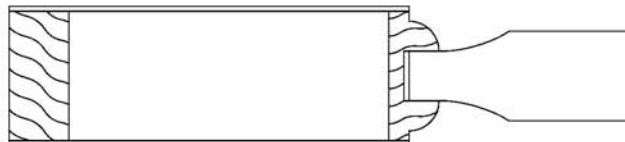
Membrane pressed veneer raised panel
Premium or Custom grades (scoop panel raise)
Premium grade must be at the request of the architect or specifier



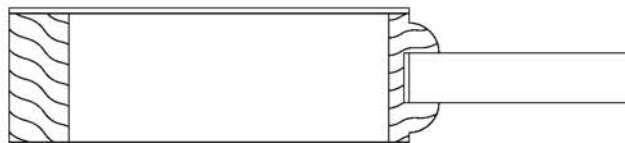
Veneered flat panel
Premium or Custom grades



MDF raised panel (opaque only)
Premium or Custom grades (hip/bevel panel raise)



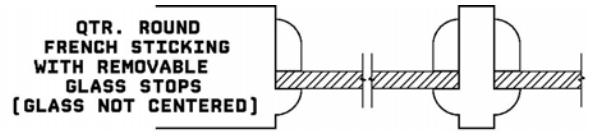
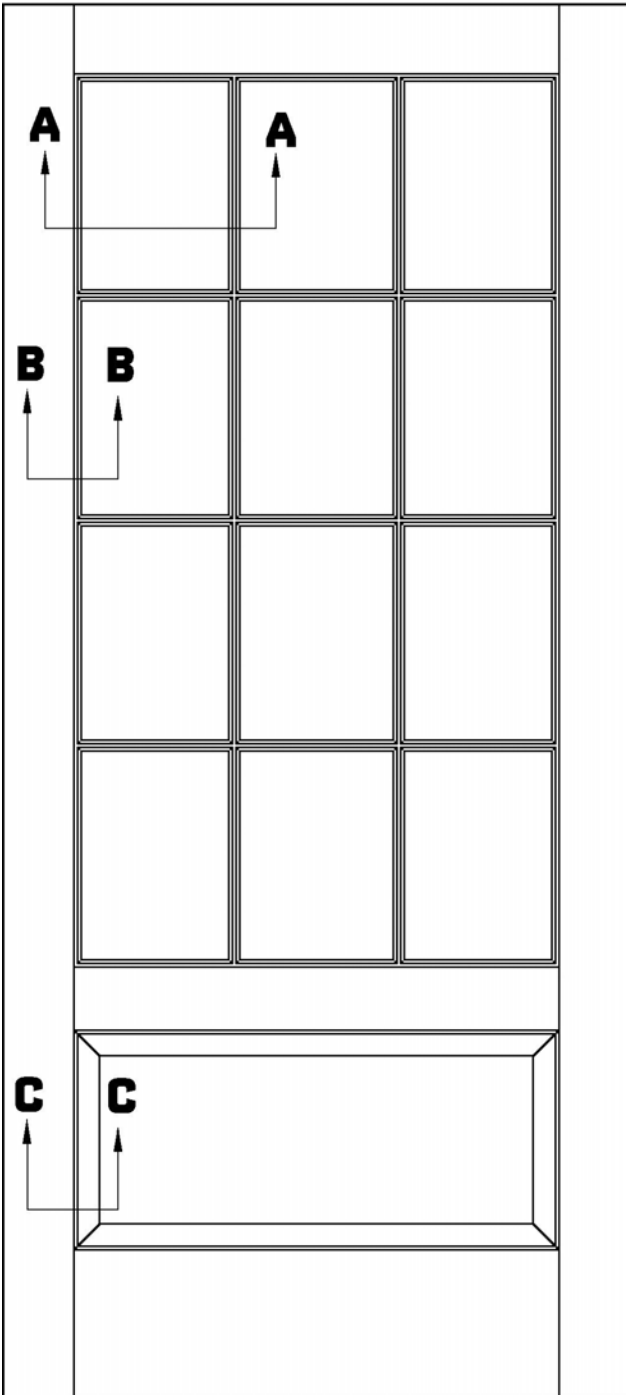
MDF raised panel (opaque only)
Premium or Custom grades (scoop panel raise)



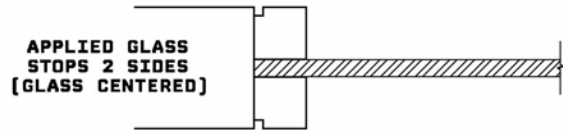
MDF flat panel (opaque only)
Premium or Custom grades

C-5: Typical Panel and Glass Retention Options

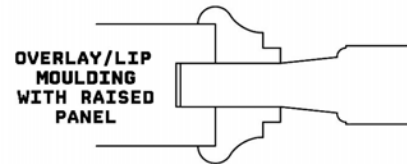
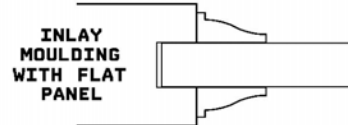
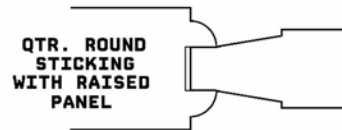
A wide variety of design choices are available to the designer, architect, and specifier. The illustrations below are intended as guidelines for the design professional and should not limit the potential for creative solutions. Glass cannot always be centered within the thickness of the stiles and rails. Consult with your door manufacturer for additional information as it relates to fire rated glass thickness, design criteria and allowable dimensions. At the option of the manufacturer, stops may be applied on both sides of the door.



Section A-A



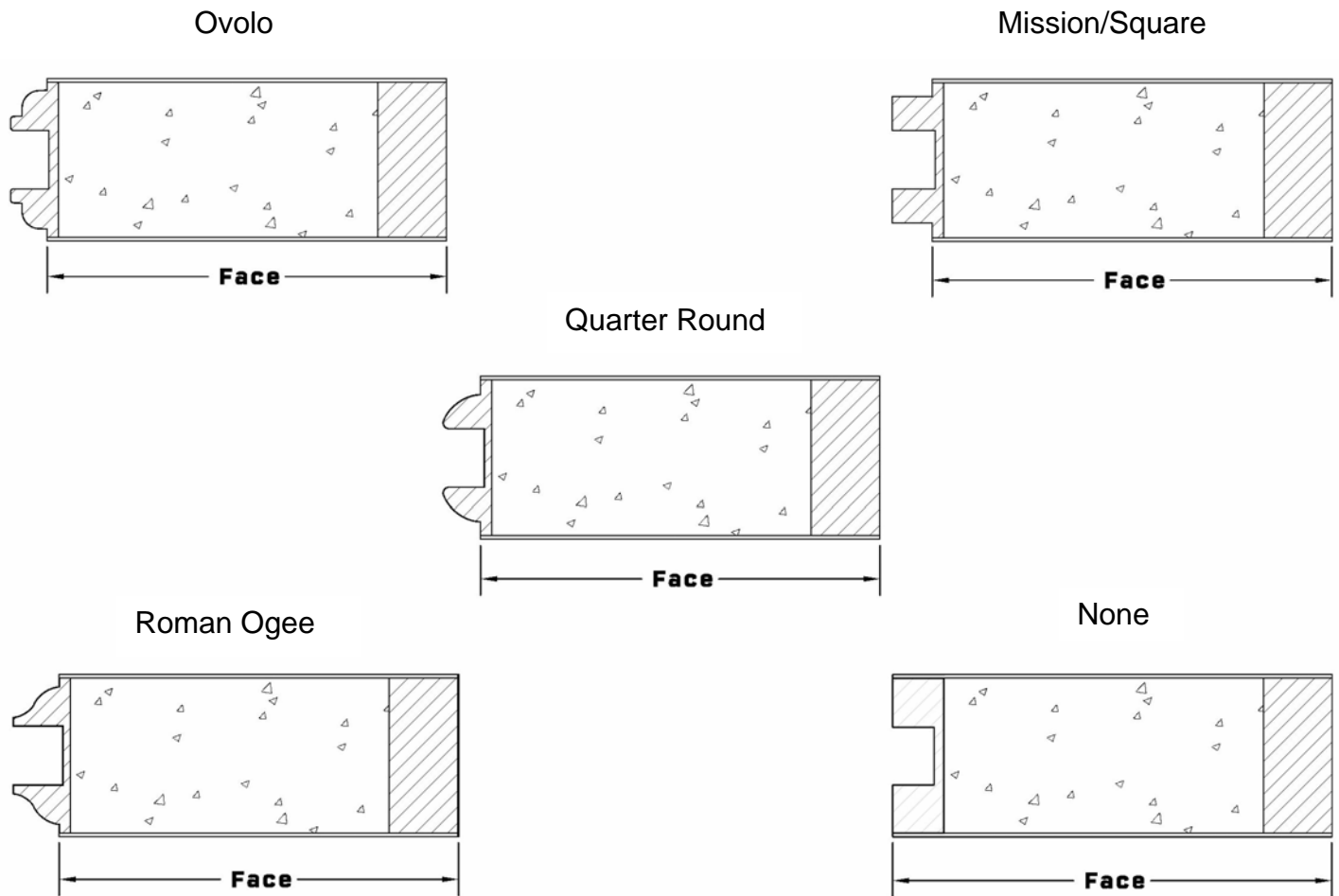
Section B-B



Section C-C

Typical Glass & Panel Retention Options

C-6: Typical Sticking Options



Note: Manufacturer's terminology may vary.

C-7: Suggested Joinery

Subject to design considerations, connecting joints between stiles and rails shall be cope and stick and doweled, or mortise and tenon, and glued under pressure. Alternate methods of joinery may be used; for all methods of joinery it is the manufacturer's responsibility to provide supporting test data. The door shall be tested in accordance with WDMA TM-7 Cycle-Slam test. Refer to duty levels in P-1.

- **Doweled Construction.** 1/2 inch minimum diameter dowels shall have glue grooves and be sized for a drive fit. The length of the dowel will vary with the width of the stiles and rails. The minimum number of dowels at each end of each rail shall be:
 - Rails under 4-1/2 inches (115mm) -- 1 dowel
 - Rails 4-1/2 to 7 inches (115mm to 180mm) -- 2 dowels
 - Rails over 7 inches (over 180mm) -- 3 dowels, plus one dowel for each additional 3 inches (75mm) in width.
- **Mortise & Tenon Construction.** Mortise & tenon shall be sized for a drive fit. The tenon shall be set in adhesive.

C-8: Fire Doors

Fire Door Ratings and Openings Classification

The Model Codes have established a fire door rating system for doors that protect openings in fire resistant rated wall constructions. In 1997, the International Council of Building Officials (ICBO) approved a change to the Uniform Building Code (UBC) that requires fire doors to be tested under positive pressure instead of neutral pressure. Many states and local jurisdictions across the U.S. have adopted the International Building Code (IBC) which also contains the requirement for positive pressure.

It is very important that architects, contractors and distributors are aware of the requirements in their area so the appropriate type of door is supplied (neutral or positive pressure). Door manufacturers are not responsible for interpretations of local codes.

All fire doors must meet the requirements of recognized fire door tests and bear certifying labels of an independent testing agency approved by the building official.

Installation is required to be in accordance with the National Fire Protection Association's Publication NFPA 80, "Standard for Fire Doors and Other Opening Protectives". Machined fire doors shall be provided with detailed installation instructions when doors bear a label indicating compliance to UBC 7-2-or UL 10C.

Requirements for fire ratings and neutral or positive pressure depend upon local codes; door manufacturers are not responsible for interpretations of local code requirements.

Important Facts to Consider When Reading Specifications

Key phrases indicating positive pressure	Key phrases indicating negative (neutral) pressure	Phrases that don't indicate either positive or negative pressure
<ul style="list-style-type: none"> • UBC 7-2-1997 – UBC Fire Test • IBC 2000 or IBC 2003 – Code • NFPA 5000 – Building Construction and Safety Code • UL 10C – Fire Test • After 5 minutes into the test the neutral pressure plane should be at 40 inches • Shall meet positive pressure requirements • Intumescent seals – not telling you it is positive pressure but implying that it is. 	<ul style="list-style-type: none"> • UL 10B – Fire Test • UBC 7-2-1994 – UBC Fire Test • UBC 43-2 – UBC Fire Test • Tested at atmospheric pressure • Neutral pressure • Negative pressure • 	<ul style="list-style-type: none"> • NFPA 101 – Life Safety Code • NFPA 105 – Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives • NFPA 252 – Fire Test method which gives the option to be positive or negative • UBC – With no date given could be either positive or negative • UL 1784 – Air Leakage Test for Door Assemblies • NFPA 80 – Installation standard for fire doors

There are two categories of doors available for positive pressure fire openings.

Category A doors have the door-to-frame sealing system incorporated (concealed or visible) into the door edge at the licensed manufacturer or machining distributor. Refer to the manufacturer's listings or installation instructions for meeting edge requirements, which may require an astragal or field-applied edge sealing system.

Category B doors require a field-applied edge-sealing system between the labeled frame and door. The application of the edge-sealing system cannot require any field machining of the frame or door. Refer to the manufacturer's listings or installation instructions for meeting edge requirements, which may not require an astragal or field-applied edge sealing system. Refer to the individual door listings and Category G, Edge-Sealing Systems for individual manufacturer's requirements.

Smoke and Draft Control Rating [S] (Category "H")

Many positive pressure openings will also require a smoke seal. An "S" label requirement indicates the opening needs to have Smoke and Draft Control Gasketing. Category "H" includes gasket systems that are surface-applied to the perimeter of the door or frame. They may be kerf applied, adhesive backed or mechanically attached. It includes gasketing for the meeting edges. This category covers gasket systems that have been evaluated for use in positive pressure rated assemblies but generally do not provide an edge-sealing system to the opening as described below.

Edge-Sealing Systems (Category "G")

Category "G" includes field applied systems only. Category "G" "Edge-Sealing Systems" are for use on Category "B" doors, or meeting edges (only) of Category "A" doors. These systems are surface-applied to either the perimeter of the door or frame, or meeting edge of the door. They may be kerf-applied, adhesive-backed, or mechanically fastened.

Door Specification Descriptors

Section D-1, lists the different types of stile and rail door constructions available in the industry. Fire rated stile and rail doors for positive pressure openings are designated with the "PP" suffix. Wood Flush doors as described by WDMA I.S. 1A are also available for positive pressure openings based on specific manufacturer's approvals.

Labeling and Listing

The U.S. model building codes require fire doors to be labeled. The label indicates the rating and is a permanent identifying mark attached to the door. A certification organization provides random unannounced inspection of the production of the fire door. Labeling on the door indicates compliance with the requirements of the certification organization. In addition to the door, the door frame, glazing and hardware are required to be labeled for use with a specific fire door. NFPA 80 requires that all fire doors must be self-closing and self-latching.

C-9: Special Function Doors

Sound Resistant (STC)

Sound Resistant Doors are specified by the Sound Transmission Class (STC) ratings as determined by ASTM E90 and ASTM E413. These doors are certified by the manufacturer with regard to their sound resistance. There are a variety of ways in which sound resistance is achieved. . The assigned SCT rating shall reflect operable values. Door thickness may exceed 1-3/4 inches (44mm). Consult manufacturer for details of gasketing, automatic door seals, and thresholds, frames or hardware which may be required.

Bullet Resistant

Bullet resistant doors are manufactured with special ballistic rated materials within the core assembly. They are available to meet or exceed protection levels defined in UL 752 or NIJ. 0108.01 performance standards. When specifying bullet resistant doors, identify what protection level is required.

C-10: Environmental Doors

What is "Green"?

The word "Green" is so often used in the context of "environmental responsibility" and "sustainability" yet is hard to quantify definitively. Green to an environmentalist may be drastically different than that of a manufacturer. The challenge is finding common ground that promotes and rewards environmental responsibility as well as product design and performance that is balanced with the rigors and challenges of manufacturing products that need to be competitive in the marketplace.

Many manufacturers are capable of producing doors that can qualify for environmental credits; for example there are specific credits in the LEED, Green Globes, FSC, SFI, SCS and other programs applicable to doors. Check with the door manufacturer to determine how their products can contribute.

FINISHING

General

Finishes protect wood from moisture, handling, and harsh chemicals. The sooner moisture is restricted from entering or leaving, the longer wood lasts and the finer it looks. It should be noted, however, that finishing only retards moisture penetration, it will not prevent it. Finishes described in this Section are intended for interior applications only.

Transparent finishes without stain provide a protective "window" for the wood, maintaining its natural look. Transparent finishes with stain provide the architect or designer an opportunity to create a striking visual effect by modifying the color, look, and sheen of the door. Opaque finishes protect the wood and provide a solid color "painted" appearance.

A finish can be applied to wood doors in the controlled environment of the door manufacturer's plant or it can be applied in the field by a painting contractor.

The majority of architectural wood doors are now finished at the factory as opposed to the jobsite. It is highly recommended that specifications require factory finishing to achieve the best overall door appearance and durability.

F-1: Factory Finishing

Factory finishing is generally specified when a project requires high quality performance and superior appearance. Factory finishing offers many benefits:

- Factory finishing utilizes state-of-the-art equipment in a dust-free environment provides uniform color, texture, and sheen - conditions normally unavailable in the field.
- Often in field finishing, numerous limitations prevent proper sanding. If improperly sanded, a door lacks the clarity of finish and uniformity of color that is achieved by factory finishing.
- Factory finishing provides adequate drying time in a dust free environment.
- Door manufacturing facilities are subject to strict State and Federal environmental standards which result in the proper handling, application, and disposal of finishing materials. Specifying factory finish improves environmental compliance.
- Factory finishing ensures that wood is protected from unfavorable moisture conditions at the earliest possible time.
- In most cases, the cost of factory finishing is lower than the cost of using a separate finishing contractor.
- Factory finished doors can immediately be installed after delivery, which means faster project completion.

F-2: Finish Selection

Normally, door manufacturers will only supply their standard finishing system. The factory finishing information provided by the specified door manufacturer should be consulted before specifying the type and extent of finishing desired.

Section P-1 of this standard identifies varying minimum finish systems for doors based on their performance duty level. However, many door manufacturers supply a TR-6/OP-6 or TR-8/OP/8 finish system as their standard finish regardless of duty level. These systems provide the highest levels of wear and chemical resistance at an economical cost. Other systems are available, based on individual door manufacturer's processes and policies.

Non-standard stain colors to match architect's selection are available from most manufacturers. Some manufacturers may offer more than one finish system or grain textures (i.e., open grain or "filled" grain). Specifying non-standard finishes may increase the cost over standard finishes. Should special door finishes be desired, they must be fully described in the specifications.

Since appearance and other finish characteristics are somewhat subjective, just the selection of a finishing system does not ensure that the final finish will be acceptable. Selection of a finish should be based on physical samples provided by the door manufacturer.

F-3: Finish System Description

A variety of wood finishes are available, from single stains to multi-step processes. When selecting a finish, consider the desired appearance, exposure, and maintenance it will require.

By identifying a particular finish system, an expectation of performance characteristics for the factory finish is established. There are eight finishing systems that are commonly referenced for architectural wood flush doors. These are:

- TR-2 & OP-2 (Catalyzed Lacquer)
- TR-4 & OP-4 (Conversion Varnish)
- TR-6 & OP-6 (Catalyzed Polyurethanes)
-TR-8 & OP-8 (UV Cured Acrylated Polyester/Urethanes)

The performance levels established by specifying one of these systems can be found in the table located in Section F-7. Finish performance levels can also be specified by referencing the duty level identified in this same table. Unless otherwise specified, manufacturers will furnish their standard finish system.

This standard is not an attempt to identify all available finish systems, or to limit the types of finishes which may be offered by door manufacturers. Other formulations may exhibit similar performance characteristics as the systems described in this section, but must meet or exceed the performance levels for the system specified to be considered as equal. Also, the listing of a finish system in this standard does not imply compliance with the requirement of Local and/or Federal Environmental Protection Agencies.

Finishes are available in different bases and curing methods. The basic types are solvent, water reducible or ultra violet cure. Solvent bases cure by the evaporation of volatile organic compounds (VOC's) into the atmosphere and their use is regulated by environmental agencies. Water base systems evaporate water for curing. Ultra violet (UV) finishes are cured using light to create a chemical reaction within the finishing material. UV finishes are typically the most environmentally friendly of the systems used for architectural door production finishing.

Common finishing systems used by many door manufacturers are described below. "TR" indicates a transparent finish, while "OP" indicates an opaque finish.

TR-2 & OP-2 Catalyzed Lacquer

Catalyzed lacquer systems contain an ingredient for faster drying and harder film. They have the strength and higher solids of conversion coatings. Vinyl lacquer systems are catalyzed lacquers that have a vinyl resin rather than a nitrocellulose base.

TR-4 & OP-4 Conversion Varnish

Conversion varnish is a high solids catalyzed alkyd based coating, offering high resistance to chemicals, moisture, and scratches. Similar in composition to catalyzed lacquer except for nitrocellulose, the solids in this finish make it economical; one coat of conversion varnish can equal two coats of lacquer. Conversion varnishes are also available in waterborne formulations.

TR-6 & OP-6 Catalyzed Polyurethane

Catalyzed polyurethanes have higher solids content than lacquers and provide high build and excellent hardness, providing one of the highest chemical, wear and impact resistance ratings of all available finishes. These finishes are very durable and offer excellent chemical, mar, and impact resistance. Many door manufacturers provide a catalyzed polyurethane system that is cured using ultraviolet (UV) technology.

TR-8 & OP-8 UV Cured Acrylated Polyester/Urethane

Since polyesters have strong filling, build, leveling, and hardness traits, they can be combined with polyurethanes to achieve high gloss and endurance. This finish system excels in appearance, burnish, texture, and overall durability and is the highest rated performance of all the standard door finishes.

F-4: Sample Submission

Door manufacturers will provide standard colors for selection.

To specify non-standard colors and sheens, the architect is to provide two or more samples at least 8 inches x 8 inches (200 x 200 mm) showing the desired effect on the wood species and cut of veneer to be used.

Samples are to bear identification of the project and door supplier. The door manufacturer may elect to submit samples in sets of two or more, illustrating the possible range of variations. Exposure to sunlight and ultraviolet light will cause changes in wood by accelerating bleaching and oxidation. Approved finish samples must be covered and protected from effects of light during the period between approval and delivery of the finished doors.

Variations in color and appearance can be expected due to the nature of wood. Barber pole effect in book matched veneers is not a defect, but is a result of tight and loose sides of veneer created during the slicing process. This can affect color from veneer leaf to veneer leaf within a door face because of light reflection and stain absorption.

Color variation from door to door due to veneers from different logs, color variation within veneers from the same log, and variations from heartwood and sapwood, can also cause differences in appearance from door to door and are acceptable in standard door grades. Specification of uniform color and grain or flitch selection can narrow color variation.

Some veneers are susceptible to grain variations (typically end grain) which can cause a blotchy or uneven color appearance. The darker the stain, the more prevalent the variation can be. Veneers that are more likely to exhibit this effect are Birch and Maple, although it can present itself in any species. Proper sanding can reduce, but not entirely eliminate the contrast in color.

F-5: Job Site Finishing

Because of the many uncontrollable variables that exist at a job site, such as temperature, dust and other factors, door manufacturers' warranties do not cover the appearance of finishes applied in the field. See Section J1 for information on field finishing.

F-6: Visual Inspection Standards

Architectural stile & rail door faces sometimes require touch up due to natural, manufacturing or installation marks. The chart below outlines the allowable defects based on visual inspection from a described distance.

Factory finished doors must be final inspected in the vertical position, at the opening, viewed under lighting identical to final job site conditions, prior to installation.		
Defect Type	Premium Grade	Custom Grade
Glue Spots	Not permitted	Not permitted
Fine Sanding Scratches	Not Permitted	Not noticeable at 3 feet (0.9 m)
Finish runs, orange peel, blisters, blushing, cracking, sags or checking	Not permitted	Not permitted
Filled holes or splits	Not noticeable at 3 ft. (0.9 m)	Not noticeable at 6 ft. (1.8 m)
Repair or touch-up	Not noticeable at 3 ft. (0.9 m)	Not noticeable at 6 ft. (1.8 m)

F-7: Standard Wood Door Finishing System Ratings

The ratings described in the following chart indicate overall performance scores to provide the specifier with a guide to select the system that meets the resistance needs of the project. These systems are those typically available from architectural door manufacturers. Other systems may be available upon request, subject to individual manufacturer's capabilities. Specify system number and chemical description for clarity, i.e., "TR-6 Catalyzed Polyurethane".

CHEMICAL / WEAR	SYSTEM NAME / NUMBER							
	Catalyzed Lacquer		Conversion Varnish		Catalyzed Polyurethane		UV Cured Acrylated Polyester/Urethane	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
	TR-2	OP-2	TR-4	OP-4	TR-6	OP-6	TR-8	OP-8
Vinegar	5	5	5	5	5	5	5	5
Lemon Juice	5	5	5	5	5	5	5	5
Orange Juice	5	5	5	5	5	5	5	5
Catsup	5	5	5	5	5	5	5	5
Coffee	5	5	5	5	5	5	5	5
Olive Oil	5	5	5	5	5	5	5	5
Boiling Water	5	5	5	5	5	5	5	5
Cold Water	5	5	5	5	5	5	5	5
Nail Polish Remover	3	3	4	4	4	4	5	5
Household Ammonia	5	5	5	5	5	5	5	5
VM&P Naphtha	5	5	5	5	5	5	5	5
Isopropyl Alcohol	3	3	5	5	5	5	5	5
Wine	5	5	5	5	5	5	5	5
Windex™	4	4	5	5	5	5	5	5
409 Cleaner™	4	4	5	5	5	5	5	5
Lysol™	5	4	5	5	5	5	5	5
33% Sulfuric Acid	5	5	5	5	5	5	5	5
77% Sulfuric Acid	3	3	1	1	4	4	4	4
28% Ammonium Hydroxide	3	3	5	5	5	5	5	5
Gasoline	5	5	5	5	5	5	5	5
Murphy's Oil Soap™	5	5	5	5	5	5	5	5
Vodka 100 Proof	5	5	5	5	5	5	5	5
1% Detergent	5	5	5	5	5	5	5	5
10% TSP	5	5	4	4	5	5	5	5
TOTAL	110	110	114	114	118	118	119	119
Wear Index	4	3	5	5	5	4	5	4
Cold Check	5	5	5	5	5	5	5	5
Adhesion	5	5	5	5	5	5	5	5
SCORE	124	123	129	129	133	132	134	133

The chemical and wear resistance characteristics of these eight standard door finishing systems were evaluated in an ISO 9000 certified laboratory using the following ASTM test criteria: Chemical Resistance Testing - ASTM D1308; Wear Index - Abrasion Resistance Testing - ASTM D4060; Cold Check Resistance - ASTM D1211; Cross Hatch Adhesion - ASTM D3359. Base line data for application prior to testing: A - 45 - 55% humidity at 70 - 80 degrees Fahrenheit (21 - 26 degrees Celsius); B - Water borne coatings must be cured in a dehumidified atmosphere and can be assisted with Infrared light and good air movement.

Performance indicator numbers on the Standard Wood Door Finishing Systems chart are used, with the following definitions:

For Chemical Resistance and Wear Index - Abrasion Resistance:

- 5 - No effect from the test
- 4 - Minimal effect or slight change and little repair required
- 3 - Some effect, noticeable change and the coating will recover with minimal repairs
- 2 - Moderate effect, performance adversely affected and repairs required
- 1 - Poor performance and film failure is imminent and repairs difficult

For Cross Hatch Adhesion

- 5 - Edges of the cuts are completely smooth; none of the squares of the lattice is detached
- 4 - Small flakes of the coating are detached at intersections; less than 5% of the area is affected
- 3 - Small flakes of the coating are detached along edges and at intersections of cuts; 5 to 15% of the area is affected
- 2 - Coating has flaked along the edges and on parts of the squares; 15 to 35% of the area is affected
- 1 - Coating has flaked along the edges of the cuts in large ribbons and whole squares have detached; 35 to 65% of the area is affected

JOB SITE INFORMATION



WINDOW & DOOR
MANUFACTURERS ASSOCIATION

WDMA

HOW TO STORE, HANDLE, FINISH, INSTALL AND MAINTAIN WOOD DOORS

CARE AND INSTALLATION AT JOB SITE

To preserve the fine qualities of wood doors and a lifetime of superior service, proper storage, handling, finishing and installation is very important. The following guidelines will help to maintain the high quality products supplied by wood door manufacturers.

STORAGE AND HANDLING

1. Store doors flat on a level surface in a dry, well-ventilated building. Doors shall not come in contact with water. Doors shall be kept at least 4 in. (102 mm) off the floor with cross supports, and shall have protective coverings under the bottom door and over the top. Covering shall protect doors from dirt, water and abuse but allow for air circulation under and around the stack.
2. Avoid exposure of interior doors to direct sunlight. Certain species (e.g., cherry, mahogany, walnut, teak) in an unfinished state are more susceptible to discoloration if exposed to sunlight or some forms of artificial light. To protect doors from light damage after delivery, opaque wrapping of individual doors may be specified.
3. Do not subject interior doors to extremes of heat and/or humidity. Do not allow doors to come in contact with water. Prolonged exposure may cause damage. Building where humidity and temperature are controlled provide the best storage facilities (required conditions 25%-55% RH and 50°F-90°F (10°C to 32°C)).
4. Do not install doors in buildings that have wet plaster or cement. Do not store doors in buildings with excessive moisture content – HVAC systems shall be operating and balanced.
5. Doors shall always be handled with clean dry hands or while wearing clean dry gloves.
6. Doors shall be lifted and carried when being moved, not dragged across one another.

FINISHING

1. Wood is hygroscopic and dimensionally influenced by changes in moisture content caused by changes within its surrounding environment. To assure uniform moisture exposure and dimensional control, all surfaces must be finished equally.
2. Doors shall not be considered ready for finishing when initially received. Before finishing, remove all handling marks, raised grain, scuffs, burnishes and other undesirable blemishes by block sanding all surfaces in a horizontal position with 120, 150 or 180 grit sandpaper. Solid core doors, due to their weight, naturally compress the face veneer grain while in the stack. Therefore, block sanding of the overall surface will be required to open the veneer grain to receive a field applied finish evenly. To avoid cross grain scratches, sand with the grain.
3. Certain species of wood, particularly oak, will contain extractives which react unfavorably with foreign materials in the finishing system. Do not use steel wool on bare wood, rusty containers or any other contaminate in the finishing system.
4. A thinned coat of sanding sealer shall be applied prior to staining to promote a uniform appearance and avoid sharp contrasts in color or a blotchy appearance. Door manufacturers are not responsible for the final appearance of field-finished doors. It is expected that the painting contractor will make adjustments as needed to achieve desired results.
5. All exposed, unfinished wood surfaces shall be finished and the top and bottom rails sealed as required by manufacturers finishing instructions. Cutouts for hardware in exterior doors and doors located adjacent to areas where high moisture is expected shall be sealed prior to installation of hardware.
6. Dark colored finishes should be avoided on all surfaces if the door is exposed to direct sunlight, in order to reduce the chance of warping or veneer checking.
7. Water-based coatings on unfinished wood may cause veneer splits, highlight joints and raise wood grain. If used on exterior doors, the coating shall be an exterior grade product. When installed in exterior applications, doors must be properly sealed and adequately protected from the elements. Please follow the finish and door manufacturer's recommendations regarding the correct application and use of these products.
8. Be sure the door surface being finished is satisfactory in both smoothness and color after each coat. Allow adequate drying time between coats. Desired results are best achieved by following the finish manufacturer's recommendations. Do not finish doors until a sample of the finish has been approved.
9. Certain wood fire doors have fire retardant salts impregnated into various wood components that make the components more hygroscopic than normal wood. When exposed to high moisture conditions, these salts will concentrate on exposed surfaces and interfere with the finish. Before finishing the treated wood, reduce moisture content below 11% and remove the salt crystals with a damp cloth followed by drying and light sanding.

INSTALLATION

1. The utility or structural strength of the doors must not be impaired when fitting to the opening, applying hardware, or preparing for lites, louvers, plant-ons or other detailing.
2. Use two hinges for solid core doors up to 60 in. (1524 mm) in height, three hinges up to 90 in. (2286 mm) in height or portion thereof. Interior hollow core doors weighing less than 50 lbs. (23 kg) and not over 90 in. (2286 mm) in height may be hung on two hinges. Use heavy weight hinges on doors over 175 lbs. (79 kg). Pivot hardware may be used in lieu of hinges. Consult hinge or pivot hardware manufacturer with regard to weight and size of hinges or pivots required.
3. The maximum clearance between the top, hinge edge and lock edge to the frame and meeting edge of pairs of doors, is 1/8 in. (3.2 mm).
4. All hardware locations, preparations and methods of attachment must be appropriate for the specific door construction. Templates for specific hardware preparation are available from hardware manufacturers or their distributors.
5. When lite or louver cutouts are made for exterior doors, they must be protected in order to prevent water from entering the door core.
6. Pilot holes must be drilled for all screws that act as hardware attachments. Full threaded screws are preferable for fastening hardware to non-rated doors and are required on fire-rated doors. Self-tapping or combination wood/metal screws are not to be used on wood doors.
7. In fitting non-rated doors for height, do not trim top or bottom edge by more than 3/4 in. (20 mm) unless accommodated by additional blocking.
Trimming of fire-rated doors must be in accordance with NFPA 80.
8. Doors and door frames shall be installed plumb, square and level.

CLEANING AND TOUCHUP

1. Inspect all wood doors prior to hanging them on the job. Repair noticeable marks or defects that may have occurred from improper storage and handling.
2. Field repairs and touchups are the responsibility of the installing contractor upon completion of initial installation. Field touchup shall include the filling of exposed nail or screw holes, re-finishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars and final cleaning of finished surfaces.
3. When cleaning door surfaces, use a non-abrasive commercial cleaner designed for cleaning wood door or paneling surfaces, that does not leave a film residue that would build up or affect the surface gloss of the door finish.

ADJUSTMENT AND MAINTENANCE

1. Ensure that all doors swing freely and do not bind in their frame. Adjust the finish hardware for proper alignment, smooth operation and proper latching without unnecessary force or excessive clearance.
2. Review with the owner/owner's representative how to periodically inspect all doors for wear, damage and natural deterioration.
3. Review with the owner/owner's representative how to periodically inspect and adjust all hardware to insure that it continues to function as it was originally intended.
4. Finishes on exterior doors may deteriorate due to exposure to the environment. In order to protect the door it is recommended that the condition of the exterior finish be inspected at least once a year and re-finished as needed. Both exterior and interior finishes will change color over time.

401 N. Michigan Avenue, Suite 2200, Chicago, IL 60611
www.wdma.com



REFERENCE STANDARDS AND ORGANIZATIONS

ADA

Americans with Disabilities
Disability Rights Section Mailing Address
U.S. Department of Justice
950 Pennsylvania Avenue, NW
Civil Rights Division
Disability Rights Section - NYA
Washington, D.C. 20530
www.usdoj.gov

ANSI

American National Standards Institute, Inc.
25 West 43rd Street, 4th floor
6New York, NY 10036
www.ansi.org

ANSI A135.4 – 04 Basic Hardboard

ANSI A208.1 – 09 Particleboard

ANSI A208.2 – 09 Medium Density Fiberboard (MDF) for Interior Applications

ASTM

American Society for Testing and Materials
100 Barr Harbor Drive
P.O. Box C700
West Conshohocken, PA 19428-2959
www.astm.org

ASTM D1308 - 02(2007) Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

ASTM D3359 - 09 Standard Test Methods for Measuring Adhesion by Tape Test

ASTM D4060 - 10 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser

ASTM E90 - 09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

ASTM E413 - 10 Classification for Rating Sound Insulation

AWI

Architectural Woodwork Institute
1952 Isaac Newton Square West
Reston, VA 20190
www.awinet.org

Architectural Woodwork Standards, 1st Edition

FSC

Forest Stewardship Council – U.S.
212 Third Avenue North, Suite 504
Minneapolis, MN 55401
www.fscus.org

GBI

Green Globes
The Green Building Initiative
2104 SE Morrison
Portland, Oregon 97214
www.thegbi.org

HPVA

Hardwood Plywood & Veneer Association
1825 Michael Faraday Drive
Reston, VA 20290
www.hpva.org

ICC
International Code Council
500 New Jersey Avenue, NW, 6th Floor
Washington, DC 20001
www.iccsafe.org
International Building Code (IBC) – all editions

NFPA
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169
www.nfpa.org
NFPA 80 – 10 *Standard for Fire Doors and Other Opening Protectives*
NFPA 101 – 09 *Life Safety Code*
NFPA 105 – 10 *Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives*
NFPA 252 – 08 *Standard Methods of Fire Tests of Door Assemblies*
NFPA 5000 – 09 *Building Construction and Safety Code*

NIJ
National Institute of Justice
810 Seventh Street, NW
Washington, DC 20531
www.ojb.usdoj.gov/nij

SCS
Scientific Certification Systems
2200 Powell Street, Suite 725
Emeryville, CA 94608
www.scscertified.com

SFI
Sustainable Forestry Initiative, Inc.
900 17th Street, NW, Suite 700
Washington, DC 20006
www.sfiprogram.org

UL
Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062
www.ul.com
UL 10B – 08 *Standard for Fire Tests of Door Assemblies*
UL 10C – 09 *Standard for Positive Pressure Fire Tests of Door Assemblies*
UL 752 – 05 *Standard for Bullet-Resisting Equipment*
UL 1784 – 01 *Standard for Air Leakage Tests of Door Assemblies*

USGBC
LEED – Leadership in Energy and Environmental Design
U.S. Green Building Council
2101 L Street, NW
Suite 500
Washington, DC 20037
www.usgbc.org

WDMA
Window & Door Manufacturers Association
401 North Michigan Ave.
Chicago, IL 60611-4267
www.wdma.com

WDMA I.S. 1A-08 Industry Standard for Architectural Wood Flush Doors

WDMA I.S.10-05 Industry Standard for Testing Cellulosic Composite Materials for Use in Fenestration Products

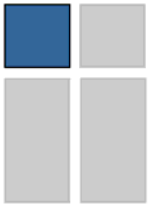
WDMA T.M. 6-08 Test Method for Determining the Durability of Adhesives Used in Doors under Accelerated Aging Conditions

WDMA T.M. 7-08 Test Method for Determining the Physical Endurance of Wood Doors and Associated Hardware Connections under Accelerated Operating Conditions

WDMA T.M. 8-08 Test Method for Determining Hinge Loading Resistance of Wood Door Stiles

WDMA T.M. 10-08 Test Method for Determining the Screw Holding Capacity of Wood Doors

WDMA T.M. 15-11 Test Method for Determining the Vertical Edge Impact Resistance of Backing for Veneered Wood Door Stiles



**WINDOW & DOOR
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401N. Michigan Avenue, Suite 2200, Chicago, IL 60611
www.wdma.com