

Architectural Woodwork Standards

SECTION - 6 INTERIOR & EXTERIOR MILLWORK

SECTION 6 ♦ INTERIOR & EXTERIOR MILLWORK

(Including Standing & Running Trim, Door Frames, Window Frames, Sashes, Blinds & Shutters, Screens, Ornamental & Miscellaneous Millwork Composed of Solid Wood and/or Sheet Products)

GENERAL

1 INFORMATION

1.1 GRADES

- 1.1.1 These standards are characterized in three Grades of quality that may be mixed within a single project. Limitless design possibilities and a wide variety of lumber and veneer species, along with overlays, high-pressure decorative laminates, factory finishes, and profiles are available in all three Grades.
- 1.1.2 **ECONOMY GRADE** defines the minimum quality requirements for a project's workmanship, materials, or installation and is typically reserved for woodwork that is not in public view, such as in mechanical rooms and utility areas.
- 1.1.3 **CUSTOM GRADE** is typically specified for and adequately covers most high-quality architectural woodwork, providing a well-defined degree of control over a project's quality of materials, workmanship, or installation.
- 1.1.4 **PREMIUM GRADE** is typically specified for use in those areas of a project where the highest level of quality, materials, workmanship, and installation is required.
- 1.1.5 **MODIFICATIONS** by the contract documents shall govern if in conflict with these standards.

1.2 BASIC CONSIDERATIONS

- 1.2.1 **ACCEPTABLE REQUIREMENTS** of lumber and/or sheet products used within this woodwork product section are established by Sections 3 and 4, unless otherwise modified herein.
- 1.2.2 **CONTRACT DRAWINGS** and/or **SPECIFICATIONS**, furnished by the design professional, shall clearly indicate or delineate all material, fabrication, installation, and applicable building code/regulation requirements.
- 1.2.3 **CROSS GRAIN** in band-sawn or laminated members and **EDGES** in veneer-laminated members or where multiple layers are exposed by shaping may cause objectionable color variation when finished.
- 1.2.4 **WOOD FIRE-RATED DOOR FRAMES** are available in 20-, 45-, 60-, and 90-minute classifications (see Industry Practices [Item 1.5] for additional information).
- 1.2.5 **EXPOSED SURFACES INCLUDE:**
 - 1.2.5.1 Visible surfaces of standing/running trim, door/window frames, sashes, screens, blinds, shutters, and miscellaneous woodwork, excluding:
 - 1.2.5.1.1 Top horizontal surfaces 80" (2032 mm) or more above the finished floor, unless visible from above.
 - 1.2.5.1.2 Bottom horizontal surfaces 42" (1067 mm) or less above the finished floor.
- 1.2.6 **SEMI-EXPOSED SURFACES INCLUDE:**
 - 1.2.6.1 Top horizontal surfaces 80" (2032 mm) or more above the finished floor, unless visible from above.
 - 1.2.6.2 Bottom horizontal surfaces 42" (1067 mm) or less above the finished floor.
- 1.2.7 **CONCEALED SURFACES INCLUDE:**
 - 1.2.7.1 Non-visible surfaces attached to and/or covered by another.
 - 1.2.7.2 Non-visible blocking, spacers, etc., used for attachment.
- 1.2.8 The **SMOOTHNESS** of:
 - 1.2.8.1 **PLANED** or **MOLDED SURFACES** is directly related to the closeness of the knife cuts.
 - 1.2.8.1.1 The closer the cuts are to each other (i.e., the more knife cuts per inch [KCPI]), the closer the ridges, therefore, the smoother the resulting appearance.

GENERAL1.2 **BASIC CONSIDERATIONS** (continued)1.2.8 The **SMOOTHNESS** of (continued)

1.2.8.2 **SANDED SURFACES** is directly related to the grit of the abrasive used.

1.2.8.2.1 Sandpapers come in grits from coarse to fine and are assigned ascending grit numbers. The coarser the grit, the faster the stock removal.

1.2.8.2.2 The surface will show the striations caused by the grit. Sanding with progressively finer-grit papers will produce smoother surfaces.

1.2.9 **RADIUS WORK** is segmented, bent, laminated, and formed or machined to the radius.

1.2.9.1 **SOLID MACHINED** woodwork typically starts with a large, often glued-up piece of material, from which several nested pieces can be machined.

1.2.9.1.1 Characteristically, this method limits the length of pieces that can be developed without a joint.

1.2.9.1.2 It also yields a piece of material with the grain straight on the face, not following the curve.

1.2.9.1.3 Profiles with a flat face can be machined from sheet products with an edgeband applied, yielding larger pieces with more consistent grain.

1.2.9.2 **BLOCK-LAMINATED** woodwork is made of solid machined pieces, glued-up typically in a staggered fashion for width and length.

1.2.9.2.1 This technique is used in radius jams and often becomes the core for **CORE-VENEERED** woodwork (see 1.2.9.4).

1.2.9.3 **LAMINATED-PLIES** woodwork consists of thin, bendable plies of lumber in a form that will hold its shape without having to be secured to another surface.

1.2.9.3.1 The curved piece can then be milled to the desired profile.

1.2.9.3.2 The glue lines follow the edge grain and the curve, thus minimizing their visibility.

1.2.9.3.3 The species of wood and the tightness of the radius determine the maximum thickness of each ply.

1.2.9.4 **CORE-VENEERED** woodwork consists of core machined from lumber or panel product to which finish material is laminated as an exposed face.

1.2.9.4.1 This technique is limited to certain profiles; however, it offers the ability to minimize glue joints and control grain directions.

1.2.9.5 **KERFED** woodwork consists of lumber with repeated saw cuts on the back face of the piece, perpendicular to the bend.

1.2.9.5.1 The tightness of the radius determines the spacing and depth of the kerfs. Kerfing allows the piece to be bent to the required radius and then secured in place to hold the bend. Kerfing could result in "flats" on the face, which show in finishing.

1.2.9.5.2 When dealing with a large radius, it is sometimes possible to stop the kerf prior to going through an exposed edge. In most cases, however, the kerf runs all the way through, and the edge must be concealed.

1.2.9.6 **CHORD SEGMENTATION**, as shown below, is the process of cutting short lengths of straight molding and joining them around a curved substrate and is **NOT** permitted unless specified.



GENERAL

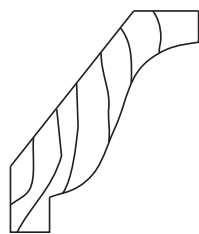
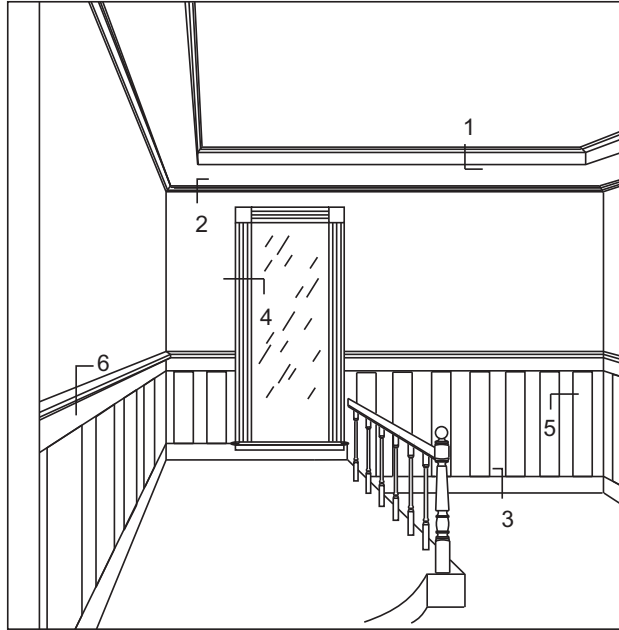
1.2 **BASIC CONSIDERATIONS** (continued)

1.2.9 **RADIUS WORK** (continued)

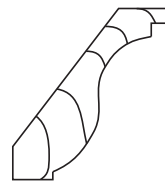
1.2.9.7 The **METHOD of FABRICATION**, unless specified otherwise, is the manufacturer's option.

1.2.9.7.1 The fabrication method can affect the final appearance, especially regarding the direction of the grain and the visibility of the glue joints. The design professional may wish to specify the method; however, it is recommended that an architectural woodwork firm be consulted before making a particular selection. Mock-ups may be required to visualize the end product.

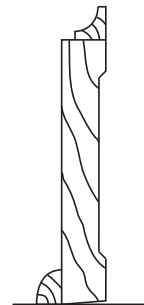
1.2.10 **STANDING** and **RUNNING** trim nomenclature and examples:



1 Crown Running Trim



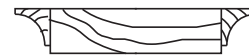
2 Crown Running Trim



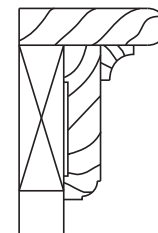
3 Base Combination (Cove, Board, Shoe) Running Trim



4 Window Casing Standing Trim



5 Wall Molding Combination (Cove, Board, Cove) Standing Trim



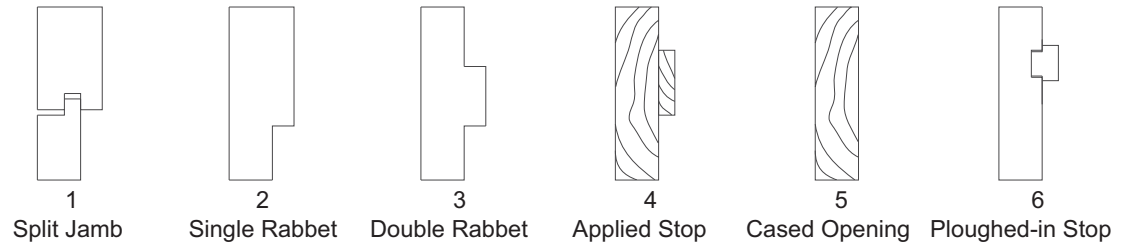
6 Chair Rail Combination (Cap, Cove, Rail) Running Trim

GENERAL

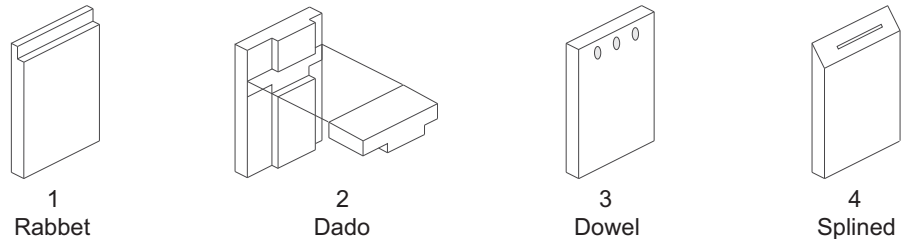
1.2 BASIC CONSIDERATIONS (continued)

1.2.11 DOOR FRAMES and JAMBS

1.2.11.1 Typical FRAME and JAMB examples:



1.2.11.2 Typical FRAME JOINERY examples:



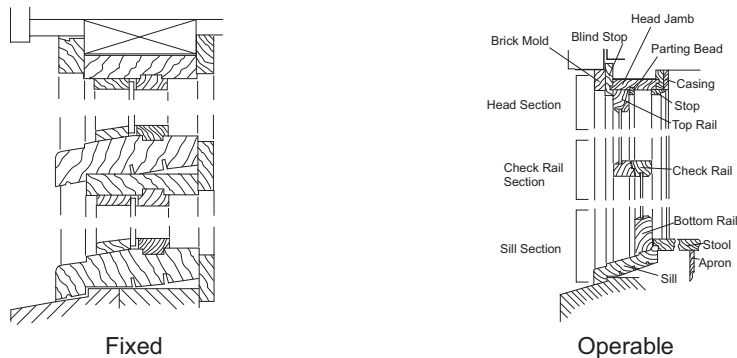
1.2.11.3 **LABELED** (fire-rated) jamb assemblies are available in limited design/ratings/species; however, new designs/ratings are in ongoing development.

1.2.11.3.1 Only firms recognized by applicable code officials are authorized to label a frame assembly. If a label will be required by the applicable code officials, it is the obligation of the design professional to so specify, and the obligation of the manufacturer to assure a properly licensed assembly.

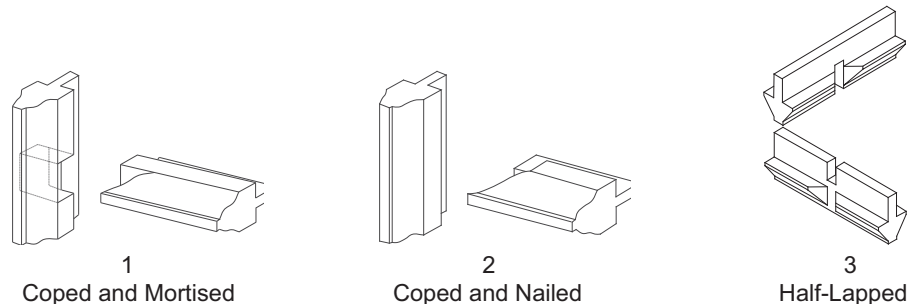
1.2.11.3.2 These standards do not cover **LABELED** frames.

1.2.12 WINDOW SASH and FRAMES

1.2.12.1 Typical ASSEMBLY examples:



1.2.12.2 Typical SASH JOINERY examples:

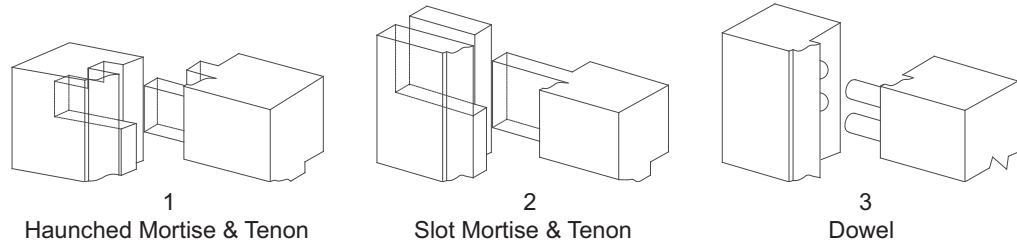


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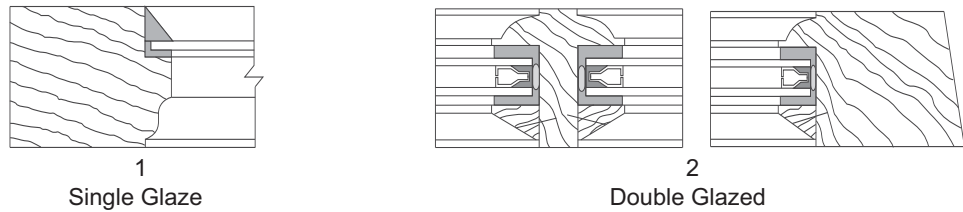
1.2 BASIC CONSIDERATIONS (continued)

1.2.12 WINDOW SASH and FRAMES (continued)

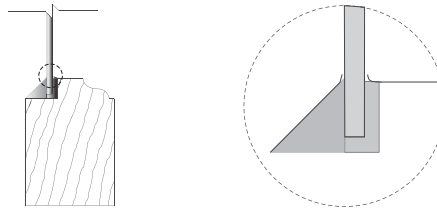
1.2.12.2 Typical SASH JOINERY examples (continued)



1.2.12.3 Typical GLAZING examples:



1.2.12.3.1 Paint should lap the glass by 1/16" + (1.6 mm+) for proper exterior seal:



1.2.12.4 THERMAL INTEGRITY:

1.2.12.4.1 Wood is a natural insulator that retains heat in winter without a thermal break, resists conductance of cold temperatures 2000 times better than aluminum, and is approximately 30% more thermally efficient than comparable aluminum windows.

1.2.12.4.2 Wood's minimal conduction keeps the inside wood surface of windows warm in the winter and cool in the summer.

1.2.12.4.3 Wood windows are available in single-, double-, and triple-glazing systems, increasing thermal efficiency.

1.2.12.5 **PERFORMANCE TESTING** is applicable only to complete exterior window units and, if required, must be specified and may include all or part of ASTM E 283, Air Infiltration; E 330, Loading; and/or E 547, Water Penetration. ASTM tests must be specified for the current ASTM Grade Level:

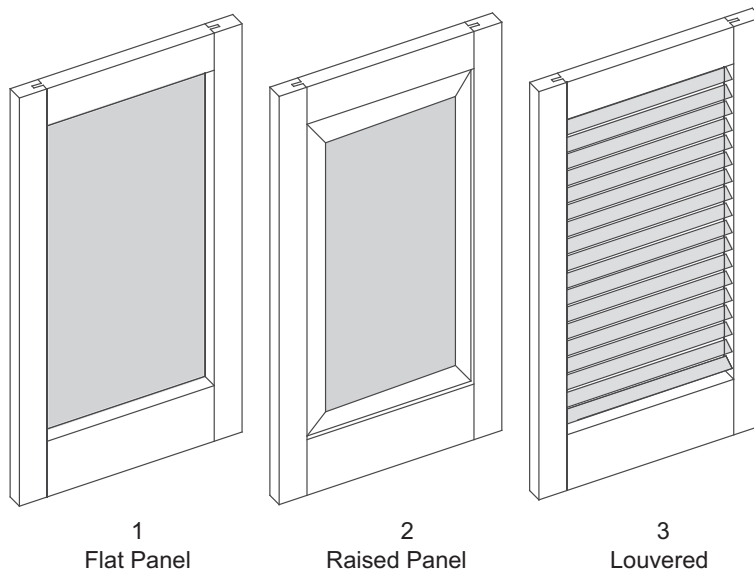
1.2.13 BLINDS and SHUTTERS:

1.2.13.1 **HARDWARE** must be specified, as it dictates the details of construction.

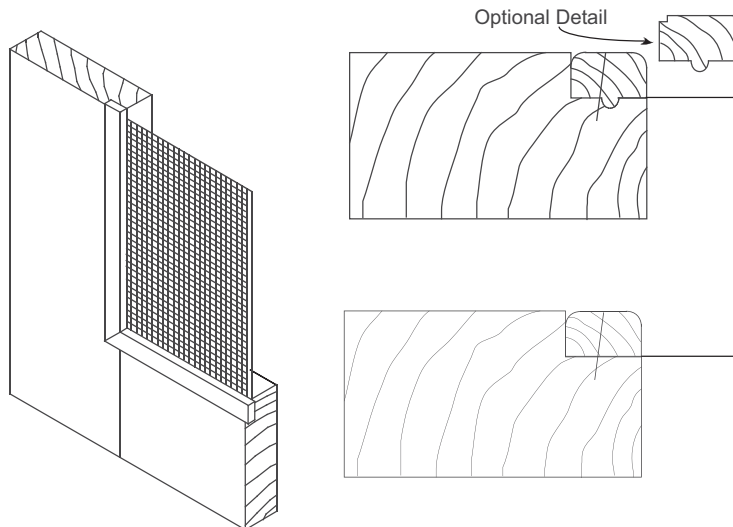
1.2.13.1.1 **MANUFACTURER DOES NOT** typically supply, machine for, or install operating hardware, locking devices, pulls, lifts, etc.

GENERAL1.2 **BASIC CONSIDERATIONS** (continued)1.2.13 **BLINDS and SHUTTERS** (continued)

1.2.13.2 Typical examples

1.2.14 **SCREENS:**1.2.14.1 **HARDWARE** must be specified, as it dictates the details of construction.1.2.14.1.1 **MANUFACTURER DOES NOT** typically supply, machine for, or install operating hardware, locking devices, pulls, lifts, etc.

1.2.14.2 Typical bead detail examples:

1.2.15 **ORNAMENTAL WOODWORK:**1.2.15.1 **TYPICAL SOURCES** of wood ornamentation are either mass-produced or custom carved and tooled.1.2.15.1.1 **MASS-PRODUCED** product is often limited in available species, sizes, and design, and is often a hodgepodge of historic styles, which:

1.2.15.1.1.1 Might lack detail clarity.

1.2.15.1.1.2 Can be appropriate for many applications.

GENERAL

1.2 BASIC CONSIDERATIONS (continued)

1.2.15 ORNAMENTAL WOODWORK (continued)

1.2.15.1 TYPICAL SOURCES (continued)

1.2.15.1.2 **CUSTOM CARVED** or tooled work has a special appearance, with:

1.2.15.1.2.1 Depth and clarity or crispness that machine tooling often cannot achieve.

1.2.15.1.2.2 Slight irregularities because it is done by a skilled artisan; however, this is deemed desirable as it lends character and credence to the work.

1.2.15.1.2.3 Tool-marked surface, which can be sanded smooth or left as a texture.

1.2.15.2 There are four methods of depicting a design in wood:

1.2.15.2.1 **INCISED:** Designs are simply made by shallow grooves in the surface of the material.

1.2.15.2.2 **RELIEF:** Most architectural carving is carved in relief. The degree to which the design is lifted off the surface is described as low or high relief.

1.2.15.2.3 **PIERCED:** Some voids in the design are literally cut through the material and are termed pierced carvings.

1.2.15.2.4 **SCULPTURE:** Carving in-the-round or sculptural works are incorporated into architectural surroundings.

1.2.15.3 **MOLDINGS** have multiple uses but an important one is to visually set apart various elements. For instance, they are transitions between the parts of the entablature.

1.2.15.3.1 They accentuate the trim (architrave) around doors and windows and around an arch (archivolt).

1.2.15.3.2 The various terms depend primarily on the profiles, but there are a few terms that indicate use, location, or size.

1.3 RECOMMENDATIONS

1.3.1 INCLUDE IN DIVISION 09 OF THE SPECIFICATIONS:

1.3.1.1 For **JOBSITE FINISHING - BEFORE FINISHING**, all exposed portions of woodwork shall have handling marks or effects of exposure to moisture removed with a thorough, final sanding over all surfaces of the exposed portions using an appropriate grit sandpaper, and shall be cleaned before applying sealer or finish.

1.3.1.2 At **CONCEALED SURFACES** - Architectural woodwork that may be exposed to moisture, such as those adjacent to exterior concrete walls, etc., shall be back-primed.

1.3.1.3 At **WOOD SASH** and **WINDOWS**, the finish coats shall be flowed onto the glass area approximately 1/16" (1.6 mm) to properly seal against weather, wind, and rain.

1.3.1.3.1 It is not recommended to use a **RAZOR BLADE** to scrape the glass, as it might break the seal. A broad-blade putty knife is recommended to be used to protect the seal between the glass and the wood members.

1.3.2 **THOROUGHLY REVIEW** Sections 2 and 4, especially Basic Considerations, Recommendations, Acknowledgements, and Industry Practices within Part 1 for an overview of the characteristics and the minimum acceptable requirements of lumber and/or sheet products that might be used herein.

1.3.3 **CONTRACT DOCUMENTS** (plans and/or specifications) shall require that all structural members, grounds, blocking, backing, furring, brackets, or other anchorage which becomes an integral part of the building's walls, floors, or ceilings, required for the installation of architectural woodwork is not to be furnished or installed by the architectural woodwork manufacturer or installer.

GENERAL

- 1.3 **RECOMMENDATIONS** (continued)
- 1.3.4 **SPECIFY** requirements for:
- 1.3.4.1 Fire ratings or special code compliance
 - 1.3.4.2 Window performance testing and/or labeling and hardware
 - 1.3.4.3 Glass type and thickness
- 1.3.5 **WOOD SPECIES** for:
- 1.3.5.1 **EXTERIOR SASH** or **FRAME** parts shall be of any species listed in Section 3 as being:
 - 1.3.5.1.1 For **ECONOMY** Grade - **MODERATELY RESISTANT**
 - 1.3.5.1.2 For **CUSTOM** and **PREMIUM** Grade - **RESISTANT** or **VERY RESISTANT**
- 1.3.6 **CLOSET** and **UTILITY SHELVING**:
- 1.3.6.1 The design professional shall specify any shelf size, thickness, or support system needed to meet the load-carrying requirements of the project; otherwise, the minimal requirements of the standards shall prevail.
 - 1.3.6.1.1 Shelf-deflection information can be found in Section 10.
 - 1.3.6.2 The design professional shall specify and indicate in the plans any ADA or barrier-free compliance requirements. Actual design for compliance is the responsibility of the design professional.
 - 1.3.6.2.1 **ADA** design information can be found in Appendix A.
- 1.3.7 **ORNAMENTAL MILLWORK**:
- 1.3.7.1 **BUILT-UP CONSTRUCTION** can be utilized to improve fire rating.
 - 1.3.7.1.1 Where a **FIRE RATING** is required, members built up by the use of treated cores (fire-rated particleboard or medium-density fiberboard) clad with untreated veneers not thicker than 1/28" (0.9 mm) may help over the use of solid lumber.
- 1.4 **ACKNOWLEDGEMENTS** - None
- 1.5 **INDUSTRY PRACTICES**
- 1.5.1 **FIRE-RATED WOOD DOOR FRAMES** shall be of the manufacturer's standard design and construction, conforming to the requirements of their applicable labeling service.
 - 1.5.2 **STRUCTURAL MEMBERS**, grounds, blocking, backing, furring, brackets, or other anchorage that becomes an integral part of the building's walls, floors, or ceilings, that are required for the installation of architectural woodwork are not furnished or installed by the architectural woodwork manufacturer or installer.
 - 1.5.3 **WALL, CEILING**, and/or opening variations in excess of 1/4" (6.4 mm) or **FLOORS** in excess of 1/2" (12.7 mm) in 144" (3658 mm) of being plumb, level, flat, straight, square, or of the correct size are not acceptable for the installation of architectural woodwork, nor is it the responsibility of the installer to scribe or fit to tolerances in excess of such.
 - 1.5.4 **BACK-PRIMING** of architectural woodwork is not the responsibility of the manufacturer and/or installer, unless the material is being furnished prefinished.
 - 1.5.5 **RADIUS MOLDINGS** are laminated and formed, preshaped, or machined to the radius and fabricated in the longest practical lengths to minimize installer joints.

PRODUCT**2 SCOPE**

- 2.1 All exposed interior and exterior standing and running wood trim members, door frames, window frames, sashes, blinds and shutters, screens, and ornamental and miscellaneous millwork that are not structural in nature.

PRODUCT**MATERIAL, MACHINING, AND ASSEMBLY RULES** (continued)**2 SCOPE** (continued)**2.2 TYPICAL INCLUSIONS**, Interior or Exterior:

- 2.2.1 Base; shoe, casing, picture, ceiling, apron, and stool molds
- 2.2.2 Thresholds, plinth and corner blocks, and all other exposed wood trim
- 2.2.3 Wood wainscoting and caps
- 2.2.4 Wall, ceiling, soffit, or decorative paneling
- 2.2.5 Decorative columns, pilasters, false beams, screens, or louvers
- 2.2.6 False or boxed beam members, brackets, corbels, pedestals, finials, drops, and carvings
- 2.2.7 Buttress wall caps and trim
- 2.2.8 Band-sawn, turned, or ornamental woodwork
- 2.2.9 Solid, paneled, or wood-veneered door jambs/frames with sidelights, louvers, transoms, and borrowed lights, including extensions, linings, stops, mullions, transom bars, sills, other components, and fire ratings
- 2.2.10 Mill-built sliding door and sash pockets, including operating hardware
- 2.2.11 Cleat and standards/bracket-supported shelves, including hook strips, cleats, poles, and required hardware
- 2.2.12 Cornice moldings, corner and edge boards, fascia and soffits, water tables, and casing
- 2.2.13 Metal sash surrounds
- 2.2.14 Belt and base courses, verge boards, and miscellaneous moldings
- 2.2.15 Decorative sun screens, trellises, louvers, blinds, and screens
- 2.2.16 Boxed or solid posts and beams
- 2.2.17 Corbels, brackets, bolsters, finials, and pediments
- 2.2.18 Turned and boxed columns
- 2.2.19 Beam boxing, false rafters, and lookouts when scrolled, turned, or carved
- 2.2.20 Seat and bench parts, duckboards, and similarly worked wood members
- 2.2.21 Sheet products applied in the form of multiple boards
- 2.2.22 High-pressure laminate plastics or decorative sheet products
- 2.2.23 Staff moldings, blind stops, and parting beads
- 2.2.24 Attached flashing, sill pans, inside/back linings, and balances
- 2.2.25 Wood caps, pediments, casing, stucco molds, or stops for exterior door frames
- 2.2.26 Columns, pilasters, brackets, corbels, paneling, and moldings integral to a frame's design
- 2.2.27 Elliptical, segment, or full-circle head, arched, peaked, gothic, irregular, and divided entrance specialty units
- 2.2.28 Frames and sash for double-hung, hopper, tilt/turn, casement, awning, sidelights, clerestory, and fixed windows
- 2.2.29 Appropriate wood glass stops when indicated
- 2.2.30 Glass and glazing unless specified otherwise; open sash may be included by agreement
- 2.2.31 Wood-framed insect screens for window and door openings
- 2.2.32 Porch screens
- 2.2.33 Board and cleat, louvered, or paneled blinds or shutters, fixed or active
- 2.2.34 Ornamental woodwork making use of molded, shaped, and carved elements to create a decorative appearance

2.3 TYPICAL EXCLUSIONS

- 2.3.1 Any structural wood framing, timbers or sheet products, sheathing, siding, decking, or planking and S4S boards or battens
- 2.3.2 Any composition or plaster wallboards or coverings, lath, shingles, or shakes
- 2.3.3 Any bucks, grounds, stripping, furring, blocking, reglets, cant strips, or waste molding
- 2.3.4 Any wood members not exposed
- 2.3.5 Non-wood, carved, or embossed moldings, including paper-, vinyl-, or foil-wrapped
- 2.3.6 Commodity frames not governed by these standards
- 2.3.7 Machining of frames for hardware supplied by others
- 2.3.8 Any metal stops, frames, or wood cores for metal frames
- 2.3.9 Hardware, except as noted above
- 2.3.10 Priming or painting, glass and glazing, weather-stripping, operating hardware, and/or sash balances
- 2.3.11 Flush or stile and rail doors
- 2.3.12 Premanufactured or stock window units
- 2.3.13 Fence posts or fence material where standard stock lumber yard material is indicated
- 2.3.14 Metal sash, skylights, screens, or weather-stripping/milling for same
- 2.3.15 Cabinet sash and hardware
- 2.3.16 Roller screens and hardware

PRODUCT**MATERIAL, MACHINING, AND ASSEMBLY RULES** (continued)**2 SCOPE** (continued)**2.3 TYPICAL EXCLUSIONS** (continued)

- 2.3.17 Factory-assembled shelving units
- 2.3.18 Blocking within a wall or ceiling
- 2.3.19 Premanufactured or stock screen units
- 2.3.20 Providing or preparing for any electrical, telephone, mechanical, or plumbing equipment
- 2.3.21 Supplying exposed materials other than those covered herein or specified to be included
- 2.3.22 Factory finish

3 DEFAULT STIPULATION

- 3.1 If not otherwise specified or indicated in the contract documents, all work shall be unfinished, Custom Grade, solid-stock softwood intended for opaque finish.

4 RULES - The following RULES shall govern unless a project's contract documents require otherwise.

These rules are intended to provide a well-defined degree of control over a project's quality of materials and workmanship.

Where E, C, or P is not indicated, the rule applies to all Grades equally.

ERRATA, published on the Associations' websites at www.awinet.org, www.awmac.com, or www.woodworkinstitute.com, shall **TAKE PRECEDENCE OVER THESE RULES**, subject to their date of posting and a project's bid date.

ARROWS INDICATE TOPIC IS CARRIED FROM ↑ OR ONTO ↓ ANOTHER PAGE.

DESCRIPTION		E	C	P
GENERAL	4.1 GENERAL			
	4.1.1	Aesthetic GRADE RULES apply only to exposed and semi-exposed surfaces visible after installation.		
	4.1.2	WOODWORK not addressed herein shall be manufactured from solid stock, laminated stock, veneered stock, or a combination thereof.		
	4.1.3	LUMBER shall conform to the requirements established in Section 3.		
	4.1.4	SHEET PRODUCTS and BACKING SHEET shall conform to the requirements established in Section 4.		
	4.1.5	EXPOSED, SEMI-EXPOSED, and CONCEALED surfaces shall be as listed under item 1.2, Basic Considerations, of this section.		
	4.1.6	STANDING and RUNNING TRIM shall be furnished as material only, not assembled.		
	4.1.7	Where MULTIPLE OPTIONS are permitted, it shall be the manufacturer's choice unless specified otherwise.		
	4.1.8	FIRE-RETARDANT RATING , if required, shall be so specified.		
	4.1.9	SPECIFIC PROFILE , if required, shall be so specified or drawn.		
	4.1.10	SPECIAL ORNAMENTAL DETAIL or joinery, if required, shall be so specified or drawn.		
	4.1.11	At EXTERIOR applications:		
	4.1.11.1	WATERPROOF Type I adhesive is required.		
	4.1.11.2	SHEET PRODUCTS shall be of exterior type.		
	4.1.11.3	NAILS and SCREWS shall be corrosion-resistant.		
	4.1.11.4	FRAMES require:		
	4.1.11.4.1	Preservative treatment of all exposed and concealed exterior members in accordance with Section 3.		
	4.1.12	Where GLUING or LAMINATION occurs:		
	4.1.12.1	DELAMINATION or SEPARATION shall not occur beyond that which is allowed in Sections 3 & 4.		
4.1.12.2	Use of CONTACT ADHESIVE is not permitted.			
4.1.13	FIRST-CLASS WORKMANSHIP is required in compliance with these standards.			

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