

# PANELING & RELATED WOOD DOORS

SECTION  
500

## Section 500 Selection and Specification Checklist

Because most architecture, specification, and design firms have electronic master specifications in place, the AWI and AWMAC offer this quick checklist. A review of these items may help the design and specification team issue a complete and accurate contract document and avoid missing things vital to the successful completion of the project. The checklists are not considered a part of the Quality Standards for the purposes of compliance.

### Part 1. GENERAL

#### 1.1. REFERENCES

- A. AWI/AWMAC Quality Standards Illustrated (QSI), current edition

#### 1.2. SUBMITTALS

##### A. Shop drawings:

- Submit two copies; one of which will be returned with reviewed notations prior to commencement of work under this section.
- Indicate plans and elevations, materials, surface grain directions, profiles, assembly methods, joint details, fastening methods, accessories, hardware, compliance with specified fire-retardant treatments, preservative treatments, and schedule of finishes.

##### B. Finish samples:

- When appropriate, submit one or more samples of veneer-on-substrate, 200 x 250 mm [8 x 10"] illustrating expected range of component finish color and/or grain.
- When appropriate, submit one or more samples of solid lumber, 300 square centimeters [50 square inches] illustrating expected range of component finish color and/or grain.
- The sample shall bear identification of the project, architect or designer, general contractor, woodwork manufacturer, items to which the finish applies and the system utilized to attain the finish.

#### 1.3. QUALITY ASSURANCE

- A. Perform work in accordance with [Premium] [Custom] [Economy] Grade quality

- B. Work in this section shall comply with the specified Grade(s) of Work and Section (s) of the current edition of the AWI/AWMAC Quality Standards Illustrated.

#### 1.4. QUALIFICATIONS

- A. Contractors and their personnel engaged in the work shall be able to demonstrate successful experience with work of comparable extent, complexity and quality to that shown and specified.

- B. Manufacturers who are members in good standing of the Architectural Woodwork Institute (AWI) or the Architectural Woodwork Manufacturers Association of Canada (AWMAC) and are familiar with this Standard.

#### 1.5. DELIVERY, STORAGE AND HANDLING

- A. Protect work from moisture damage according to QSI, Section 1700, Installation.

### Part 2. PRODUCTS

#### 2.1. MANUFACTURERS

- A. Manufacturers who are members in good standing of the Architectural Woodwork Institute (AWI) or the Architectural Woodwork Manufacturers Association of Canada (AWMAC) and are familiar with this Standard.

#### 2.2. LUMBER

- A. Softwood Lumber: If a particular species is desired, specify here.

- For exposed surfaces:
- For semi-exposed surfaces:
- For concealed surfaces:

- B. Hardwood Lumber: If a particular species is desired, specify here.

- For exposed surfaces:
- For semi-exposed surfaces:
- For concealed surfaces:

### 2.3. PANEL PRODUCTS

- A. Softwood plywood: Not usually used for in fine architectural woodwork, but specify here if part of the design aesthetic.
- For exposed surfaces:
  - For semi-exposed surfaces:
  - For concealed surfaces:
- B. Hardwood plywood: Made with medium density particleboard or fiberboard (MDF) core for interior use or moisture-resistant core stock for exterior use; specify face veneer species here.
- For exposed surfaces:
  - For semi-exposed surfaces:
  - For concealed surfaces:
- C. High-pressure decorative laminate (HPDL), specify by brand name and design name/part number.
- For exposed surfaces:
  - For semi-exposed surfaces:
- D. Core material for veneered or laminated components, if other than QSI standards:
- For exposed surfaces:
  - For semi-exposed surfaces:
- E. Solid surface materials, Thermoplastic sheets, Acrylic or methacrylate sheets, Solid phenolic core, or any other special panel product, specify by brand name and design name/product number.

### 2.4. WOOD TREATMENT

- A. List the specific local requirement for fire retardant treatment, if any.
- B. List the specific chemical and process for preservative treatment, if any.

### 2.5. GLAZING, HARDWARE, AND ACCESSORIES

- A. If glass is to be supplied by woodworker, the materials and requirements should be listed here.
- Wood stops shall conform to the QSI for the Grade of Work specified.
  - Finish coats on glazed exterior work, if any, shall be allowed to flow on to the glass.
- B. Fasteners: Size and type to suit application. Weather resistant if exterior. The QSI does not set standards for fasteners.
- C. Hardware, if not specified by brand name and part number, shall be mill option to meet QSI minimums.

### 2.6. FABRICATION

- A. Fabricate to [Premium] [Custom] [Economy] Quality Standards.
- B. Shop prepare and identify components of assemblies for matching during site assembly.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Select a joinery technique, or leave it up to the manufacturer to choose from QSI compliant methods.

### 2.7. FINISHING MATERIALS AND APPEARANCE

- A. List the name of the finish system (topcoats) to be used from Section 1500
- B. List the sheen desired: [Flat] [Satin] [Semi-gloss] [Gloss].
- D. List the special or extra steps and/or products to be used, such as bleach, distressing, filler, glaze, shading, stain, toner or washcoats.

## 2.8. FINISHING REQUIREMENTS

- A. Sand work smooth and set exposed nails [and screws].
  - For opaque finishes, apply wood filler in exposed nail [and screw] indentations and sand smooth.
  - For transparent finishes, use wax or burn-in filler which blends with surrounding color and sheen, often after stain and before final top coat.
- B. When combining wood and laminates or other specialty products, careful consideration must be given to finishing specifications. Responsibility for finish wood parts should be clarified by the design professional here.
- C. Finish work in the factory in accordance with Section 1500.
- D. [Prime paint] [Seal] surfaces in contact with cementitious materials.

## Part 3. EXECUTION

### 3.1. EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are in place and ready to receive this work.

### 3.2. INSTALLATION

- A. Install work in accordance with [Premium] [Custom] [Economy] Grade, Section 1700, QSI.
- B. Set and secure materials and components in place, plumb and level.

### 3.3. ADJUSTING

- A. Adjust work under provisions of Section [ ] of the contract documents.
- B. Adjust moving or operating parts to function smoothly and correctly.

### 3.4. CLEANING

- A. Clean work under provisions of Section [ ] of the contract documents.

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## General Criteria

### 500-G-1

#### Scope

Includes:

Custom wall paneling, wainscot and related wood doors manufactured with solid lumber and/or panel products for a particular project.

This Section is divided as follows:

- 500A - **Flush Wood Paneling**
- 500B - **Laminate Clad Paneling**
- 500C - **Stile and Rail Paneling**

Excludes:

Unrelated doors specified in Section 1300 and/or 1400. Proprietary panel products are not covered by this section. If they are to be supplied, they must be specified by a brand name or manufacturer.

Solid lumber board paneling is covered in Section 300.

Unless required by the details and/or woodwork specifications, the woodworker shall not:

- provide or prepare for any electrical, telephone, mechanical, or plumbing equipment;
- install paneling or furnish common blocking, furring, or hanging devices for the support or attachment of the panels;
- supply exposed bases other than wood or plastic laminate; or
- factory finish. (Finishing is described in Section 1500 of this standard.)

### 500-G-2

#### Specification Requirements

##### GRADE MUST BE SPECIFIED

These standards provide for three Grades: Premium, Custom, and Economy.

##### Premium Grade

The Grade specified when the highest degree of control over the quality of workmanship, materials, installation and execution of the design intent is required. Usually reserved for special projects, or feature areas within a project.

##### Custom Grade

The Grade specified for most conventional architectural woodwork. This grade provides a well-defined degree of control over the quality of workmanship, materials and installation of a project. The vast majority of all work produced is Custom Grade.

##### Economy Grade

The Grade that defines the minimum expectation of quality, workmanship, materials, and installation within the scope of the Standards.

## Prevailing Grade

When the Quality Standards are referenced as a part of the contract documents and no Grade is specified, Custom Grade standards shall prevail. In the absence of specifications, material shall be mill option lumber or veneers suitable for opaque finish.



*It is the responsibility of the specifier to indicate what fire-retardant rating, if any, is required for the paneling.*

### 500-G-3

#### Smoothness of Flat and Moulded Surfaces

Planers and Moulders: The smoothness of surfaces that have been machine planed or moulded is determined by the closeness of the knife cuts. The closer the cuts to each other (i.e., the more knife cuts per inch [KCPI]), the closer the ridges, and therefore the smoother the resulting appearance.

Sanding and Abrasives: Surfaces can be further smoothed by sanding. Sandpapers come in grits from coarse to fine and are assigned ascending grit numbers. The coarser the grit, the faster the stock removal. The surface will show the striations caused by the grit. Sanding with finer grit papers will produce smoother surfaces.

### 500-G-4

#### Standing and Running Trim

Site-applied cornice, chair rail, base, trim, and mouldings are governed by Section 300 – Standing and Running Trim.

### 500-G-5

#### Installation Recommendation

##### (when specified)

This section does not cover field installation of paneling and doors; however, the methods and skill involved in the installation of paneling and doors in large measure determine the final appearance of the project. The design, detailing, and fabrication should be directed toward achieving installation with a minimum of exposed face fastening. The use of interlocking wood cleats or metal hanging clips combined with accurate furring and shimming will accomplish this. Such hanging of panels has the additional advantage of permitting panel movement that results from humidity changes or building movement. Depending upon local practice, many woodworkers will perform the wall preparation and installation of the paneling and related wood doors. (See Section 1700 of this standard.)

### 500-G-6

#### Finishing Recommendation

##### (when specified)

This Section does not cover finishing. However, site conditions and air quality regulations for finishing are rarely conducive to good results. Poor lighting, dust-laden air, and techniques available are limiting factors. Depending upon local practice,

many woodworkers will factory finish, yielding better results than can be achieved from field finishing. See Section 1500, Factory Finishing, of this Standard.

Manufacturer is not responsible for the appearance of field finished panels or doors.

## 500-G-7

### Material Selections

Design professionals shall specify the following:

- A. Veneers for Transparent Finishes - The Big 5!
  1. Species: There are numerous foreign and domestic species available. Involve your woodworker early in the design and selection process.
  2. Slicing: Select either plain sliced, quarter sliced, or (in the case of oak only, rift sliced).
  3. Matching of individual leaves: Select either book matched (most appropriate for plain sliced), slip matched (most appropriate for quartered and rift sliced), or random matched (for a rustic look, usually more expensive). Specify end matching for tall elevations.
  4. Matching on each panel face: Select either running match, balance match, or center balance match. Specify type of end matching for tall elevations.
  5. Matching between panels: Select either no sequence, premanufactured sets – full width, premanufactured sets – selectively reduced in width, sequence matched uniform size set(s), or blueprint matched panels and components.

See Section 500A for details and illustrations of all of the above, as well as illustrations of special matches

- B. Materials for Opaque Finishes

1. Medium Density Overlay (MDO) - This provides the optimum paintable surface for architectural panels and doors. The thermosetting resin overlay is designed to take and hold paint. Opaque finish sheens above 40 Satin require special manufacturing procedures.
2. Close Grain Hardwood - Extra preparation may be required by the finisher as there may be grain show-through, split veneer joints, and other wood characteristics in this grade.
3. Mill Option - Face materials are determined by the manufacturer.

- C. High Pressure Decorative Laminates (HPDL)

1. Virtually any high pressure decorative laminate color and texture can be used in the manufacture of architectural panels and doors with the following cautions:
2. High gloss HPDL will highlight minor core and surface imperfections, often unacceptably.
3. HPDL panels and doors are not recommended for exterior use due to the potential differentials in humidity between the faces.

## Variations in Natural Wood Products

Wood is a natural material, with variations in color, texture and figure. These variations are influenced by the natural growing process and are uncontrollable by the woodworker. The color of wood within a tree varies between the “sapwood (the outer layers of the tree which continue to transport sap), which is usually lighter in color than the “heartwood (the inner layers in which the cells have become filled with natural deposits). Various species produce different grain patterns (figures), which influence the selection process. There will be variations of grain patterns within any selected species. The architectural woodworker cannot select solid lumber cuttings within a species by grain and color in the same manner in which veneers may be selected. Color, texture, and grain variations will occur in the finest architectural woodworking.

## 500-G-8

### Shop Drawings and Engineering

Shop drawings are the means by which the design intent is turned into reality. They shall indicate methods of construction, exact material selections, grain direction(s), methods of attachment and joinery, and exact dimensions. They should also include the woodworker’s technical suggestions. Unless specified, sequence of lamination and assembly is determined by the woodworker. See Appendix: Shop Drawings, What to Expect for suggestions.

## 500-G-9

### Fire-Retardant Ratings

#### Fire-Retardant Solid Lumber

The natural fire-retardant qualities and acceptability of treatments varies among the species. Where certain items of architectural woodwork are required to have a flame spread classification to meet applicable building and safety codes, the choice of lumber species must be a consideration. Shown below are some references and charts to assist in making these choices. Additional data on various species may be available from U.S. Department of Agriculture Forest Service, Fire Safety of Wood Products Work Unit at (608) 231-9265.

**Flame Spread Classification:** This is the generally accepted measurement for fire rating of materials. It compares the rate of flame spread on a particular species with the rate of flame spread on untreated oak.

Most authorities accept the following classes for flame spread:

Class I or A	0-25
Class II or B	26-75
Class III or C	76-200

**Fire-Retardant Treatments:** Some species may be treated with chemicals to reduce flammability and retard the spread of flame over the surface. This usually involves impregnating the wood, under pressure, with salts suspended in a liquid. The treated wood must be redried prior to fabrication. Consult



with your woodworker about the appearance and availability of treated woods prior to specification.

The sizes and species currently being treated (flame spread less than 25) are very limited, and not available in all markets. Fire-retardant treatment does affect the color and finishing characteristics of the wood.

Subject to local codes, untreated wood and wood products can usually be used in up to 10% of an area, according to the traditional model codes:

- BOCA - Basic National Building Code
- ICBO (UBC) - Uniform Building Code
- SBCCI (SBC) - Standard Building Code
- NFPA - 101 Life Safety Code

... as outlined in the *Fire Code Summary* in the Appendix of this edition.

Face veneers are not fire retardant treated, and combining untreated veneers with treated lumber can result in color and finishing contrasts.

**Intumescent Coatings for Wood:** It is possible to reduce flammability by using intumescent coatings in either opaque or transparent finishes. These are formulated to expand or foam when exposed to high heat, and create an insulating effect that reduces the speed of spread of flame. Improvements are continually being made on these coatings. Consequently, the specifier must ascertain whether they will be permitted under the code governing the project, the relative durability of the finish, and the effect of the coating on the desired color of the finished product.

**Finishing of Fire-Retardant-Treated Lumber:** Fire-retardant treatments may affect the finishes intended to be used on the wood, particularly if transparent finishes are planned. The compatibility of any finishes should be tested before they are applied.

**Built-up Construction to Improve Fire Rating:** In lieu of solid lumber, it is often advisable, where a fire rating is required, to build up members by using treated cores clad with untreated veneers not thicker than 1 mm [ $1/28$ "]. Existing building codes, except where locally amended, provide that facing materials 1 mm [ $1/28$ "] or thinner finished dimension are not considered in determining the flame spread rating of the woodwork.

## Fire-Retardant Panel Products

Flame Spread Factors:

**A. Core** - The fire rating of the core material determines the rating of the assembled panel. Fire-retardant veneered panels must have a fire-retardant core. Particleboard core is available with a Class I (Class A) rating and can be used successfully with veneer or rated high pressure decorative laminate faces. MDF (Medium Density Fiberboard) is available with a fire rating in some markets.

**B. Face** - Some existing building codes, except

where locally amended, provide that facing materials 1 mm [ $1/28$ "] or thinner are not considered in determining the flame spread rating of the panel. If state and local codes move toward adoption of the International Building Code provisions, it is possible that the 1 mm [ $1/28$ "] exemption may not be available.



*Note: The International Code is rapidly replacing the traditional codes. In localities where basic panel building codes have been amended, it is the responsibility of the specifier to determine whether the application of the facing material specified will meet the code.*

**Face veneers are not required to be fire-retardant treated, and such treatment will adversely affect the finishing process.**

If a Class I panel assembly is specified with a decorative laminate face, the fire-rated decorative laminate and the laminate balancing sheet must be applied to a Class I core material (usually particleboard) with the laminate manufacturer's recommended adhesive for rated assemblies.

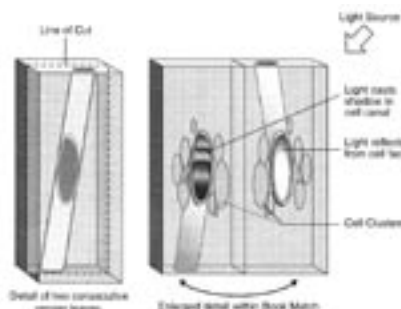


*It is the responsibility of the specifier to indicate what fire-retardant rating, if any, is required for the paneling. In the absence of such a specified rating, the woodworker shall supply unrated paneling.*

## 500-G-10

### Types of Veneer Cuts

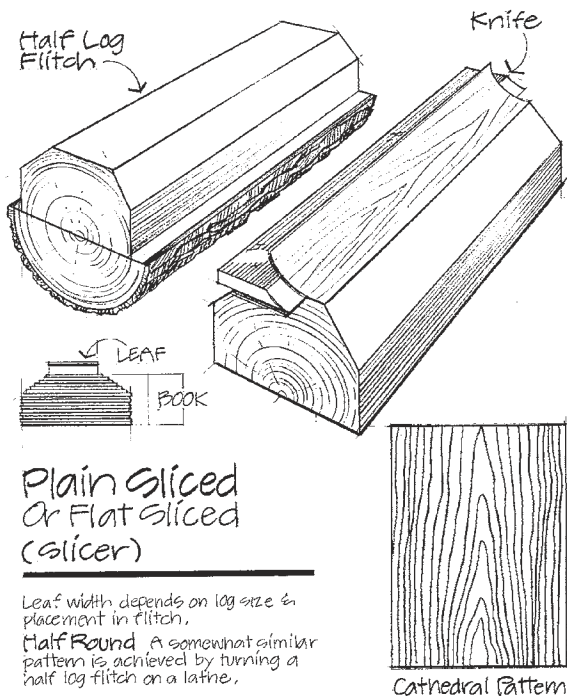
The manner in which a log segment is cut with relation to the annual rings will determine the appearance of the veneer. When sliced, the individual pieces of veneer, referred to as *leaves*, are kept in the order in which they are sliced, thus permitting a natural grain progression when assembled as veneer faces. The group of leaves from one slicing is called a *fitch* and is usually identified by a fitch number and the number of gross square feet of veneer it contains. The faces of the leaves with relation to their position in the log are identified as the *tight face* (toward the outside of the log) and the *loose face* (toward the inside or heart of the log). During slicing the leaf is stressed on the loose face and compressed on the tight face. When this stress is combined with the natural variation in light refraction caused by the pores of the wood, the result is a difference in the human perception of color and tone between tight and loose faces.





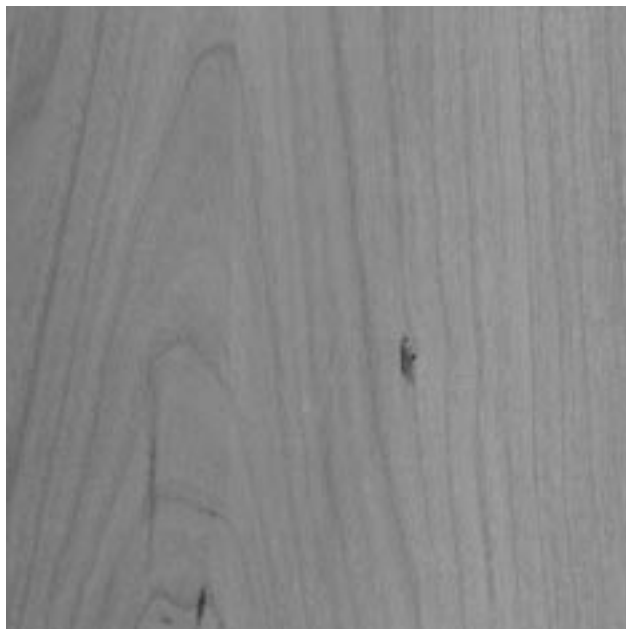
The principal methods of slicing veneers and the general visual characteristics of the grain are:

### Plain Slicing (or Flat Slicing)

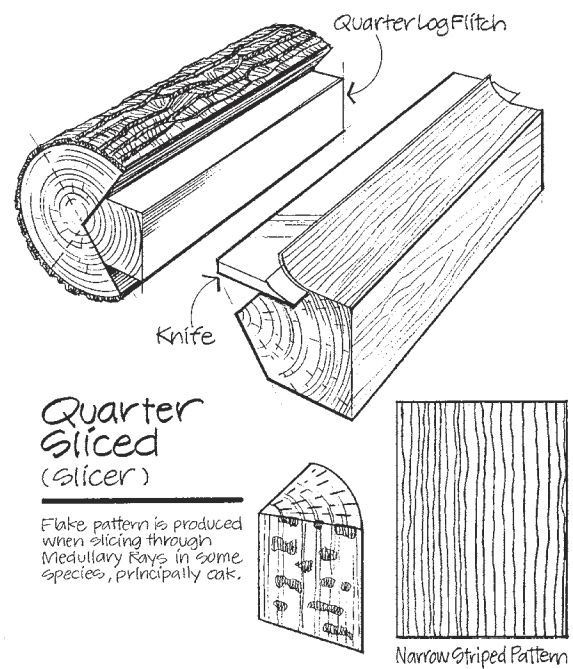


Plain Sliced - Figure 500-01

This is the slicing method most often used to produce veneers for high quality architectural woodworking. Slicing is done parallel to a line through the center of the log. A combination of cathedral and straight grain patterns results, with a natural progression of pattern from leaf to leaf.

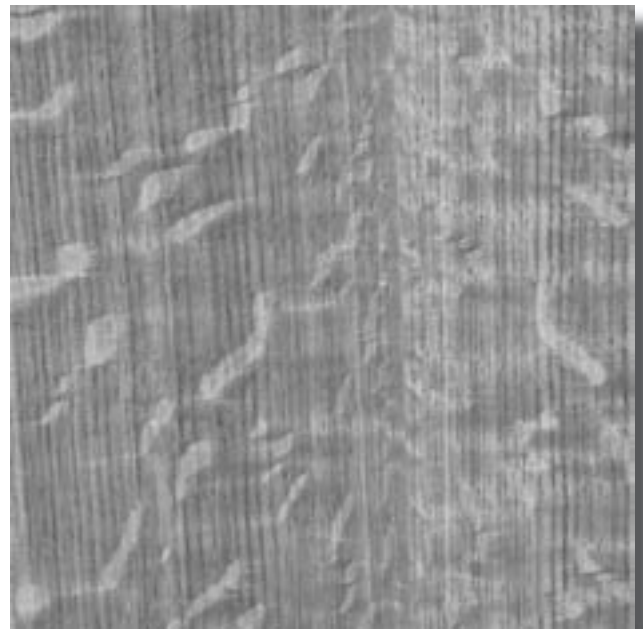


### Quarter Slicing (or Quarter Cut)

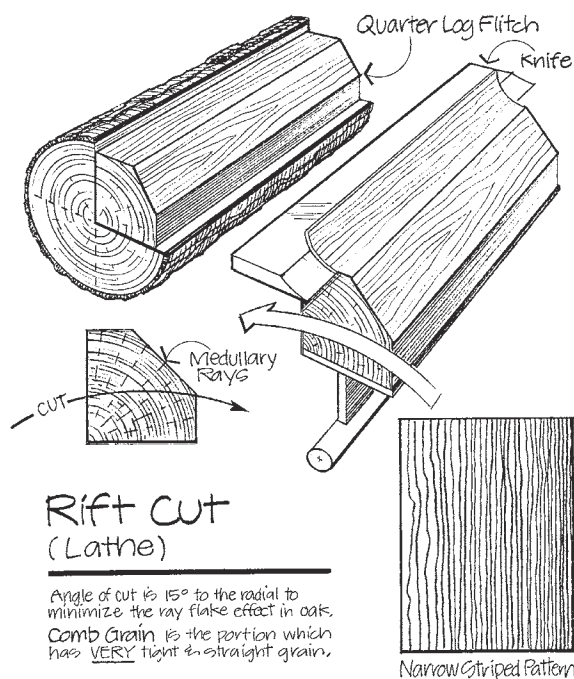


Quarter Sliced - Figure 500-02

Quarter slicing simulates the quarter sawing process of solid lumber, roughly parallel to a radius line through the log segment. In many species the individual leaves are narrow as a result. A series of stripes is produced, varying in density and thickness from species to species. "Flake" is a characteristic of this slicing method in Red and White Oak.



## Rift Slicing (or Rift Cut)



Rift Sliced - Figure 500-03

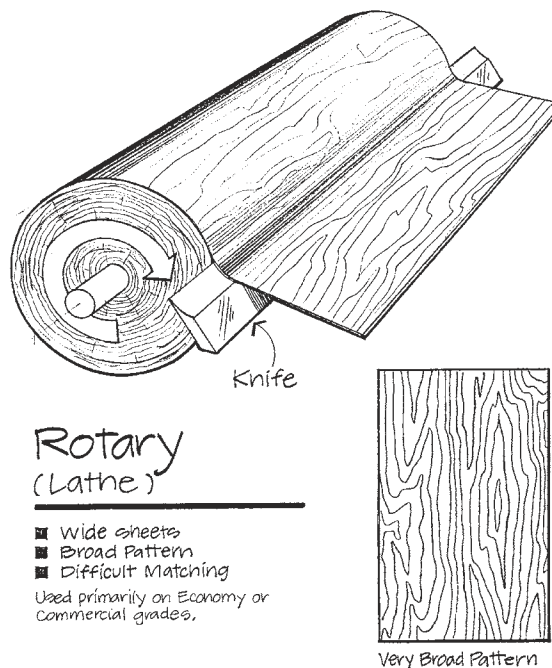
Rift veneers are produced most often in Red and White Oak, rarely in other species. Note that rift veneers and rift sawn solid lumber are produced so differently that a *match* between rift veneers and rift sawn solid lumber is highly unlikely. In both cases the cutting is done slightly off the radius lines minimizing the fleck or flake associated with quarter slicing.



## Comb Grain

Limited in availability, comb grain is a select product of the Rift process distinguished by tight, straight grain along the entire length of the veneer. Slight angle in the grain is allowed. Comb grain is restricted to Red and White Oak veneers.

## Rotary



Rotary Sliced - Figure 500-04

The log is center-mounted on a lathe and *peeled* along the general path of the growth rings like unwinding a roll of paper, providing a generally bold random appearance. Rotary cut veneers may vary in width and matching at veneer joints is extremely difficult. Almost all softwood veneers are cut this way. Except for a specific design effect, rotary veneers are the least useful in fine architectural woodwork.



**NOTE:** Rotary sliced fine hardwood veneers are used in a limited way, and usually for special figure and cut, in the manufacture of Premium Grade woodwork. Careful consideration, specification, and communication are recommended when rotary cut is contemplated.

## Composite Veneers

Sliced from fast-growing trees, these veneers are dyed and then re-glued in molds to create "grain patterns. The color is established during manufacture because the high percentage of glue-line resists staining by the woodworker. Must be specified by brand name and manufacturer's designation. *Matching* between components may not be possible.



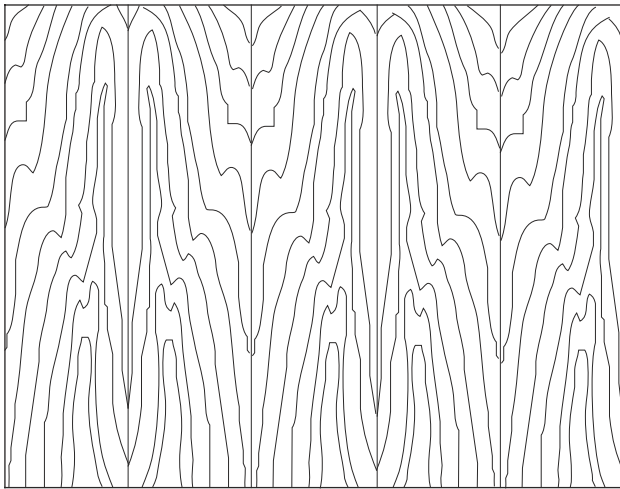
## DIVISION A - Flush Wood Paneling

### 500A-G-1

#### Matching Between Adjacent Veneer Leaves

It is possible to achieve certain visual effects by the manner in which the leaves are arranged. As noted, rotary cut veneers are difficult to match, therefore most matching is done with sliced veneers. The matching of adjacent veneer leaves must be specified. These are the more common types:

#### Book Matching



*Book Matching - Figure 500-05*

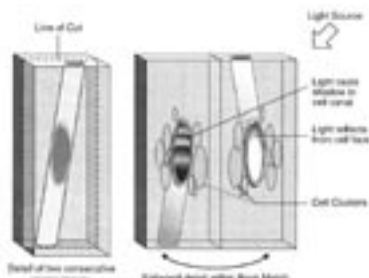
This is the most commonly used match in the industry. Every other piece of veneer is turned over so adjacent pieces (leaves) are “opened” like the pages of a book.

**Visual Effect** - Veneer joints match, creating a symmetrical pattern. Book matching yields the maximum continuity of grain. When sequenced panels are specified, prominent characteristics will ascend or descend across the match as the leaves progress from panel to panel.

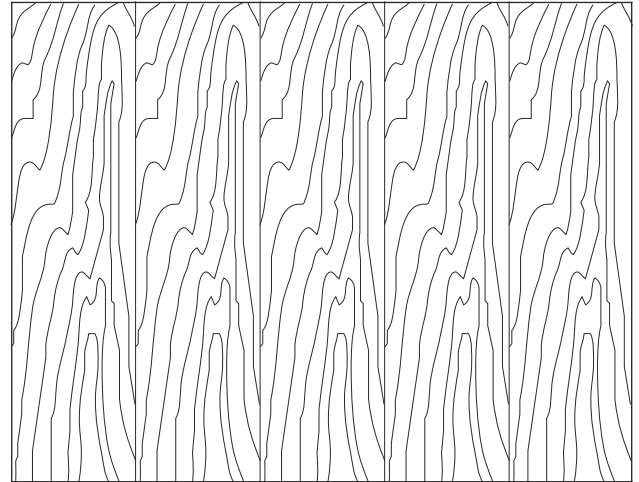
Note: May be used with plain, quarter, or rift sliced veneers.

#### Barber Pole Effect in Book Match

Because the “tight and “loose faces alternate in adjacent pieces of veneer, they may accept stain differently, and this may result in a noticeable color variation. Book matching also accentuates cell polarization, causing the perception of different colors. These natural characteristics are often called barber pole, and are not a manufacturing defect. It is possible, in some instances, to minimize this effect with special finishing techniques.



#### Slip Matching

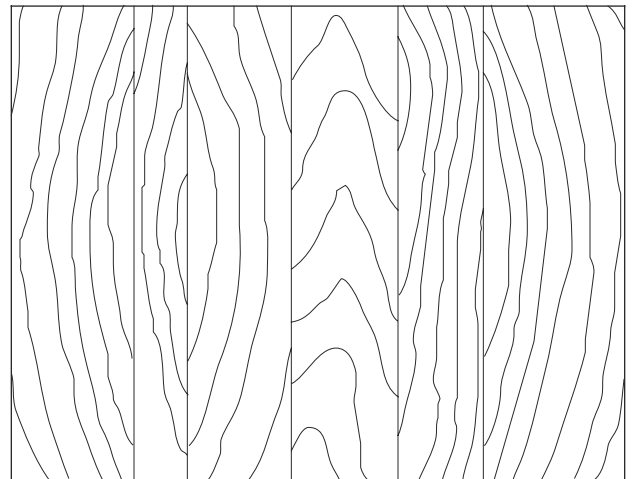


*Slip Matching - Figure 500-06*

Often used with quarter sliced and rift sliced veneers. Adjoining leaves are placed (slipped out) in sequence without turning, resulting in all the same face sides being exposed.

**Visual Effect** - Grain figure repeats but joints do not show grain match. When sequenced panels are specified, prominent characteristics will ascend or descend across the match as the leaves progress from panel to panel. The lack of grain match at the joints can be desirable. The relatively straight grain patterns of quartered and rift veneers generally produce pleasing results and a uniformity of color because all faces have the same light refraction.

#### Random Matching



*Random Matching - Figure 500-07*

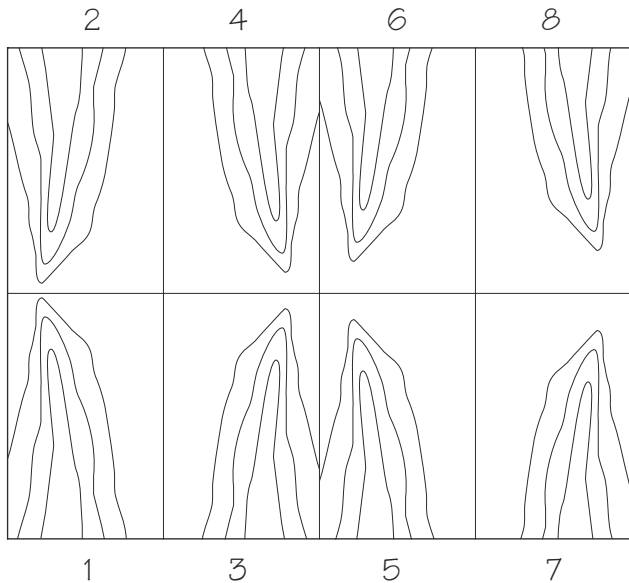
Veneer leaves are placed next to each other in a random order and orientation, producing a “board-by-board effect in many species.

**Visual Effect** - Casual or rustic appearance, as though individual boards from a random pile were applied to the product. Conscious effort is made to mismatch grain at joints. Degrees of contrast and variation may change from panel to panel. This match is more difficult to obtain than Book or Slip Match, and must be clearly specified and detailed.

## End Matching

Often used to extend the apparent length of available veneers for high wall panels and long conference tables. There are two types of end matching:

**A. Architectural End Match.** - Leaves are individually book (or slip) matched, first end-to-end and then side-to-side, alternating end and side. (Book and butt match illustrated.)

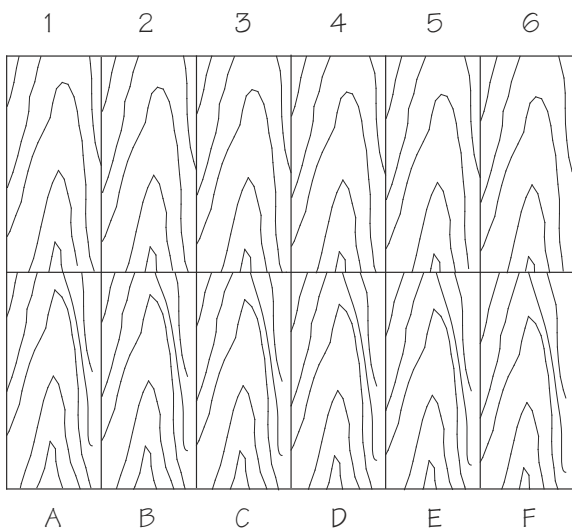


*Architectural End Match - Figure 500-08*

**Visual Effect** - Yields best continuous grain patterns for length as well as width.

### B. Continuous Sequenced Match

Leaves are individually book (or slip) matched, separate panels are stacked in sequenced order, either horizontally or vertically in the elevation. (Horizontal sequence illustrated.)

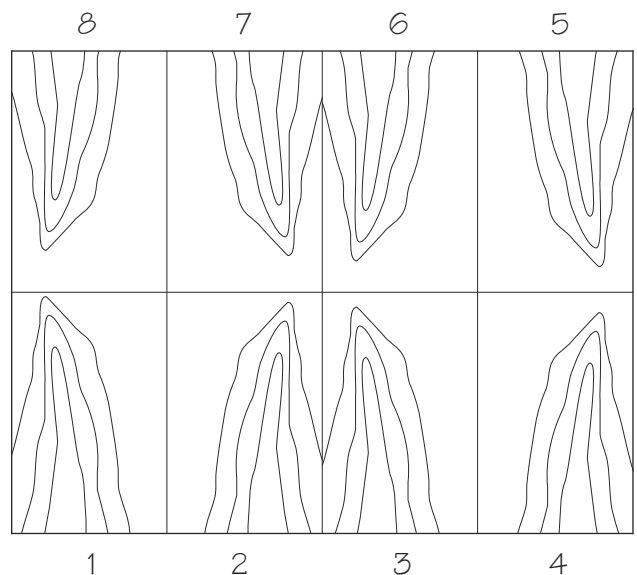
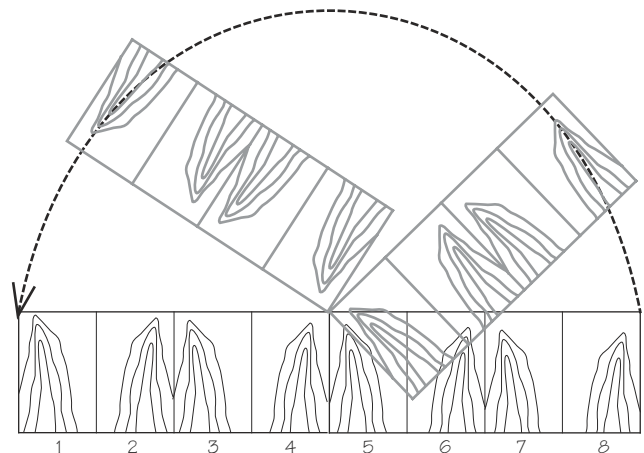


Each label represents a full panel from a set

*Continuous Sequenced Match - Figure 500-09*

**Visual Effect** - Yields sequenced grain patterns for elevations, with pleasing blend of figure horizontally and vertically.

**C. Panel End Match** - Leaves are book (or slip) matched on panel sub-assemblies, with sequenced sub-assemblies end matched, resulting in some modest cost savings on projects where applicable.



*Panel End Match - Figure 500-10*

**Visual Effect** - For most species, yields pleasing blended appearance and grain continuity.



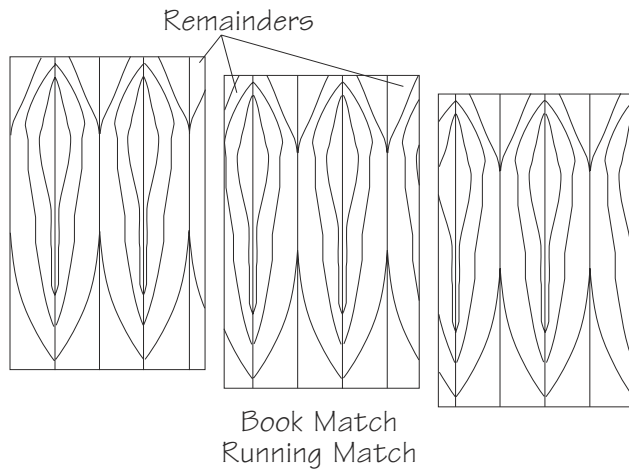
## Wood Veneer

### 500A-G-2

#### Matching within Individual Panel Faces

The individual leaves of veneer in a sliced flitch increase or decrease in width as the slicing progresses. Thus, if a number of panels are manufactured from a particular flitch, the number of veneer leaves per panel face will change as the flitch is utilized. The manner in which these leaves are “laid up within the panel requires specification, and are classified as follows:

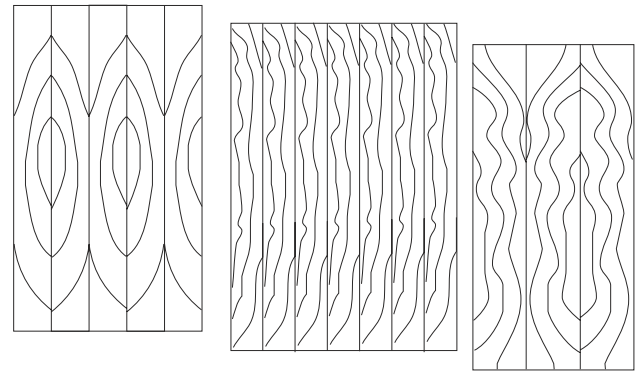
#### Running Match



*Running Match - Figure 500-11*

Each panel face is assembled from as many veneer leaves as necessary. This often results in a nonsymmetrical appearance, with some veneer leaves of unequal width. Often the most economical method at the expense of aesthetics, it is the standard for Custom Grade, and must be specified for other grades. Running matches are seldom “sequenced and numbered for use as adjacent panels. Horizontal grain “match or sequence cannot be expected.

#### Balance Match



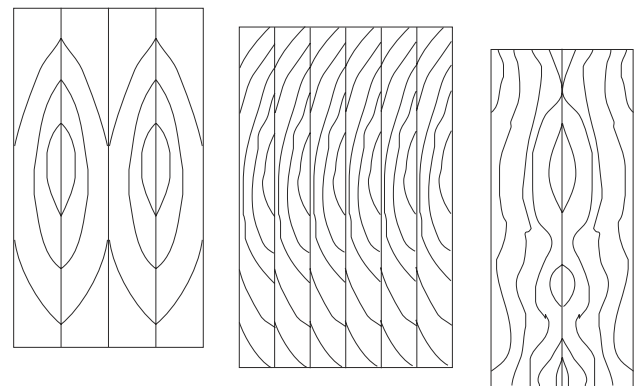
*Balance Match*

*Balance Match - Figure 500-12*

Each panel face is assembled from veneer leaves of uniform width before edge trimming. Panels may contain an even or odd number of leaves, and distribution may change from panel to panel within a sequenced set. While this method is the standard for Premium Grade, it must be specified for other Grades. It is the most common assembly method.

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#### Center Balance Match



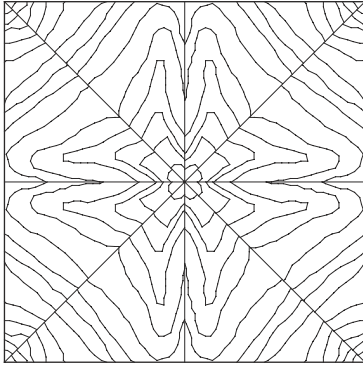
*Balance and Center Match*

*Center Balance Match - Figure 500-13*

Each panel face is assembled of an even number of veneer leaves of uniform width before edge trimming. Thus, there is a veneer joint in the center of the panel, producing horizontal symmetry. In some instances a small amount of figure is lost in the process. Considered by some to be the most pleasing assembly at a modest increase in cost over Balance Match.

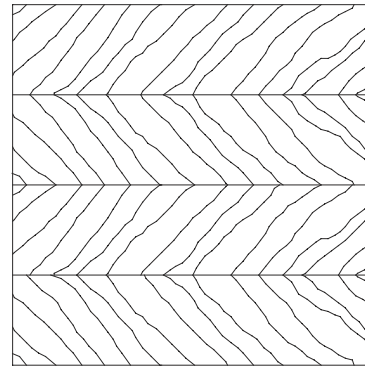
### Special Matches

There are regional variations in the “names of the following veneer leaf matching techniques. It is strongly recommended the design professional use *both* names and drawings to define the effect desired.



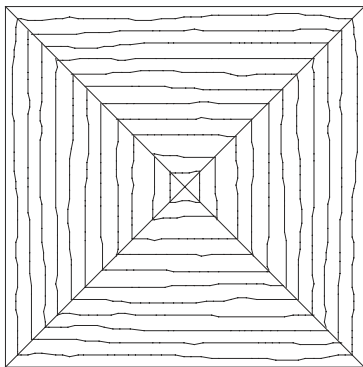
8-piece Sunburst

*Sunburst - Figure 500-14a*



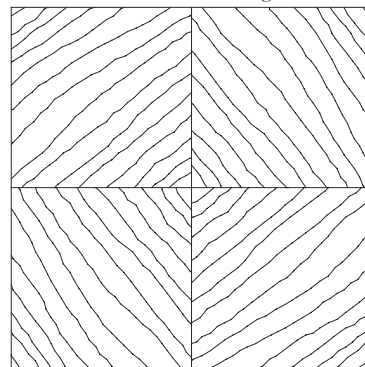
Herringbone or  
Y-Book Match

*Herringbone - Figure 500-14d*



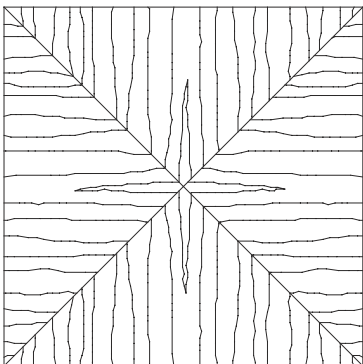
Box Match

*Box - Figure 500-14b*



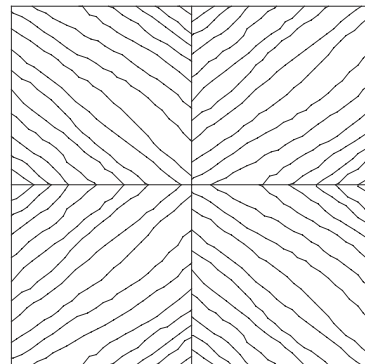
Diamond Match

*Diamond - Figure 500-14e*



Reverse or End Grain Box

*Reverse Box - Figure 500-14c*

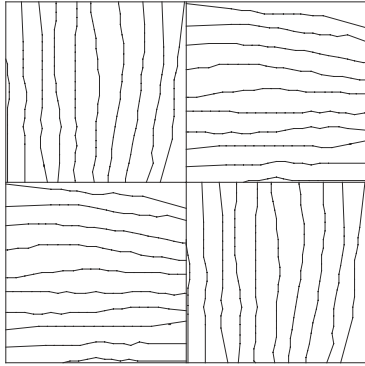


Reverse Diamond

*Reverse Diamond - Figure 500-14f*

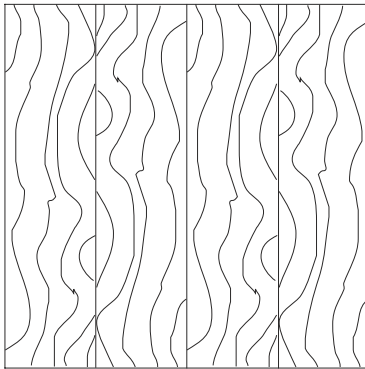
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Wood Veneer



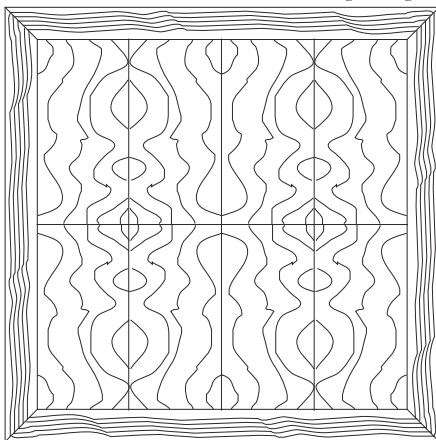
Parquet Match

*Parquet - Figure 500-14g*



Swing Match

*Swing - Figure 500-14h*



Book & Butt Match w/ border

*Combination Face - Figure 500-14i*

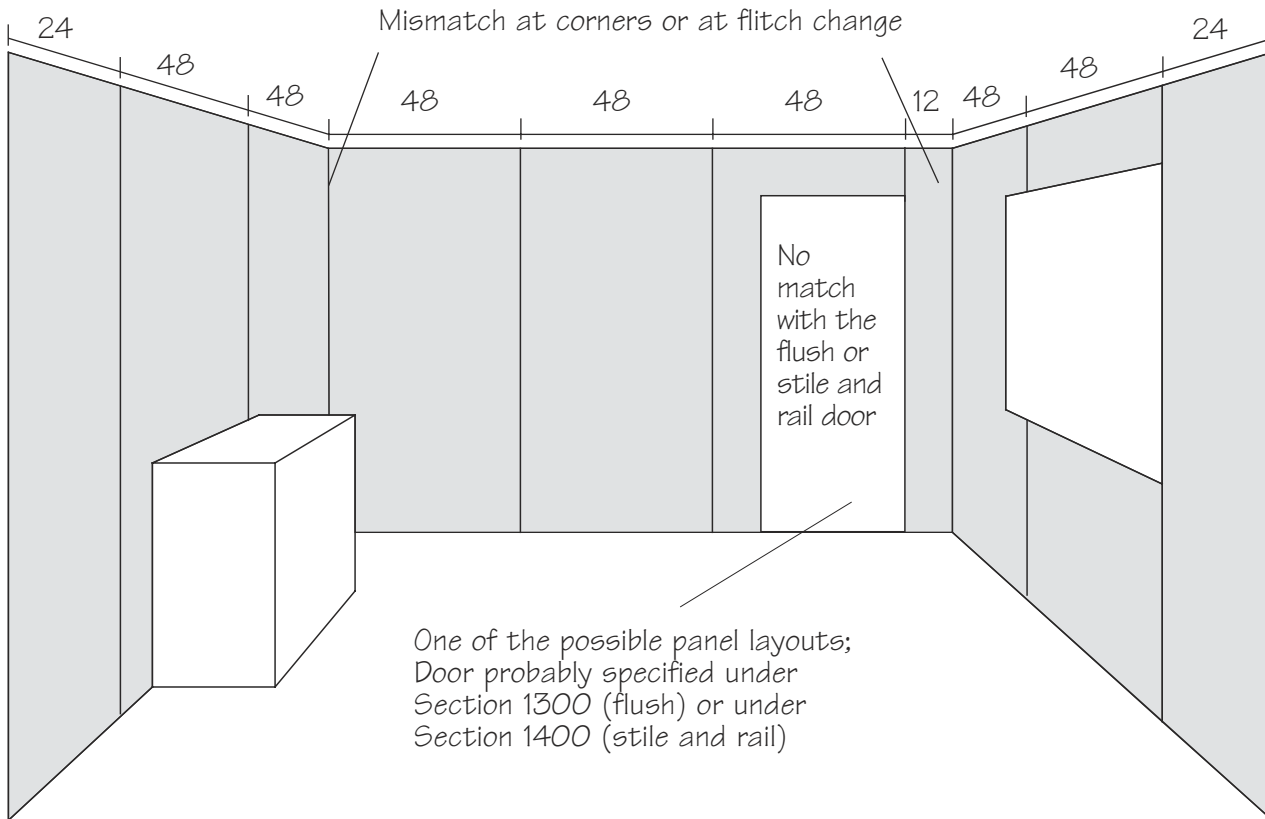


500A-G-3

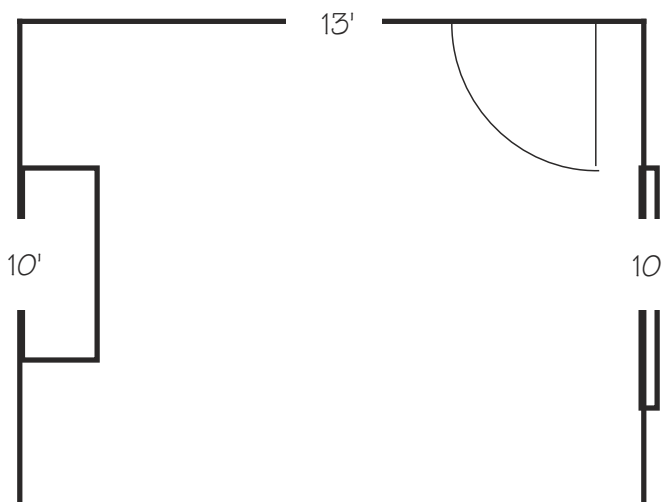
Matching of Panels Within an Area

Veneered panels used in casework or paneling in the same area may be matched to each other. This important component of the project must be carefully detailed and specified. The natural growth patterns of the tree will cause the figure on the sequential panels to ascend, descend, or show a “grain progression as the eye moves from panel to panel. The four common methods are:

1 - Premanufactured Sets - Full Width



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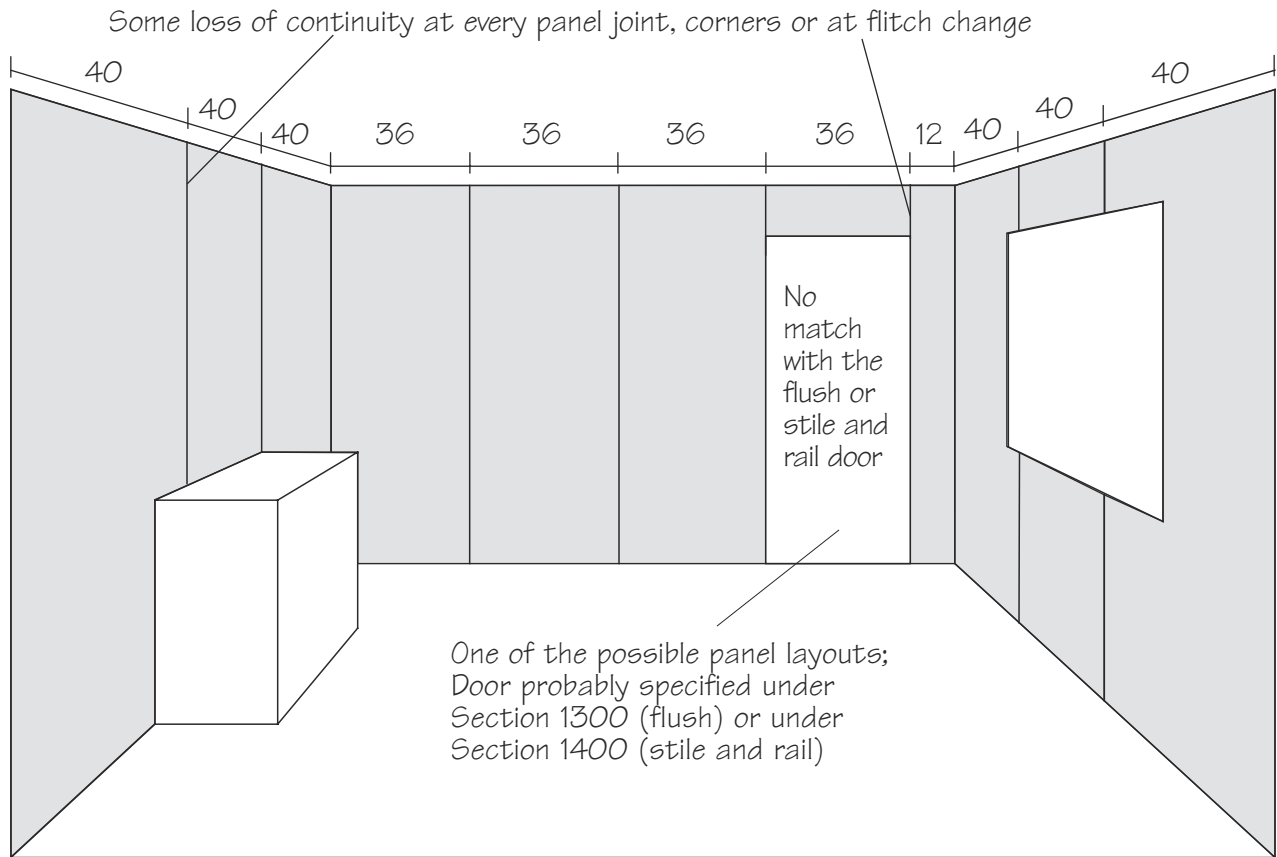


Premanufactured Sets - Full Width - Figure 500-15

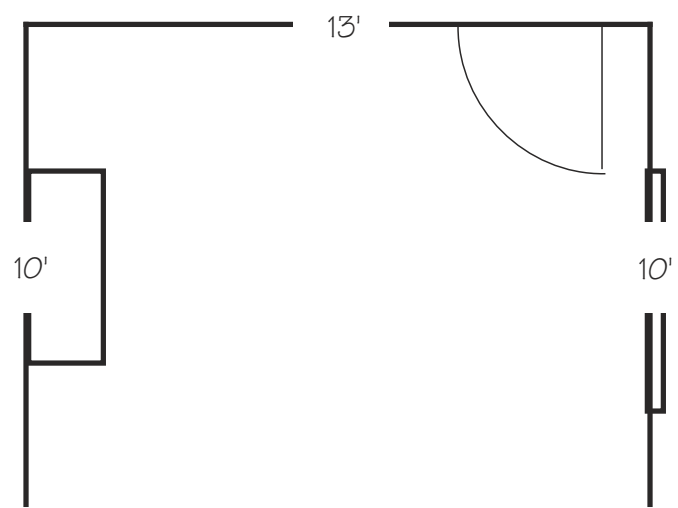
These are one step above “stock plywood panels, usually made and warehoused in 4' x 8' or 4' x 10' sheets in sequenced sets. They may be produced from a single flitch or a part of a flitch, usually varying in number from 6 to 12 panels. If more than one set is required, matching between the sets cannot be expected. Similarly, doors or components often cannot be fabricated from the same flitch materials, resulting in noticeable mismatch. This is often the most economical type of special panel products.

Wood Veneer

2 - Premanufactured Sets - Selectively Reduced in Width



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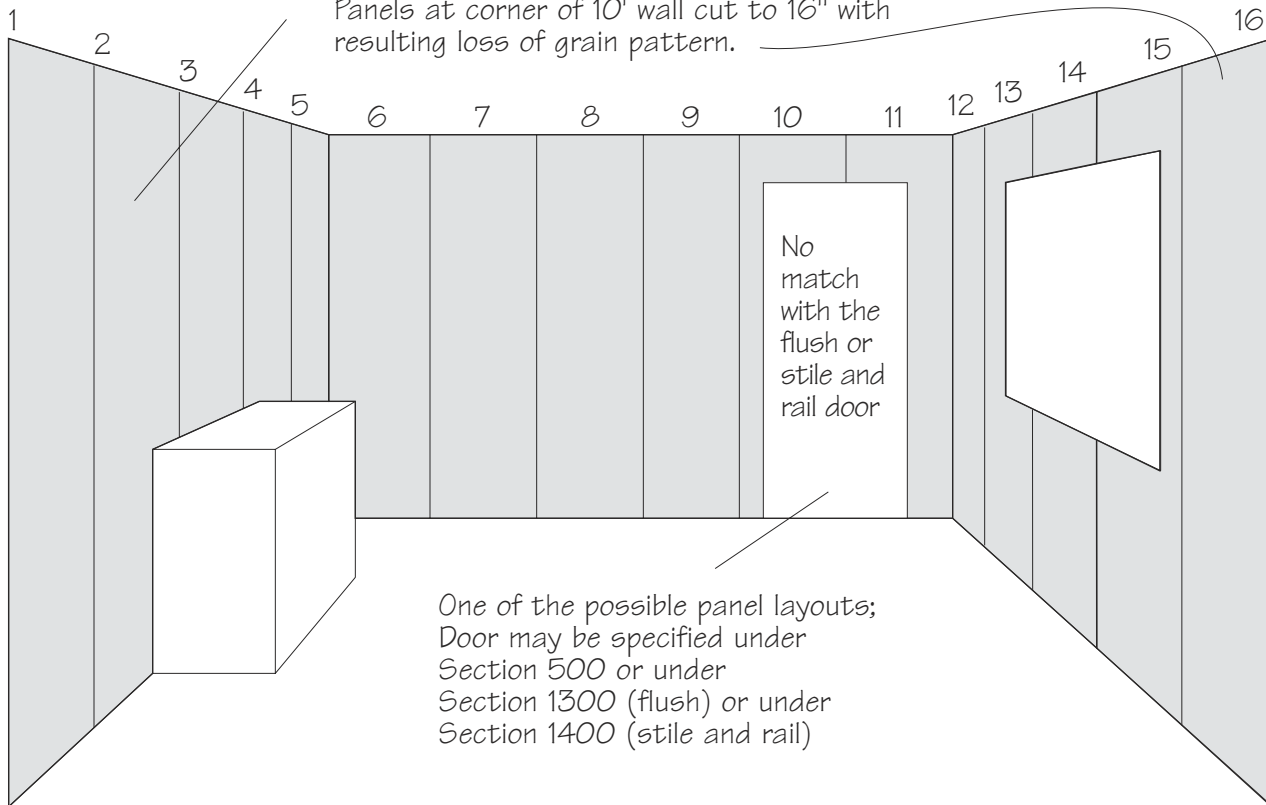


Premanufactured Sets Reduced - Figure 500-16

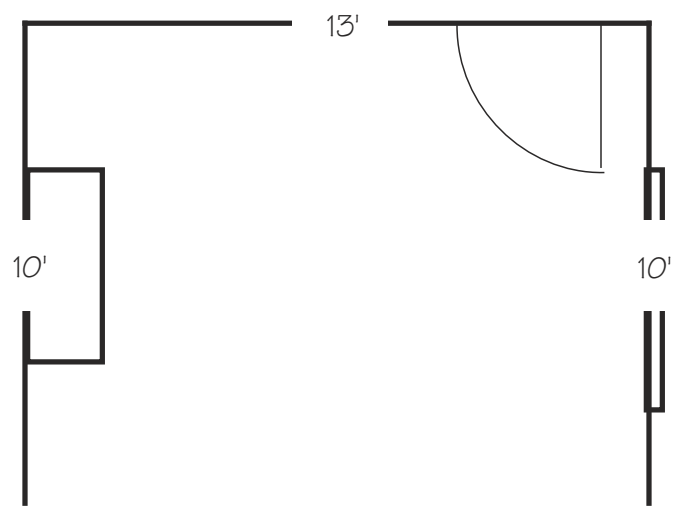
These are panels just like those in the previous illustration, usually made and warehoused in 4' x 8' or 4' x 10' sheets in sequenced sets. They are often selected for continuity, recut into modular widths, and numbered to achieve the appearance of greater symmetry. If more than one set is required, matching between the sets cannot be expected. Similarly, doors or components often cannot be fabricated from the same flitch materials, resulting in noticeable mismatch.

### 3 - Sequence Matched Uniform Size Set

Panels manufactured at 26 inches wide,  
for the job in sequenced and numbered set(s)  
Panels at corner of 10' wall cut to 16" with  
resulting loss of grain pattern.



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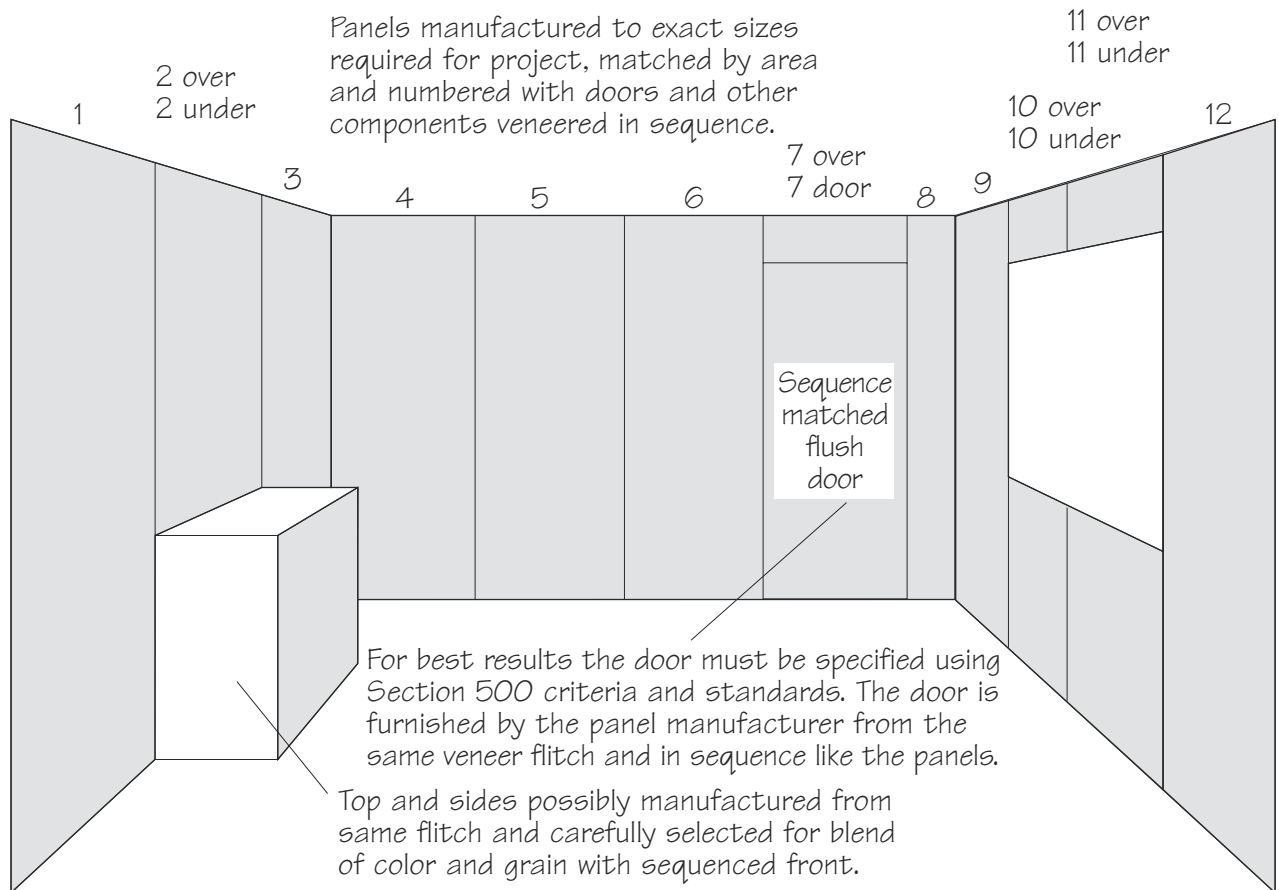


Sequence Matched Uniform Set(s) - Figure 500-17

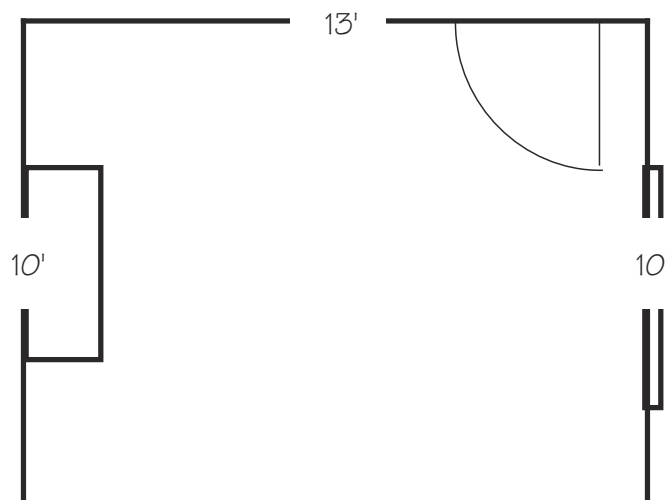
These sets are manufactured for a specific installation to a uniform panel width and height. If more than one flitch is required to produce the required number of panels, similar flitches will be used. This type of panel matching is best used when panel layout is uninterrupted, and when the design permits the use of equal-width panels. Some sequence will be lost if trimming is required to meet field conditions. Doors and components within the wall cannot usually be matched to the panels. Moderate in cost, sequenced uniform panels offer a good compromise between price and aesthetics.

Wood Veneer

4 - Blueprint Matched Panels and Components



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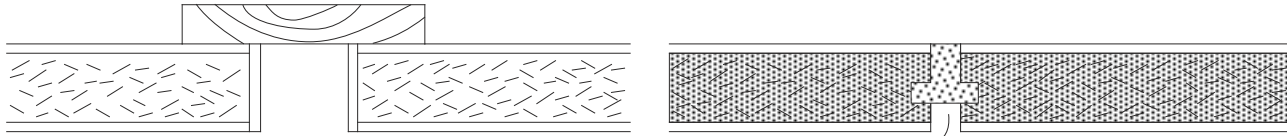


Blueprint Matched Panels - Figure 500-18

This method of panel matching achieves maximum grain continuity since all panels, doors, and other veneered components are made to the exact sizes required and in exact veneer sequence. If possible, flitches should be selected that will yield sufficient veneer to complete a prescribed area or room. If more than one flitch is needed, flitch transition should be accomplished at the least noticeable, predetermined location. This method requires careful site coordination and relatively long lead times. Panels cannot be manufactured until site conditions can be accurately measured and detailed. This panel matching method is more expensive and expresses veneering in its most impressive manner.

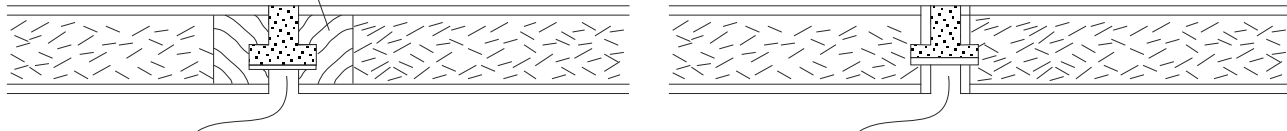
500A-G-4

Joints and Transitions



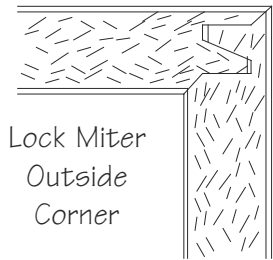
Wood under veneer likely to cause telegraphing

Suggest Medium Density Fiberboard (MDF) core for incised reveals.  
(MDF Not readily available as fire rated panels)

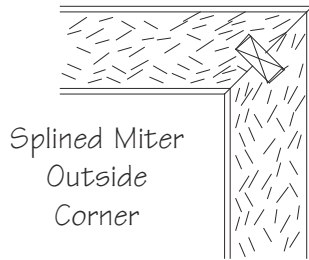


For reveals, finish same as panel solid edges or veneered elements can be specified

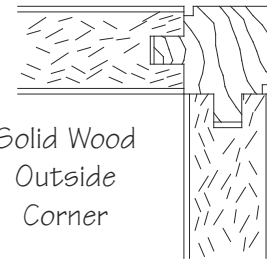
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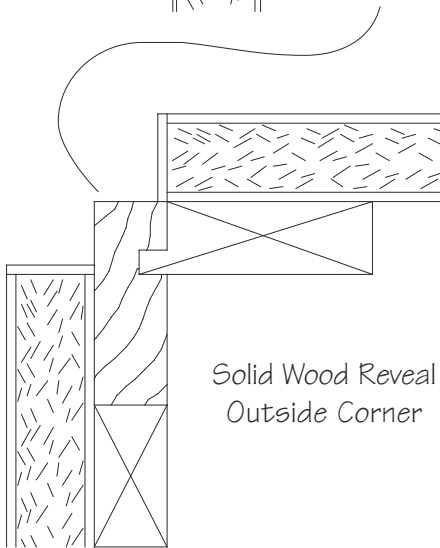
Lock Miter  
Outside  
Corner



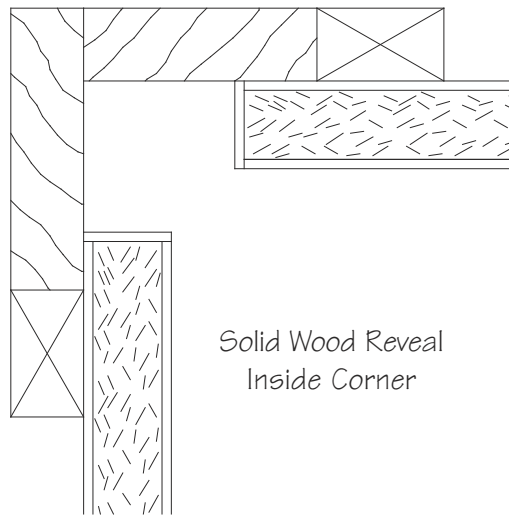
Splined Miter  
Outside  
Corner



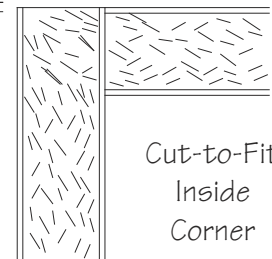
Solid Wood  
Outside  
Corner



Solid Wood Reveal  
Outside Corner



Solid Wood Reveal  
Inside Corner



Cut-to-Fit  
Inside  
Corner

Joints & Transitions - Figure 500-19

## Wood Veneer

### 500A-G-5

#### Flitch Selection

NOTE: The architect or designer may choose to see samples of veneer flitches to evaluate color and grain characteristics for other than premanufactured sets. This must be specified. Unless specified, sequence of lamination is determined by the woodworker.

When it is determined that the use of pre-manufactured panel sets is not adequate for the scope of the project then selecting specific veneer flitches is an option to consider.

When sliced from a log the individual pieces of veneer are referred to as leaves. These leaves are kept in order as they are sliced and then dried. As the leaves come out of the dryer the log is literally reassembled. This sliced, dried and reassembled log or parital log is called a flitch. The flitch is given a number and the gross square footage of the flitch is tallied.

To select specific veneer flitches for a project:

1. Determine the net square footage of face veneer required for the project. This should include paneling, casework, built in furniture items and, when specifying a sequence to a blueprint matched project, the flush doors.
2. Multiply the net square footage times three, (this is the average ratio, some species require a higher multiplier). Example: 5,000 (net square feet) x 3 = 15,000 square feet; this is the gross square footage that should be sampled for this project.

While this may sound like a daunting quantity of veneer to look through, there is an established process that simplifies the task. When a numbered flitch is sampled, typically, three leaves of veneer are removed from the flitch and numbered sequentially. Starting from the top of the flitch, a leaf is removed from one-third of the way down, then from one-half, and then from two-thirds down in the flitch. These three, sequentially numbered leaves of veneer, form a representative sample of that flitch.

3. To view a sampling of veneer that will meet the project needs one should request samples, from numbered flitches, that will represent thirty to forty-five thousand square feet of veneer. This means that if the average size of the flitches which are sampled is 2,500 square feet there will be about 36 to 54 leaves of veneer, representing 12 to 18 flitches of architectural quality veneers.

Since it will take at least 6 flitches, with a gross square footage of 2500 square feet, to meet the project needs, give careful consideration to the following key criteria:

Length - Is the length adequate for the requirements?

Width - What will the net yield for width be from each flitch?

Gross square footage of each flitch - total yield must be 15,000 square feet

Color and grain compatibility - While exact matching is not possible, from flitch to flitch, this is the opportunity to select the range of color and grain compatibility that will enhance the visual continuity of the entire project.

Note: The reality of this process is that the square footage of individual flitches of veneer will probably range from 1,200 square feet up to 3,000 square feet. This means that one may end up selecting 9 or 10 flitches, instead of just 6. But the goal remains the same as in the example, selecting flitches that will satisfy the aesthetic needs, while fulfilling the face veneer requirements for the project.

It is recommended that specifications be written with the foregoing objective in mind. Then, when the project has been awarded to a qualified woodworker, talk directly to the woodworker and be involved in one of the most exciting aspects of bringing the design concepts to reality.



## Technical Criteria

### 500A-T-1

#### Flush Paneling & Related Doors: Wood

Flat panels with wood veneer faces. Design may encompass face application of mouldings. Joints between panels to be designed for functional and/or decorative purposes.

#### Specification Requirements

Architect or Design Professional shall ...

- specify the veneer species and type of cut;
- specify the method of matching and assembly of veneer leaves in relation to each other, such as book match, slip match, random match and/or end match;
- specify the method of matching and assembly of a single panel face; choosing balance, center, or special match as required;
- specify the method of matching between panels and within each area as required, particularly Blueprint Matching;
- specify the grain direction of panels (if other than vertical);
- specify the fire-retardant rating, if required;
- in the case of selected flitch or flitches, specify the source, gross footage\* in flitch, and cost per square foot; and
- specify the methods of installation and attachment.

In the absence of complete and accurate specifications, including but not limited to above, the woodwork manufacturer will prepare the paneling using standard operating procedures for that plant. Unless specified, sequence of lamination is determined by the woodworker.

**Special Note on Blueprint Matching** - When Blueprint Matching is specified by the design team, the woodwork manufacturer is obligated to create shop drawings showing the relationship of the panels to each other.

*\*Gross veneer is the total quantity of veneer required to yield the net face footage required. Generally, this is an average of 3 to 5 square feet of gross footage to one square foot of net footage. The design professional shall research and certify that the yield from the selected flitch(es) will meet the needs of the project. Consultation with a woodworker during the design process is recommended.*



## Wood Veneer

### 500A-T-2

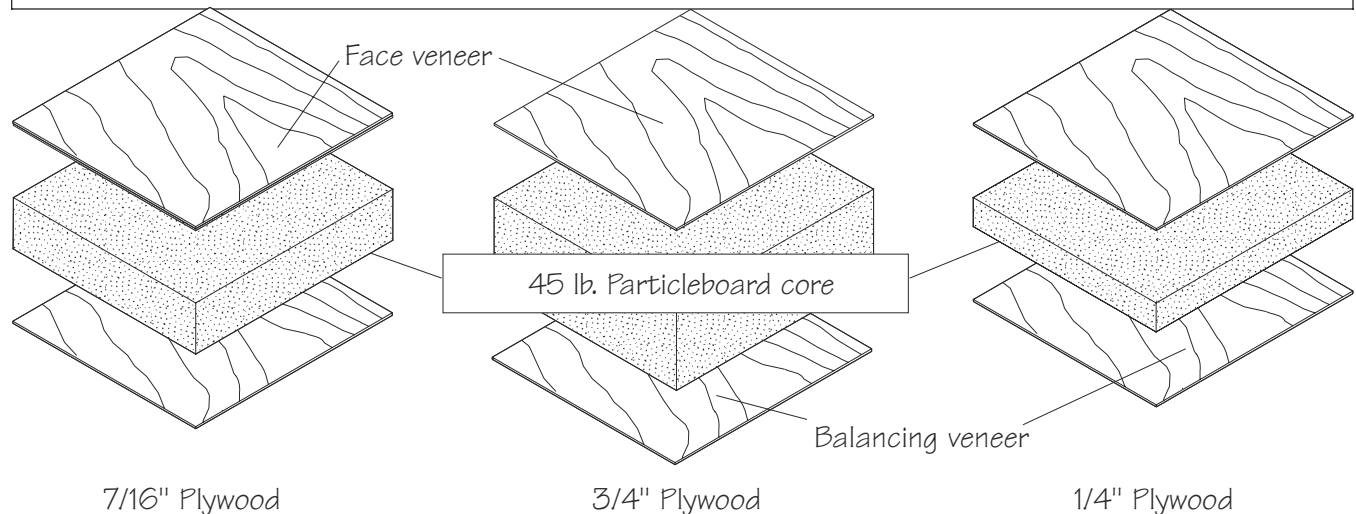
#### Materials

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives.

Materials	Premium		Custom		Economy	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
<b>Lumber Grade</b> (see Section 100)	I	II	II	II	II	II
<b>Panel Products (see Section 200)</b>						
Core	Particleboard or fiberboard (veneer core only by direct specification) Particleboard or fiberboard (Veneer Core only by direct specification)		Particleboard or fiberboard (veneer core only by direct specification)	Particleboard or fiberboard recommended (veneer core permitted)	Particleboard or fiberboard recommended (veneer core permitted)	Particleboard, fiberboard or veneer core
Minimum Thickness	19 mm [3/4"]	19 mm [3/4"]	11.1 mm [7/16"]		6.4 mm [1/4"]	
Face: Veneer Grade for transparent finish and Material for opaque finish	"AA" face veneer	"B" veneer, plain fiberboard or medium density overlay	"A" face veneer	"B" veneer, plain fiberboard or medium density overlay	"B" face veneer	"B" veneer, plain fiberboard or medium density overlay

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Notes: Wood has natural markings and characteristics which will enhance the beauty and value of any project. However, these natural characteristics may, when seen in the final product, not fulfill the design professional's intent. Therefore, it is the responsibility of the design professional to review the allowable criteria, for these characteristics, in Sections 100 and 200 of this Standard, to insure that material being specified will meet the project requirements. Veneer slicing produces a *tight* and *loose* face on each leaf of veneer. Book matching of some species accentuates this condition, reflecting light differently in adjacent leaves and even causing differences in the absorption of stain. For panels in which reveals occur in the face of the panel, medium density fiberboard core is recommended. Consult your AWI/AWMAC woodwork manufacturer, when specifying veneer panels. Glass panels, decorative wire panels, stained glass, beveled glass, etched glass, etc., shall be specified by the design professional, including appropriate safety considerations and method of retention.



Panel Thickness - Figure 500-20

500A-T-3

Workmanship

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives. Unless specified, sequence of lamination is determined by the woodworker.

Workmanship	Premium		Custom		Economy	
Finish Condition	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Cut of Lumber	Plain Sawn	Plain Sawn	Plain Sawn	Plain Sawn	Plain Sawn	Plain Sawn
Cut of Veneer	Plain Sliced	Mill option	Plain Sliced	Mill option	Rotary	Mill option
<b>Matching Considerations</b>						
Veneer match between adjacent leaves on a single panel face	Book Match	Mill option	Book Match	Mill option	Mill option	Mill option
Special Note on Matching: Book-Match-and-End-Match or Slip-Match-and-End-Match or Special Sketch Faces must be specified and detailed in the architectural drawings. Consult a member woodwork manufacturer for design and spec. help.						
Veneer match within each panel face	Balance	Mill option	Running	Mill option	Mill option	Mill option
Veneer sequence between adjacent panels	Sequenced and numbered set(s)	Mill option	Sequenced and numbered pre-manufactured set(s)	Mill option	Mill option	Mill option
Veneered panel sequence within an area of the project	Sequenced and numbered sets (Blueprint match available. See also Section 200)	Mill option	Sequenced and numbered pre-manufactured set(s)	Mill option	Mill option	Mill option
Adjacent Veneer and Lumber match within each panel face	Well matched for color and grain	Mill option	Compatible for color	Mill option	Mill option	Mill option
<b>Visible Splines and Reveals</b>						
Shall be full length and...:	Well matched for color and grain	Mill option	Compatible for color	Mill option	Mill option	Mill option

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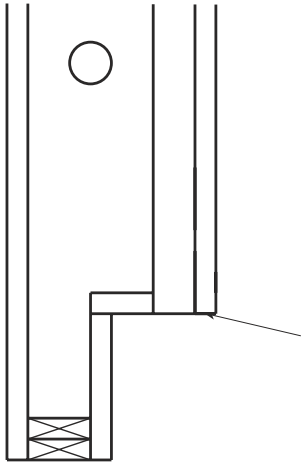
Wood Veneer

500A-T-4

Edge Treatment

Visible edges of panel products shall be treated by applying edge bandings using automatic edgebander or glue and pressure or, in the case of Economy Grade, fillers as indicated below. In cases where raw MDF is intended to have a clear or opaque finish, no edge banding is required. Edges may be banded before or after face, at manufacturer's option. Edgebanding in excess of this standard must be specified. PVC edge banding varies between 0.5 mm and 5 mm and should be evaluated and specified or approved by the design professional as desired. The following standards apply to square, PVC or veneer edged panel parts and related flat reveal faces. Special design considerations may require special solutions by the woodworker. Contrasting edges and/or reveals may be specified. Thickness dimension tolerance is  $\pm 0.05$  mm [0.002"]. Close Grain is defined in the Glossary in the Appendix.

Component	Material and Nominal Thickness	Premium Grade	
		Transparent	Opaque
All exposed full thickness flat machined edges	Material	Same Species as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Reveals of 2 mm [5/64"] face dimension or less, any depth	Material	Mill option	Mill option
	Nominal Thickness	To preclude show through of core	
Reveals wider than 2 mm [5/64"], any depth	Material	Same Species as Face	Mill option
	Nominal Thickness	To preclude show through of core	
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Same Species as Face	Mill option
	Nominal Thickness	.5 mm [.020"]	
<b>Custom Grade</b>			
Component	Material and Nominal Thickness	Transparent	Opaque
All exposed full thickness flat machined edges	Material	Same Species as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Reveals of 2 mm [5/64"] face dimension or less, any depth	Material	Mill option	Mill option
	Nominal Thickness	To preclude show through of core	
Reveals wider than 2 mm [5/64"], any depth	Material	Mill option	Mill option
	Nominal Thickness	To preclude show through of core	
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Same Species as Face	Mill option
	Nominal Thickness	.5 mm [.020"]	
<b>Economy Grade</b>			
Component	Material and Nominal Thickness	Transparent	Opaque
All exposed full thickness flat machined edges	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Reveals of 2 mm [5/64"] face dimension or less, any depth	Material	Mill option	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Reveals wider than 2 mm [5/64"], any depth	Material	Mill option	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Mill option	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
NOTES: 1 - Premium Grade - All edges must be banded, including sides and bottoms of reveals. 2 - Custom Grade - All edges must be banded. Sides and bottoms of reveals treated as mill option. 3 - Economy Grade - All edges must be banded, where banding is required. Sides and bottoms of reveals treated as mill option.			



NOTE: For increased durability wall panelling with this detail shall be veneered and finished on this lower edge.

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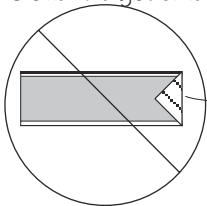
Veneer Edgeband - Sec. 1



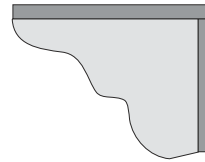
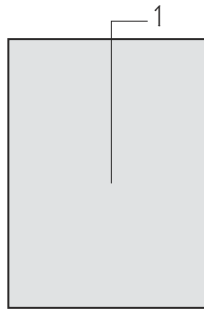
Veneered Panel Products



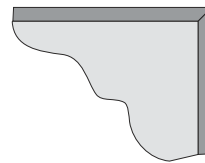
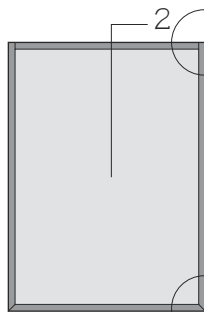
Solid Edgeband - Sec. 2



Old fashioned "V" edgeband should not be used or specified for high quality wood paneling.



Lapped Joint (typical, and direction of lap at manufacturer's option)



Mitered Joint (must be minimum of 6.4 mm [1/4"] thick in both dimensions, and must be specified)

Edge Treatment - Figure 500-21

Wood Veneer

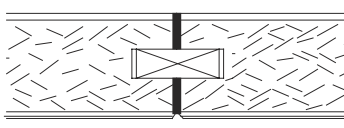
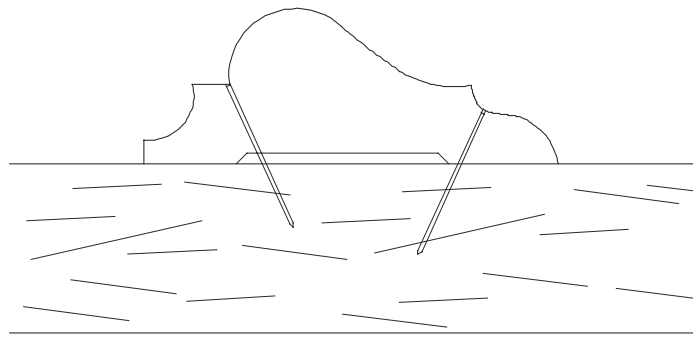
500A-T-5

Machining and Joinery

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives.

Machining	Premium	Custom	Economy
<b>Plant Machining Considerations</b>			
Panel Sizing	Plant sized except where field adjustments required	Plant sized except where field adjustments required	Shipped as full size panels for cutting and fitting in the field
<b>Joinery and Assembly Considerations</b>			
NOTE: Plant prepared joints only furnished on panel systems to be installed with panel clips or hanging strips. Due to the potential for expansion and contraction inherent in large panels, a minimum design gap of 2 mm [5/64"] per 1200 mm [47.25"] of elevation run at joints is strongly recommended to the design team.			
Butting Joints	Plant prepared; edges eased; grooved and spline(s) furnished	Plant prepared; edges eased	Shipped without preparation
Reveal Panel Joints	Plant prepared; edges eased; machined for articulation strip(s) furnished	Plant prepared; edges eased; articulation strip(s) furnished	Shipped without preparation
Reveal Joints: Outside Corners	Plant prepared; edges eased; machined for articulation strip(s) furnished	Plant prepared; edges eased; articulation strip(s) furnished Plant prepared; edges eased; machined for articulation strip(s) furnished	Shipped without preparation
Mitered Outside Corners	Plant prepared and, if site conditions permit, glued and braced prior to shipping	Plant prepared and shipped loose	Shipped without preparation
Inside Corners	Shipped oversize for field fitting	Shipped oversize for field fitting	Shipped oversize for field fitting
NOTES: Site applied mouldings are governed by Section 300 and Section 1700. The following applies to mouldings contained wholly within an individual panel or used as rim or panel retention members. Integral Applied Moulding: Acceptable with solid or veneered stiles and rails. Mouldings must be mitered. Mouldings must be fastened to stile or rail (not to panel to permit movement), utilizing not more than two positioning nails per 300 mm [12" nominal] of length before a joint or change of direction.			
Applied mouldings	Plant fastened; spot glued, fine finish nailed, set, filled and sanded	Plant fastened; spot glued, fine finish nailed	Shipped loosed for field fitting

500



Butt Joint - Allow 2 mm [5/64"] min. design gap per 1200 mm [47.25"] run in elevation. Wider gap is better in most cases, and will require edge treatment as shown previously in this Standard.

Joinery Details - Figure 500-22

500A-T-6

Smoothness of Exposed Surfaces (Minimum Requirements)

In the absence of specifications, the following sanding standards will apply.

Smoothness Table	Premium		Custom		Economy	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Sharp edges (Arris)	Eased with fine abrasive		Eased with fine abrasive		Mill option	
Top flat surfaces	150 grit		120 grit		100 grit or 15 KCPI	
Moulded surfaces	120 grit		minimum 20 KCPI			
Shaped surfaces	120 grit		minimum 20 KCPI			
Turned surfaces	120 grit		100 grit			
Sanding cross scratches	None allowed	Not to exceed 6.4 mm [.25"]	None allowed	Not to exceed 6.4 mm [.25"]		

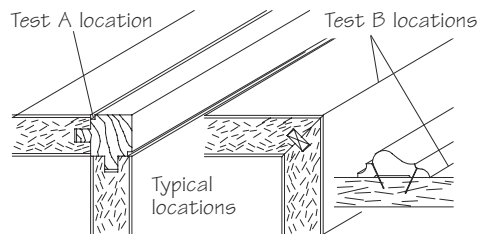
NOTE: No tearouts, knife nicks, or hit-or-miss finish allowed. No knife marks allowed where sanding is required. Surface variations as a result of multiple tool passes treated as turned surfaces above. Glue and filler, if used, must be inconspicuous and sanded as smoothly as the surrounding surface. Sanding before final stain and/or finish should be a consistent grit and scratch pattern, as it influences blend of color and sheen between components. Top Flat Surfaces are those which which can be sanded with a drum or wide belt sander. Turnings are customarily sanded on the lathe, and will exhibit cross scratches.

Before finishing, all exposed portions of architectural woodwork shall have handling marks or effects of exposure to humidity or moisture removed by a thorough uniform final sanding. The sanded surface shall then be cleaned and dust free, prior to proceeding with the first step in the finishing process. Veneer sand-through, with veneer sanded to the point where cross banding or core is visible, and/or core telegraphing (variation from a true plane in excess of 0.25 mm [0.010"] in any 76 mm [3"] span) is not allowed in any Grade.

500A-T-7

Tightness of Plant Assembled Joints

Plant Assembled Joint Table	Premium		Custom		Economy	
	Interior	Exterior	Interior	Exterior	Interior	Exterior
Maximum gap: Test A	0.4 mm [.015"] wide by 20% of joint length	0.6 mm [.025"] wide by 30% of joint length	0.6 mm [.025"] wide by 20% of joint length	1.3 mm [.050"] wide by 30% of joint length	1.3 mm [.050"] wide by 20% of joint length	1.9 mm [.075"] wide by 30% of joint length
Maximum gap: Test B	0.4 mm [.015"] x 76 mm [3"], and no gap may occur within 1829 mm [72"] of a similar gap	0.6 mm [.025"] x 152 mm [6"], and no gap may occur within 762 mm [30"] of a similar gap	0.6 mm [.025"] x 152 mm [6"], and no gap may occur within 1524 mm [60"] of a similar gap	1.3 mm [.050"] x 203 mm [8"], and no gap may occur within 660 mm [26"] of a similar gap	1.3 mm [.050"] x 203 mm [8"], and no gap may occur within 1219 mm [48"] of a similar gap	1.9 mm [.075"] x 254 mm [10"], and no gap may occur within 610 mm [24"] of a similar gap
Maximum gap: Test C	0.4 mm [.015"]	0.6 mm [.025"]	0.6 mm [.025"]	1.3 mm [.050"]	1.3 mm [.050"]	1.9 mm [.075"]
Maximum gap between fixed components shall be tested at points designed to join; where members connect or touch.						
Flushness Variation	0.03 mm [.001"]	0.4 mm [.015"]	0.1 mm [.005"]	0.6 mm [.025"]	0.6 mm [.025"]	1.3 mm [.050"]



Flushness Test location not illustrated. Test C locations are typically applied moulding miters.

Test Locations - Figure 500-23

## Wood Veneer

### 500A-T-8

#### Selection for Grain and Color

##### Plant Assemblies

For Transparent finish, adjacent members ...

- Premium Grade: ... shall be well matched for grain and color.
- Custom Grade: ... shall be compatible for color.
- Economy Grade: ... shall not be selected.

Visible finger joints not permitted in Premium and Custom Grades. No selection for grain or color is required for opaque finish in any Grade.

##### Field Assemblies

Selection of adjacent members for compatibility is the responsibility of the installation contractor.

### 500A-T-9

#### Panel and Door Workmanship

#### General Requirements for Veneer Faces

##### Opaque or Transparent Finish

- Joints must be tight.
- Veneer and overlay faces must be completely glued to substrate.
- Veneer and overlay faces shall be prepared with no visible scratches, knife marks, or other machining defects.
- Veneer faces shall meet face grades set forth in this standard.
- Veneer and overlay faces may not exhibit glue bleed-through at joints or through veneer.



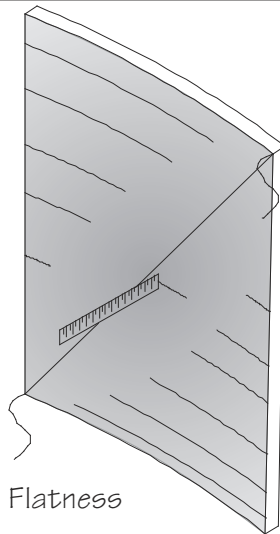


**Compliance Criteria**

**500A-C-1**

**Flatness of Installed and Removable Panels (Maximum Deviation)**

Flatness Tolerances	Premium	Custom	Economy
Measured diagonally after installation is completed, per 30 cm [lineal foot] (or portion thereof) of diagonal measurement, the following maximum deviation from flat	0.7 mm [.027"]	0.9 mm [.036"]	1.3 mm [.050"]
EXAMPLE: When the diagonal measurement of the illustrated panel is 120 cm, the maximum distance between the string and the face of the panel will be about 3.6 mm [ <sup>9</sup> / <sub>64</sub> "] in Custom Grade – 4 times 0.9 mm = 3.6 mm [0.142"]			



*Flatness Test - Figure 500-24*

**500A-C-2**

**Tests for Smoothness of Exposed Surfaces**

KCPI (Knife Cuts Per Inch) 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.

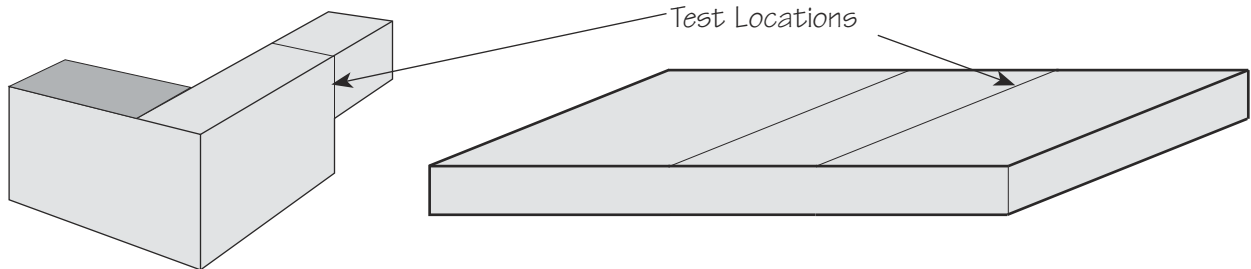
SANDING can best be checked by sanding a sample piece of the same species with the required grit of abrasive. Observation with a hand lens of the prepared sample and the material in question will offer a comparison of the scratch marks of the abrasive grit. Reasonable assessment of the performance of the finished product will be weighed against absolute compliance with the standard.

Wood Veneer

500A-C-3

Tightness and Flushness of Plant Assembled Joints

Joint tightness and/or flushness will meet the standard when tested with a feeler gauge at the points indicated in the illustration. Joint length will be measured with a ruler with a minimum division of 1 mm [ $1/16$ " ] and calculations made accordingly. Reasonable assessment of the performance of the finished product will be weighed against absolute compliance with the standard.



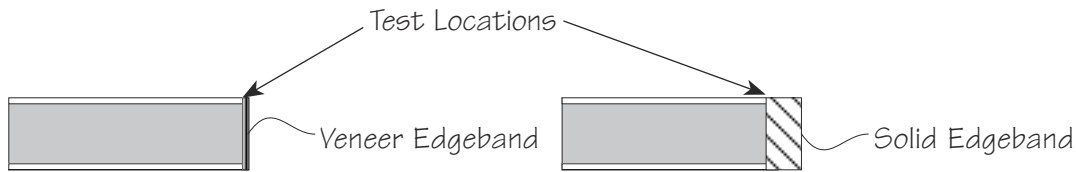
Flushness Tests - Figure 500-25

500A-C-4

Edgebanding Performance

Edgebanding Tolerances	Premium	Custom	Economy
Flushness with adjacent surfaces (maximum variation)	.03 mm [.001"]	.13 mm [.005"]	.25 mm [.010"]
All edgebanding must be free of delamination, bubbles, and all adhesive residue			

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Edgeband Performance - Figure 500-26

500A-C-5

Tests for Manufacture of Premium or Custom Grade Blueprint Matched Panels, Components and Related Doors

For products specified under this section, these tests are to be considered as additional requirements to those covered above. These tests do not apply to flush doors specified under Section 1300 or specified using other standards.

- A. PLUMBNESS OF VENEER JOINTS - No variance exceeding 5 mm [ $3/16$ " ] in 2440 mm [96"].
- B. TIGHTNESS OF VENEER JOINTS - No openings or voids of any kind.
- C. GRAIN LOSS AND ALIGNMENT AT END MATCHED JOINTS - Grain loss shall not exceed 38 mm [ $1-1/2$ " ]. This is to be tested by separating end matched panels 38 mm [ $1-1/2$ " ] and visually testing grain void for continuity.
- D. GRAIN LOSS AND ALIGNMENT AT SIDE MATCHED JOINTS - Grain loss shall not exceed 25.4 mm [1" ]. This is to be tested by separating side matched panels 25.4 mm [1" ] and visually testing grain void for continuity.

- E. HEART FIGURE PROGRESSION - The full heart figure of plain sliced veneer shall develop in uniform and natural progression. Split or cut hearts are permitted provided they are used to maintain sequence or to achieve special effects.
- F. SAPWOOD - Sap shall be considered a defect except in species and cuts selected for sap appearance.
- G. VENEER PATCHES - If required to repair unanticipated voids, when finished they shall not be discernible when viewed from a distance of 4' in normal light of the viewing area.
- H. MATCHING - All faces shall be balance matched. (Center balance matching must be specified.)
- I. SHOP DRAWINGS - Detailed shop drawings shall be produced by the woodwork manufacturer showing each individual panel, the sequence between the panels, and the general layout of the elevation. Shop drawings shall include method(s) of attachment, and be of sufficient detail to illustrate compliance with this standard.



**DIVISION B - Laminate Clad Paneling**



**Technical Criteria**

**500B-T-1**

**Specification Requirements**

Flat panels with high pressure decorative laminate (HPDL) faces and balancing backer sheets. Joints between panels to be as designed for functional and/or decorative purposes.

Architect or Design Professional shall ...

- specify the manufacturer, pattern, and sheen of laminate, in the absence of which the selection shall be at the woodworker's option;
- specify the pattern direction of panels and reveal joints. In the absence of such indication, the pattern direction of the panels shall be assumed to be vertical, and the pattern direction of reveal joints shall be at woodworker's option.

**500B-T-2**

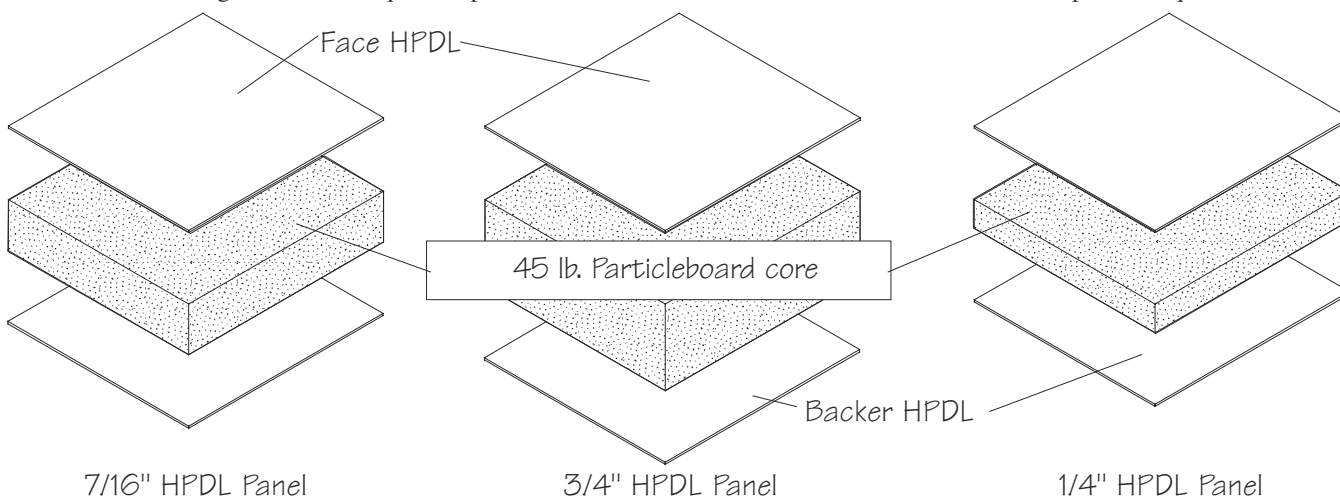
**Materials: High Pressure Decorative Laminate**

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In the absence of specifications, the following standards will apply. In the absence of specifications, the following standards will apply. Where more than one method or material is listed, AWI/AWMAC woodworkers will supply their choice from the alternatives. In the absence of a specified laminate pattern and/or color, woodworkers will furnish base-priced (excluding upcharged) decorative laminates and melamine panels from manufacturer's standard selections, **maximum of four different colors and/or patterns per project, limited to one per elevation.** When specified, woodworkers will furnish multiple patterns, color and/or specialty materials, adjusting cost and delivery time.

Materials	Premium	Custom	Economy
Panel Products: Recommended materials and thicknesses (see Section 200)			
Core Material	Particleboard or fiberboard (veneer core only by direct specification)	Particleboard or fiberboard (veneer core only by direct specification)	Particleboard or fiberboard recommended (veneer core permitted)
Minimum Core Thickness	19 mm [3/4"]	11.1 mm [7/16"]	6.4 mm [1/4"]
High Pressure Decorative Laminate Material Grade (from Section 200)	1.2 mm [.048"] nominal face and backer sheet Any HPDL or PVC for edges	0.7 mm [.028"] nominal face and backer sheet Any HPDL or PVC for edges	No minimum thickness backer sheet required; No edge treatments

NOTE: Color-through laminates require a special backer sheet. Contact laminate manufacturer for specific requirements.



Panel Thickness - Figure 500-27

HPDL

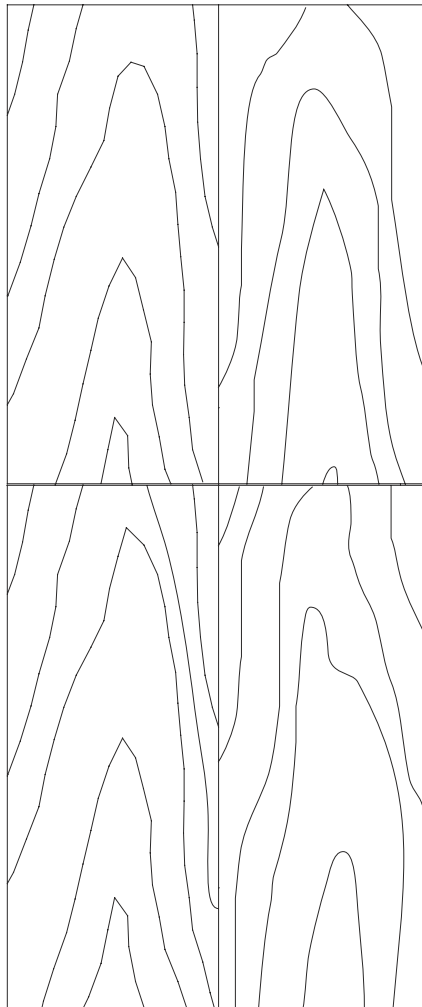
500B-T-3

Workmanship

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives. Unless specified, sequence of lamination is determined by the woodworker.

Workmanship	Premium	Custom	Economy
<b>Matching Considerations</b>			
Vertical Match (panel over panel or panel over door)	Shall match, providing total height does not exceed maximum length of available sheet	No match required	No match required
Horizontal Match (panel next to panel or door)	Impossible to attempt to match woodgrain and most other patterned high pressure decorative laminate panels side-to-side. No horizontal match required.		
<b>Backer sheet</b>	Backer sheet shall be applied in the same machine or grain direction as the face HPDL		
<b>Edge Lamination order</b>	Edges can be laminated before or after the panel faces at the option of the woodworker unless otherwise specified. Traditionally, edges are overlapped, trimmed, and beveled. Mitered HPDL corner joints are not recommended unless miterfold-machined with substrate.		

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Horizontal and Vertical Matching Options - 500-28

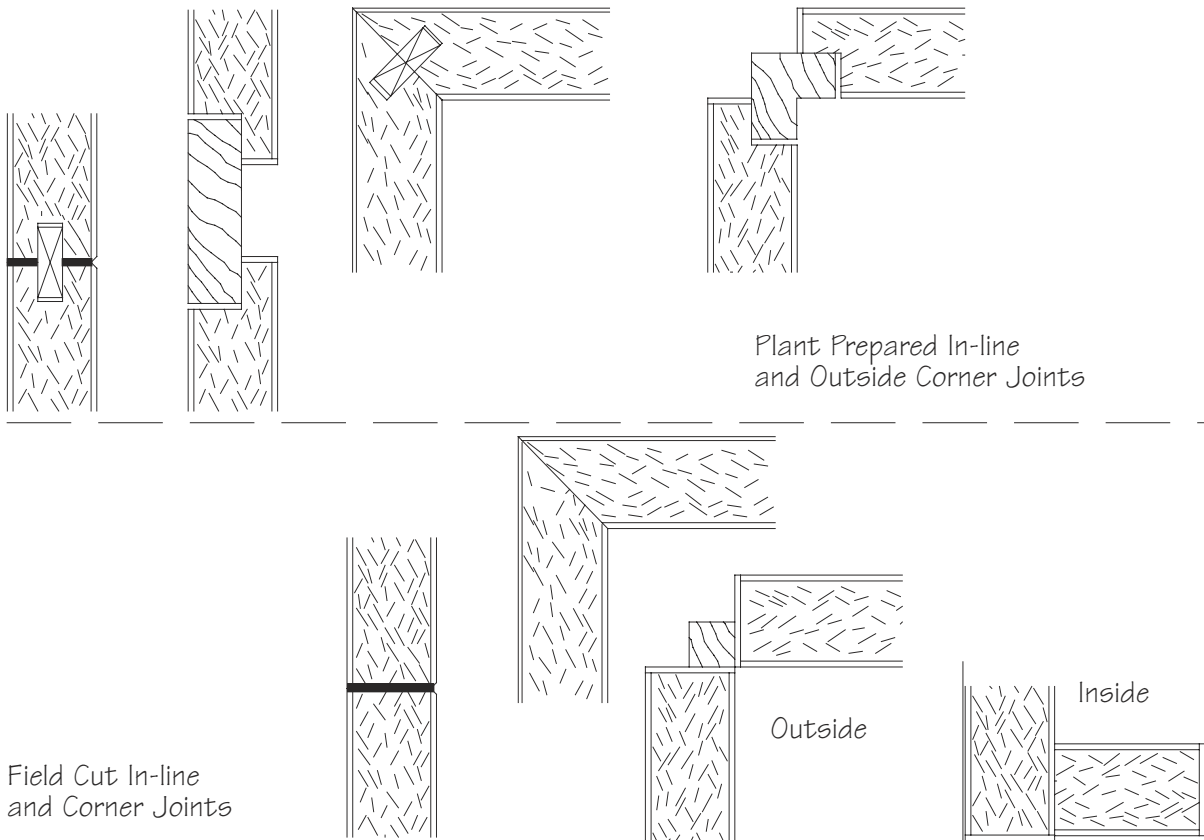
500B-T-4

Machining and Joinery

In the absence of specifications, the following joinery standards will apply.

Machining	Premium	Custom	Economy
<b>Plant Machining Considerations</b>			
Panel Sizing	Plant sized except where field adjustments required	Plant sized except where field adjustments required	Shipped as full size panels for cutting and fitting in the field
<b>Joinery and Assembly Considerations</b>			
NOTE: Plant prepared joints only furnished on panel systems to be installed with panel clips or hanging strips. Due to the potential for expansion and contraction inherent in large panels, a minimum design gap of 2 mm [5/64"] per 1220 mm [48"] of run at joints is recommended.			
Butting Joints	Plant prepared; edges eased; grooved and spline(s) furnished	Plant prepared; edges eased	Shipped as full size panels for cutting and fitting in the field
Reveal Panel Joints	Plant prepared; edges eased; machined for articulation strip(s) furnished	Plant prepared; edges eased; articulation strip(s) furnished	Shipped as full size panels for cutting and fitting in the field
Reveal Joints: Outside Corners	Plant prepared; edges eased; machined for articulation strip(s) furnished	Plant prepared; edges eased; articulation strip(s) furnished	Shipped as full size panels for cutting and fitting in the field
Mitered Outside Corners (not recommended)	Plant prepared and, if site conditions permit, glued and braced prior to shipping	Plant prepared and shipped loose	Shipped as full size panels for cutting and fitting in the field
Inside Corners	Shipped oversize for field fitting	Shipped oversize for field fitting	Shipped oversize for field fitting

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Plant Prepared In-line and Outside Corner Joints

Field Cut In-line and Corner Joints

Joinery Examples - Figure 500-29

HPDL

500B-T-5

**Plant Attached High Pressure Decorative Laminate**

In the absence of specifications, the following joinery standards will apply to a piece or pieces of HPDL attached to an individual piece of substrate material

HPDL Tolerances	Premium	Custom	Economy
Maximum Gap, butted edges glued to same piece of substrate	0.18 mm [.007"] x 76 mm [3"], and not more than 1 opening permitted in any 6 sq meters [65 sq ft]	0.38 mm [.015"] x 127 mm [5"], and not more than 2 openings permitted in any 6 sq meters [65 sq ft]	0.76 mm [.030"] x 127 mm [5"], and not more than 3 openings permitted in any 6 sq meters [65 sq ft]
Flushness Variation	Not to exceed 0.08 mm [.003"]	Not to exceed 0.15 mm [.006"]	Not to exceed 0.23 mm [.009"]
Blisters or Bubbles	None	None	None
Surface Scratches, inconspicuous beyond	610 mm [24"]	1220 mm [48"]	1830 mm [72"]
Chipout, inconspicuous beyond	610 mm [24"]	1220 mm [48"]	1830 mm [72"]
Plumbness of special patterns, slope ...	Not greater than 3 mm [ <sup>1</sup> / <sub>8</sub> "] in 2440 mm [96"]	Not greater than 6 mm [ <sup>1</sup> / <sub>4</sub> "] in 2440 mm [96"]	Not greater than 9 mm [ <sup>3</sup> / <sub>8</sub> "] in 2440 mm [96"]
Alignment of special patterns, sheet to sheet	Mismatch not greater than 1.5 mm [ <sup>1</sup> / <sub>16</sub> "]	Mismatch not greater than 3 mm [ <sup>1</sup> / <sub>8</sub> "]	Mismatch not greater than 6 mm [ <sup>1</sup> / <sub>4</sub> "]

500B-T-6

Edge Treatment

Visible edges of panel products shall be treated by applying edge bandings using automatic edgebander or glue and pressure or, in the case of Economy Grade, fillers as indicated below. In cases where raw MDF is intended to have a clear or opaque finish, no edge banding is required. Edges may be banded before or after face, at manufacturer's option. Edgebanding in excess of this standard must be specified. PVC edge banding varies between 0.5 mm and 5 mm and should be evaluated and specified or approved by the design professional as desired. The following standards apply to square, PVC or HPDL edged panel parts and related flat reveal faces. Special design considerations may require special solutions by the woodworker. Contrasting edges and/or reveals may be specified, but the use of color through laminates or mitered corners is not recommended for architectural paneling. Thickness dimension tolerance is  $\pm 0.05$  mm [0.002"].

Component	Material and Nominal Thickness	Premium Grade
		Finish Condition
All exposed full thickness flat machined edges	Material	PVC or HPDL to match face
	Nominal Thickness	.5 mm [.020"]
Reveals of 2 mm [5/64"] face dimension or less, any depth	Material	Mill option
	Nominal Thickness	To preclude show through of core
Reveals wider than 2 mm [5/64"], any depth	Material	Painted matching color
	Nominal Thickness	To preclude show through of core
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Painted matching color
	Nominal Thickness	To preclude show through of core
<b>Custom Grade</b>		
Component	Material and Nominal Thickness	Custom Grade
		Finish Condition
All exposed full thickness flat machined edges	Material	PVC or HPDL to match face
	Nominal Thickness	.5 mm [.020"]
Reveals of 2 mm [5/64"] face dimension or less, any depth	Material	Mill option
	Nominal Thickness	To preclude show through of core
Reveals wider than 2 mm [5/64"], any depth	Material	Mill option
	Nominal Thickness	To preclude show through of core
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Painted matching color
	Nominal Thickness	To preclude show through of core
<b>Economy Grade</b>		
Component	Material and Nominal Thickness	Economy Grade
		Finish Condition
All exposed full thickness flat machined edges	Material	Mill option
	Nominal Thickness	To preclude show through of core
Reveals of 2 mm [5/64"] face dimension or less, any depth	--	No treatment required
	--	--
Reveals wider than 2 mm [5/64"], any depth	Material	Mill option
	Nominal Thickness	To preclude show through of core
Partial thickness edges at reveals wider than 2 mm [5/64"]	Material	Mill option
	Nominal Thickness	To preclude show through of core
NOTES: 1- Premium Grade - All edges must be banded, sides and bottoms of reveals painted to match or blend. 2 - Custom Grade - All edges must be banded. Sides and bottoms of reveals treated as mill option. 3 - Economy Grade - All edges must be banded, where banding is required. Sides and bottoms of reveals treated as mill option.		

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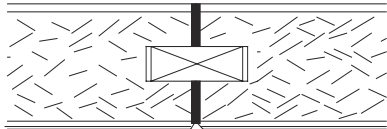


HPDL

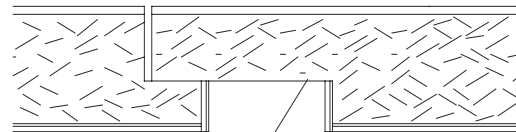
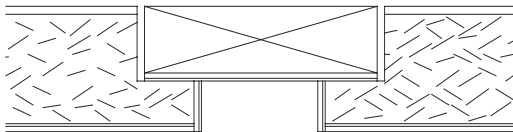
500B-T-7

Tightness of Plant Assembled Joints between Laminated Components

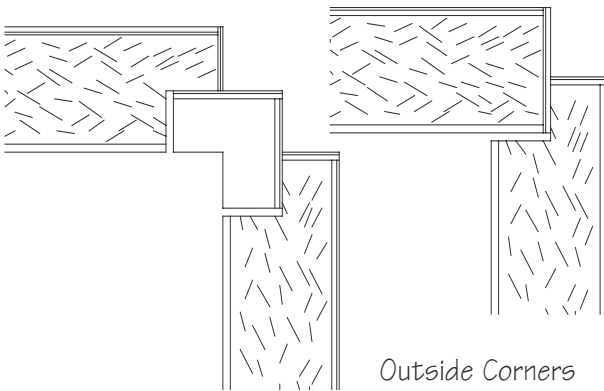
HPDL Tightness	Premium	Custom	Economy
Maximum Gap	.4 mm [.015"] x 76 mm [3"], and no gap may occur within 1830 mm [72"] of a similar gap	.6 mm [.025"] x 152 mm [6"], and no gap may occur within 1525 mm [60"] of a similar gap	1.3 mm [.050"] x 203 mm [8"], and no gap may occur within 1220 mm [48"] of a similar gap
Flushness Variation	Not to exceed .03 mm [.001"]	Not to exceed .1 mm [.005"]	Not to exceed .25 mm [.010"]



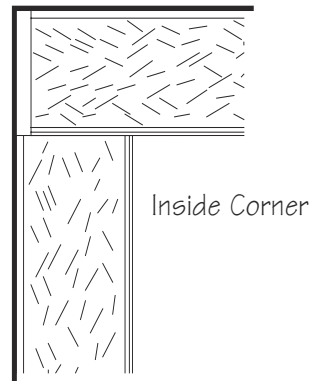
Butt Joint - Allow 2 mm [5/64"] min. design gap per 1200 mm [47-1/4"] run in elevation. Wider gap is better in most cases, and will require edge treatment as shown previously in this Standard.



Reveal painted to blend with HPDL color and pattern



Outside Corners



Inside Corner

Plant Assembled Joinery - Figure 500-30

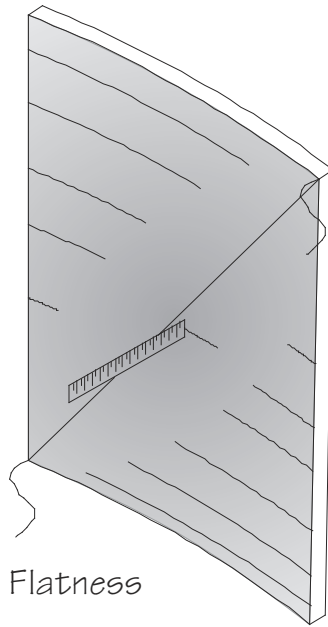


**Compliance Criteria**

**500B-C-1**

**Flatness of Cabinet Doors and Removable Panels (Maximum Deviation)**

Flatness Tolerances	Premium	Custom	Economy
Measured diagonally after installation is completed, per lineal foot (or portion thereof) of diagonal measurement, the following maximum deviation from flat:	.027" [.7 mm]	.036" [.9 mm]	.050" [1.3 mm]
EXAMPLE: When the diagonal measurement of the illustrated panel is 4', the maximum distance between the string and the face of the panel will be about 9/64" in Custom Grade—4 times .036" = .144" and 9/64" = about .141"			



*Flatness Test - Figure 500-31*

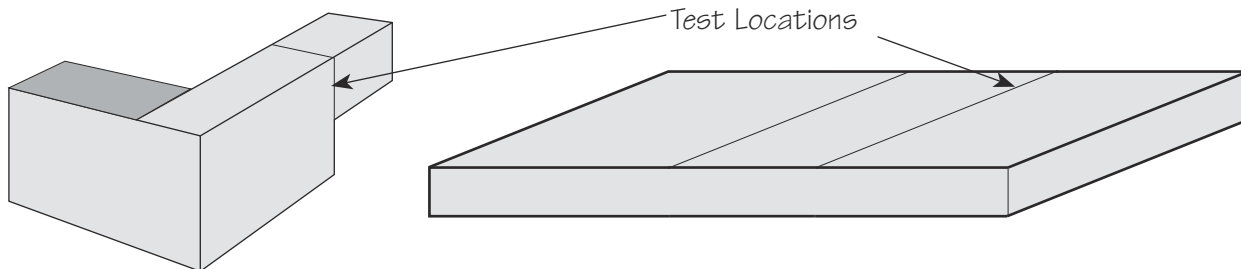
**500B-C-2**

**Tightness and Flushness of Plant Assembled Joints**

Joint tightness and/or flushness will meet the standard when tested with a feeler gauge. Joint length will be measured with a ruler with a minimum division of 1/16" and calculations made accordingly. Reasonable assessment of the performance of the finished product will be weighed against absolute compliance with the standard.

**Flushness Between Exposed Factory Assembled Joints (Maximum Variation)**

Flushness Tolerance	Premium	Custom	Economy
Measured with a feeler gauge	.03 mm [.001"]	.13 mm [.005"]	.25 mm [.010"]



*Flushness Tests - Figure 500-32*

500

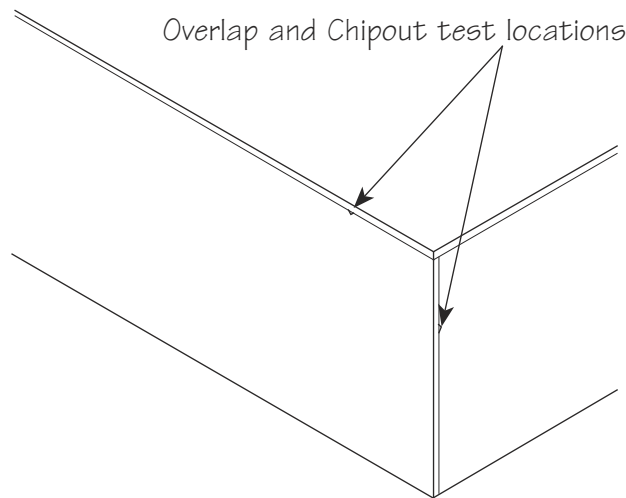
HPDL

500B-C-3

Edge/Joint Quality

Premium	Custom	Economy
All adhesive residue shall be removed from all Exposed and Semi-exposed surfaces in all Grades.		
All laminate and PVC edges shall be machined flush, filed, sanded, or buffed to remove machine marks and eased (sharp corner removed). Cleanup at easing shall be such that no overlap of the member eased is visible. Chipout of the laminate shall be invisible when viewed at 610 mm [24"].	All laminate and PVC edges shall be machined flush and eased (sharp corner removed). Cleanup at easing may show a maximum visible overlap of no more than .13 mm [.005"] for a length of no more than 25.4 mm [1"] in any 610 mm [24"] run. Chipout of the laminate shall be invisible when viewed at 1219 mm [48"].	All laminate and PVC edges shall be eased (sharp corner removed). Cleanup at easing may show a maximum visible overlap of no more than .13 mm [.005"] for a length of no more than 50.8 mm [2"] in any 1219 mm [48"] run. Chipout of the laminate shall be invisible when viewed at 1829 mm [72"].
Removal of color/pattern of face material due to overmachining limited to 1.6 mm [1/16"] x 38.1 mm [1-1/2"] and shall not occur within 1829 mm [72"] of a similar occurrence.	Removal of color/pattern of face material due to over-machining limited to 1.6 mm [1/16"] x 76 mm [3"] and shall not occur within 1524 mm [60"] of a similar occurrence.	Removal of color/pattern of face material due to over-machining limited to 2.4 mm [3/32"] x 102 mm [4"] and shall not occur within 1219 mm [48"] of a similar occurrence.

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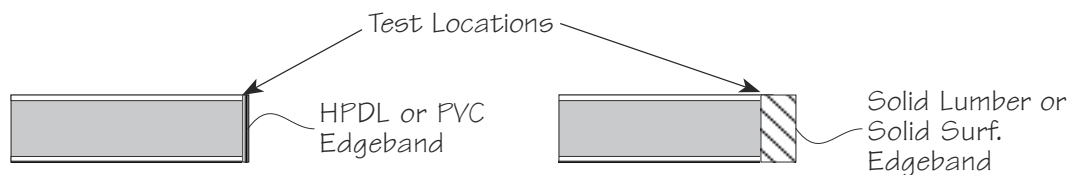


Edge/Joint Quality - Figure 500-33

500B-C-4

Edgebanding Performance

Edgebanding Tolerances	Premium	Custom	Economy
Flushness with adjacent surfaces (maximum variation)	.03 mm [.001"]	.13 mm [.005"]	.25 mm [.010"]
All edgebanding must be free of delamination, bubbles, and all adhesive residue			

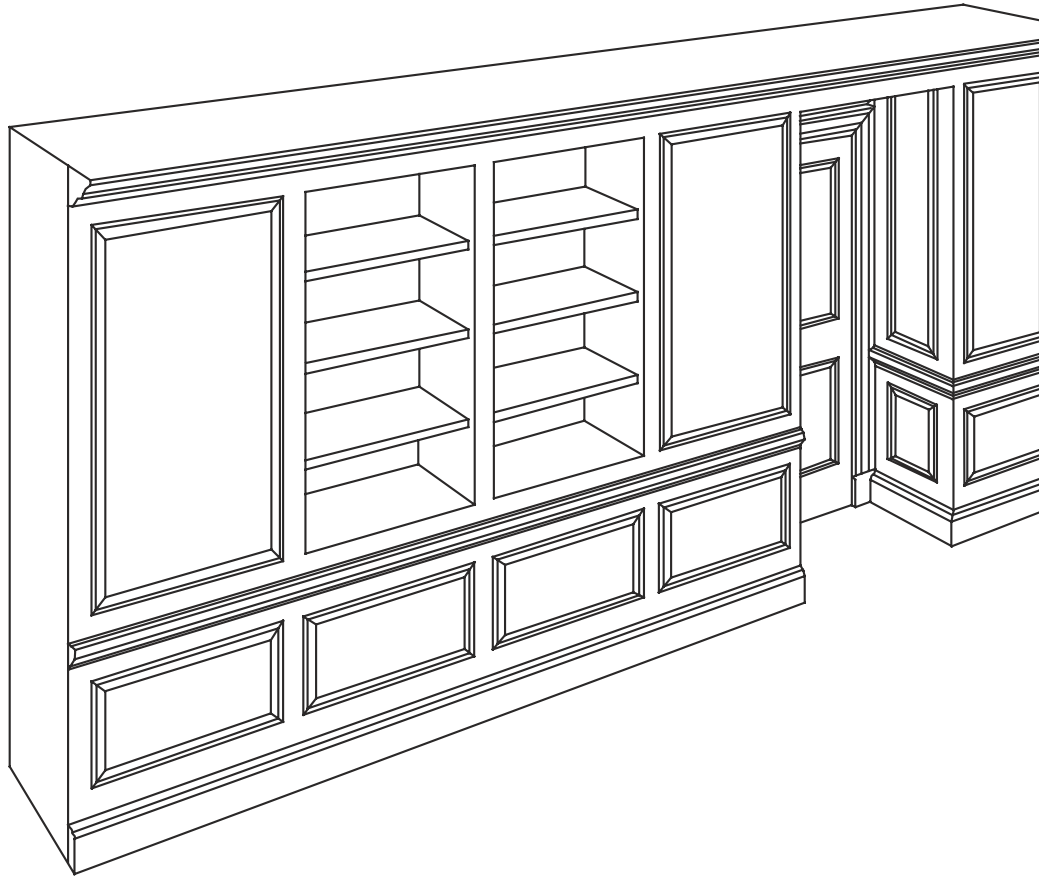


Edgeband Performance - Figure 500-34



## DIVISION C - Stile and Rail Paneling

Flat or raised panels with wood veneer faces or of solid lumber, combined with stiles and rails. Design may encompass face application of mouldings. Joints between panels, stiles, rails, and other members to be as designed for functional or decorative purposes.



Stile and Rail Design - Figure 500-35



### Technical Criteria

#### 500C-T-1

#### Specification Requirements

Architect or design professional shall ...

- specify the lumber and veneer species and type of cut;
- specify the method of matching and assembly of veneer leaves for the panels in relation to each other, such as book match, slip match, random match and/or end match;
- specify the the method of matching and assembly of a single veneered panel face; choosing balance, center, or special match as required;
- specify the the method of sequence and matching between panels within each area as required;
- specify the grain direction of panels (if other than vertical).

NOTE: The grain direction of stiles and rails is assumed to be along the long dimension;

- specify the fire-retardant rating, if required, if any;
- in the case of selected flitch or flitches, specify the source, gross footage\* in flitch, and cost per square foot.

*\*Gross veneer is the total quantity of veneer required to yield the net face footage required. Generally, this is an average of 3 to 5 square feet of gross footage to one square foot of net footage. The design professional shall research and certify that the yield from the selected flitch(es) will meet the needs of the project. Consultation with a woodworker during the design phase is recommended.*

## Stile and Rail

### 500C-T-2

#### Materials

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a grade, woodworkers will supply their choice from the alternatives.

Materials	Premium		Custom		Economy	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
<b>Lumber Grade (see Section 100)</b>						
Stiles, rails, mullions and applied mouldings	I well matched for grain and color between veneer & lumber	II	II compatible for color between veneer & lumber	II	II with no selection for grain or color	II
Flat panels	Not permitted in solid lumber		II Permitted for panels less than 350 mm [13-3/4"] across the grain		II Permitted for panels in any dimension	
Raised panels	I Used to rim panel product centers	II Used to rim panel product centers	II Used to rim panel product centers and permitted for panels less than 350 mm [13-3/4"] across the grain			
<b>Panel Products (see Section 200)</b>						
Core for veneered stiles, rails, and mullions	Particleboard or fiberboard (veneer core only by direct specification)		Particleboard or fiberboard (veneer core only by direct specification)	Particleboard or fiberboard recommended (veneer core permitted)	Not applicable	
Core for veneered flat and raised panels			Particleboard or fiberboard (veneer core only by direct specification)	Particleboard or fiberboard recommended (veneer core permitted)	Particleboard or fiberboard recommended (veneer core permitted)	Particleboard, fiberboard or veneer core
Face: Veneer Grade for transparent finish and material for opaque finish	"AA" well matched for grain and color between veneer & lumber	"B" veneer, plain fiberboard or medium density overlay	"A" compatible for color between veneer & lumber	"B" veneer, plain fiberboard or medium density overlay	"B" veneer	"B" veneer, plain fiberboard or medium density overlay
<b>Minimum Thickness</b>						
Veneered Stiles & Rails	19 mm [3/4"]		19 mm [3/4"]		12.7 mm [1/2"]	
Flat Panels	12.7 mm [1/2"]		12.7 mm [1/2"]		6.4 mm [1/4"]	
Raised Panels	19 mm [3/4"]		19 mm [3/4"]		12.7 mm [1/2"]	
NOTE: Some species may have natural and inherent grain irregularities, such as small burls or tight pin knots, gum spots in Cherry, cross bars in quarter sliced veneers and others. Traditionally, these natural markings add to the beauty and realism of fine woodworking. If their inclusion in the finished face may be objectionable, it is the responsibility of the design professional to make these objections clear early in the design process, and a visual review of the wood with the architect or designer, prior to fabrication, is suggested. Because the <i>tight</i> and <i>loose</i> faces often alternate in adjacent veneer leaves, they will reflect light and accept stain differently, and this may yield a noticeable color variation in some species or flitches.						

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500C-T-3

Workmanship

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives.

Workmanship	Premium		Custom		Economy	
Finish Condition	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Cut of Lumber	Plain sawn	Plain sawn	Plain sawn	Plain sawn	Plain sawn	Plain sawn
Cut of Veneer	Plain sliced	Mill option	Plain sliced	Mill option	Rotary	Mill option
<b>Matching Considerations</b>						
Stile & Rail Orientation	Top, cross, & bottom rails shall run between the end stiles. Mullions shall run between horizontal rails. Solid lumber shall be selected for compatibility of color and grain, member-to-member.		Top, cross, & bottom rails shall run between the end stiles. Mullions shall run between horizontal rails. Solid lumber shall be selected for compatibility of color, member-to-member.		No selection required for Economy Grade.	
Veneer match between adjacent leaves on a single panel face	Book match	Mill option	Book match	Mill option	Mill option	Mill option
Special Note on Matching: Book-Match-and-End-Match or Slip-Match-and-End-Match or Special Sketch Faces must be specified and detailed in the architectural drawings. Consult an member woodwork firm for design and spec. help.						
Veneer match within each panel face	Balance	Mill option	Running	Mill option	Mill option	Mill option
Veneer sequence between adjacent panels	Sequenced and numbered pre-manufactured set(s)	Mill option	Selected for compatibility of grain and color	Mill option	No selection for grain or color	Mill option
Veneered panel sequence within an area of the project	Sequenced and numbered sets (Blueprint match available. See also Section 200)	Mill option	Selected for compatibility of grain and color	Mill option	No selection for grain or color	Mill option
<b>Edge Treatments</b>						
Square Edge: Solid lumber or Veneered construction	All exposed edges veneered same species as face if not solid lumber	Mill option	All exposed edges veneered same species as face if not solid lumber	Mill option	All exposed edges veneered compatible species to face if not solid lumber	Mill option
Moulded Edge	Permitted only in solid lumber. Profile must be capable of being coped without a feather edge.					

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## Stile and Rail

### 500C-T-4

#### Machining and Joinery

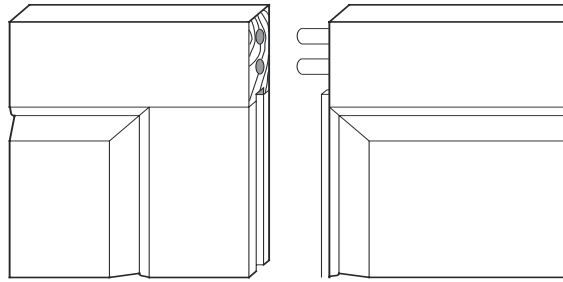
In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, woodworkers will supply their choice from the alternatives.

Machining	Premium	Custom	Economy
<b>Plant Machining Considerations</b>			
Panel Sizing	Plant sized except where field adjustments required	Plant sized except where field adjustments required	Plant sized except where field adjustments required
<b>Joinery and Assembly Considerations</b>			
NOTE: Plant prepared joints only furnished on panel systems to be installed with panel clips or hanging strips. Regardless of method of retention, panels must have freedom and room to expand and contract in reaction to ambient humidity changes. Due to the potential for expansion and contraction inherent in large panels, a minimum design gap of 2 mm [5/64"] per 1220 mm [48" nominal] of run at joints is recommended.			
Stiles, rails & mullions	Joined with mortise and tenon, dowel or spline joinery, glued under pressure.		
Solid lumber panels	Not permitted	Edge glued (up to 350 mm [13-3/4"]) and planed/sanded to thickness	Edge glued and planed/sanded to thickness
Raised panel rims	Mitered, splined or doweled to panel body and glued under pressure	Mitered, and glued to panel body under pressure	Glued to panel body under pressure
Panel continuity	All panels within view from one location must be Rim Raised or Solid but not mixed.		Mixed panel fabrication permitted
Panel product centers	Panel edge must be covered by veneer or concealed by moulding	Panel edge must be covered by veneer or concealed by moulding	No edge treatment required
Loose joints between sections	Plant assembled, if practical, utilizing mortise and tenon, dowel, or spline joinery & mechanical fasteners where possible.	Plant prepared, utilizing mortise and tenon, dowel, or spline joinery	Shipped without preparation
Outside Corners	Plant prepared and, if site conditions permit, glued and braced prior to shipping	Plant prepared and shipped loose for field fitting	Shipped without preparation
Inside Corners	Shipped oversize for field fitting	Shipped oversize for field fitting	Shipped oversize for field fitting
NOTES: Site applied mouldings are governed by Section 300 and Section 1700. The following applies to mouldings contained wholly within an individual panel or used as rim or panel retention members. Integral Applied Moulding: Acceptable with solid or veneered stiles and rails. Mouldings must be mitered. Mouldings must be fastened to stile or rail (not to panel to permit movement), utilizing not more than two positioning nails per 300 mm [12" nominal] of length before a joint or change of direction.			
Applied mouldings	Plant fastened; spot glued, fine finish nailed, set, filled and sanded	Plant fastened; spot glued, fine finish nailed	Shipped loosed for field fitting

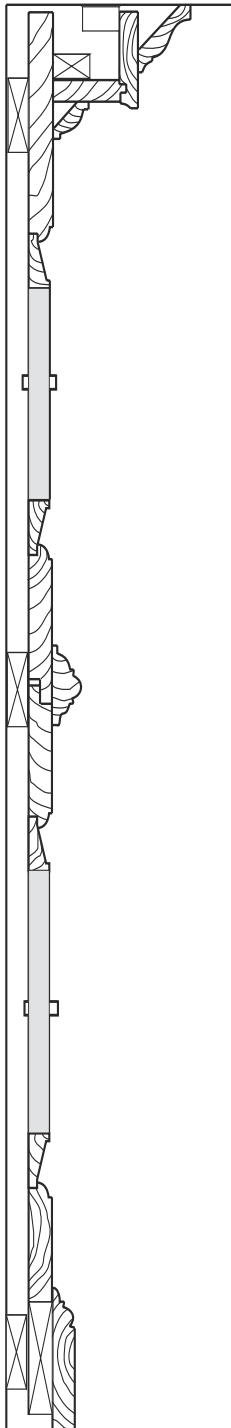
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Loose Joint fit in plant and sanded flush



Loose Joint - Figure 500-36



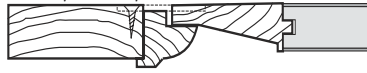
Veneered stile and rail with concealed stile and rail edges and panel rim



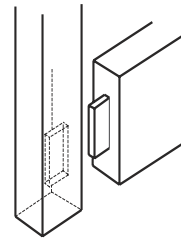
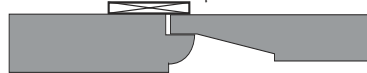
Solid lumber stile and rail with panel products and solid rims



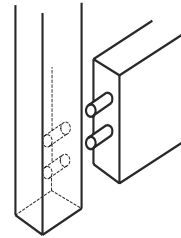
Solid stile and rail with lip moulding and panel product with solid rim



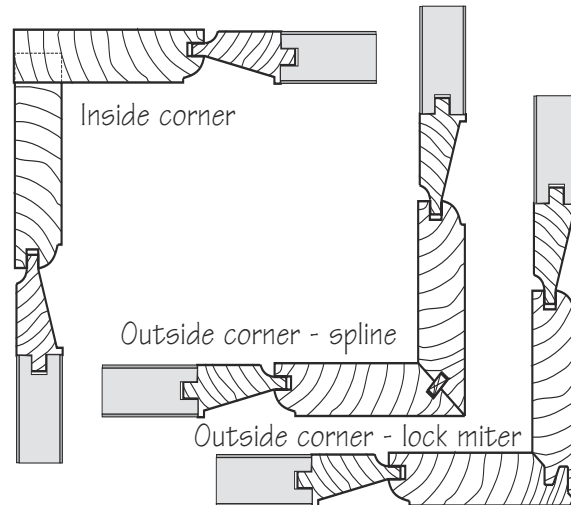
Medium density fiberboard (MDF) for stiles, rails and panels



Mortise and Tenon construction



Doweled construction



Stile and Rail Joinery - Figure 500-37

Stile and Rail

500C-T-5

Smoothness of Exposed Surfaces (Minimum Requirements)

In the absence of specifications, the following sanding standards will apply.

Smoothness Table	Premium		Custom		Economy	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Sharp edges (Arris)	Eased with fine abrasive		Eased with fine abrasive		Mill option	
Top flat surfaces	150 grit		120 grit		100 grit or 15 KCPI	
Moulded surfaces	120 grit		minimum 20 KCPI			
Shaped surfaces	120 grit		minimum 20 KCPI			
Turned surfaces	120 grit		100 grit			
Sanding cross scratches	None allowed	Not to exceed 6.4 mm [.25"]	None allowed	Not to exceed 6.4 mm [.25"]		

NOTE: No tearouts, knife nicks, or hit-or-miss finish allowed. No knife marks allowed where sanding is required. Surface variations as a result of multiple tool passes treated as turned surfaces above. Glue and filler, if used, must be inconspicuous and sanded as smoothly as the surrounding surface. Sanding before final stain and/or finish should be a consistent grit and scratch pattern, as it influences blend of color and sheen between components. Top Flat Surfaces are those which which can be sanded with a drum or wide belt sander. Turnings are customarily sanded on the lathe, and will exhibit cross scratches.

Before finishing, all exposed portions of architectural woodwork shall have handling marks or effects of exposure to humidity or moisture removed by a thorough uniform final sanding. The sanded surface shall then be cleaned and dust free, prior to proceeding with the first step in the finishing process. Veneer sand-through, with veneer sanded to the point where cross banding or core is visible, and/or core telegraphing (variation from a true plane in excess of 0.25 mm [0.010"] in any 76 mm [3"] span) is not allowed in any Grade.

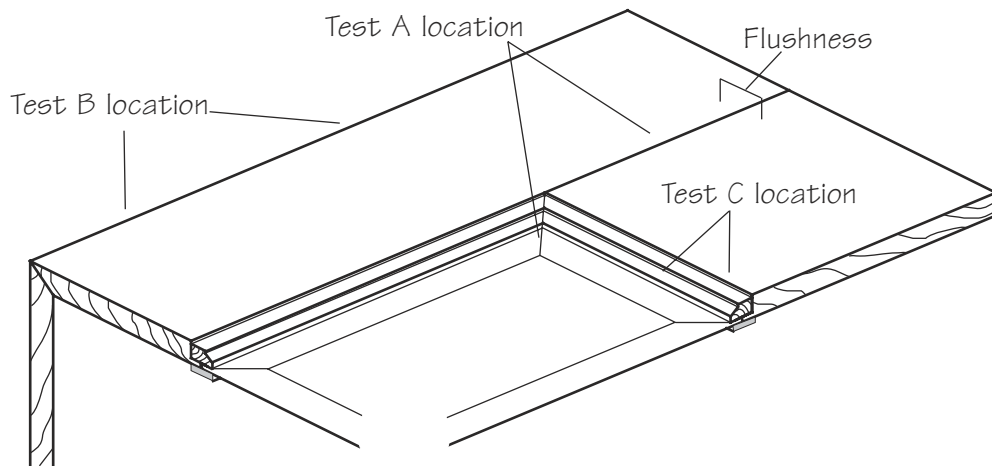
500C-T-6

Tightness of Plant Assembled Joints

Plant Assembled Joint Table	Premium		Custom		Economy	
	Interior	Exterior	Interior	Exterior	Interior	Exterior
Maximum gap: Test A	0.4 mm [.015"] wide by 20% of joint length	0.6 mm [.025"] wide by 30% of joint length	0.6 mm [.025"] wide by 20% of joint length	1.3 mm [.050"] wide by 30% of joint length	1.3 mm [.050"] wide by 20% of joint length	1.9 mm [.075"] wide by 30% of joint length
Maximum gap: Test B	0.4 mm [.015"] x 76 mm [3"], and no gap may occur within 1829 mm [72"] of a similar gap	0.6 mm [.025"] x 152 mm [6"], and no gap may occur within 762 mm [30"] of a similar gap	0.6 mm [.025"] x 152 mm [6"], and no gap may occur within 1524 mm [60"] of a similar gap	1.3 mm [.050"] x 203 mm [8"], and no gap may occur within 660 mm [26"] of a similar gap	1.3 mm [.050"] x 203 mm [8"], and no gap may occur within 1219 mm [48"] of a similar gap	1.9 mm [.075"] x 254 mm [10"], and no gap may occur within 610 mm [24"] of a similar gap
Maximum gap: Test C	0.4 mm [.015"]	0.6 mm [.025"]	0.6 mm [.025"]	1.3 mm [.050"]	1.3 mm [.050"]	1.9 mm [.075"]

Maximum gap between fixed components shall be tested at points designed to join; where members connect or touch.

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Test Locations - Figure 500-38

500C-T-7

Selection for Grain and Color

Plant Assemblies

For transparent finish, adjacent members ...

- Premium Grade: ... shall be well matched for grain and color.
- Custom Grade: ... shall be compatible for color.
- Economy Grade: ... shall not be selected.

Visible finger joints not permitted in Premium and Custom Grades. No selection for grain or color is required for Opaque finish in any Grade.

Field Assemblies

Selection of adjacent members for compatibility is the responsibility of the installation contractor.

Stile and Rail

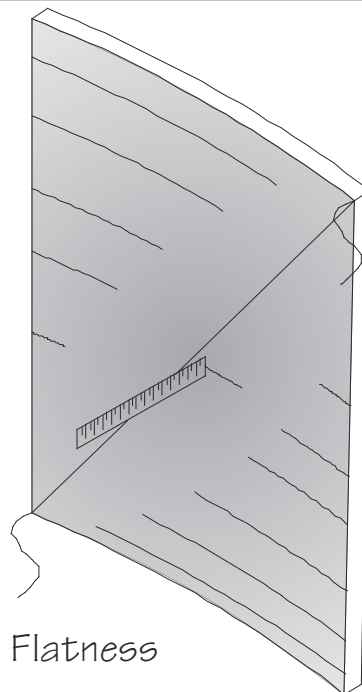


**Compliance Criteria**

**500C-C-1**

**Flatness of Cabinet Doors and Removable Panels (Maximum Deviation)**

Flatness Tolerances	Premium	Custom	Economy
Measured diagonally after installation is completed, per lineal foot (or portion thereof) of diagonal measurement, the following maximum deviation from flat:	.027" [.7 mm]	.036" [.9 mm]	.050" [1.3 mm]
EXAMPLE: When the diagonal measurement of the illustrated panel is 4', the maximum distance between the string and the face of the panel will be about 9/64" in Custom Grade—4 times .036" = .144" and 9/64" = about .141"			



Flatness

Flatness Test - Figure 500-39

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**500C-C-2**

**Tests for Smoothness of Exposed Surfaces**

KCPI (Knife Cuts Per Inch) 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.

SANDING can best be checked by sanding a sample piece of the same species with the required grit of abrasive. Observation with a hand lens of the prepared sample and the material in question will offer a comparison of the scratch marks of the abrasive grit. Reasonable assessment of the performance of the finished product will be weighed against absolute compliance with the standard.

**500C-C-3**

**Tightness and Flushness of Plant Assembled Joints**

Joint tightness and/or flushness will meet the standard when tested with a feeler gauge at the points indicated in the illustration. Joint length will be measured with a ruler with a minimum division of 1/16" and calculations made accordingly. Reasonable assessment of the performance of the finished product will be weighed against absolute compliance with the standard.

## 500C-C-4

### Tests for Manufacture of Premium and Custom Grade Blueprint Matched Panels, Components and Related Doors

For products specified under this section, these tests are to be considered as additional requirements to those covered above. These tests do not apply to flush doors specified under Section 1300 or specified using other standards.

A. PLUMBNESS OF VENEER JOINTS - No variance exceeding 5 mm [ $3/16$ " ] in 2440 mm [96" ].

B. TIGHTNESS OF VENEER JOINTS - No openings or voids of any kind.

C. GRAIN LOSS AND ALIGNMENT AT END MATCHED JOINTS - Grain loss shall not exceed 38 mm [ $1-1/2$ " ]. This is to be tested by separating end matched panels 38 mm [ $1-1/2$ " ] and visually testing grain void for continuity.

D. GRAIN LOSS AND ALIGNMENT AT SIDE MATCHED JOINTS - Grain loss shall not exceed 25.4 mm [1" ]. This is to be tested by separating side matched panels 25.4 mm [1" ] and visually testing grain void for continuity.

E. HEART FIGURE PROGRESSION - The full heart figure of plain sliced veneer shall develop in uniform and natural progression. Split or cut hearts are permitted provided they are used to maintain sequence or to achieve special effects.

F. SAPWOOD - Sap shall be considered a defect except in species and cuts selected for sap appearance.

G. VENEER PATCHES - If required to repair unanticipated voids, when finished they shall not be discernible when viewed from a distance of 4' in normal light of the viewing area.

H. MATCHING - All faces shall be balance matched. (Center balance matching must be specified.)

I. SHOP DRAWINGS - Detailed shop drawings shall be produced by the woodwork manufacturer showing each individual panel, the sequence between the panels, and the general layout of the elevation. Shop drawings shall include method(s) of attachment, and be of sufficient detail to illustrate compliance with this standard.

## 500-D

### Freedom of Expression

Custom-designed woodwork gives you complete freedom of expression.

- Design flexibility: The use of custom-designed woodwork in a building allows the design professional freedom of expression while meeting the functional needs of the client. A custom-designed building is enhanced by the use of custom-designed woodwork.

- Cost effective: Custom woodwork does compete favorably with mass-produced millwork, and offers practically limitless variations of design and material. Most woodwork lasts the life of the building – quality counts.

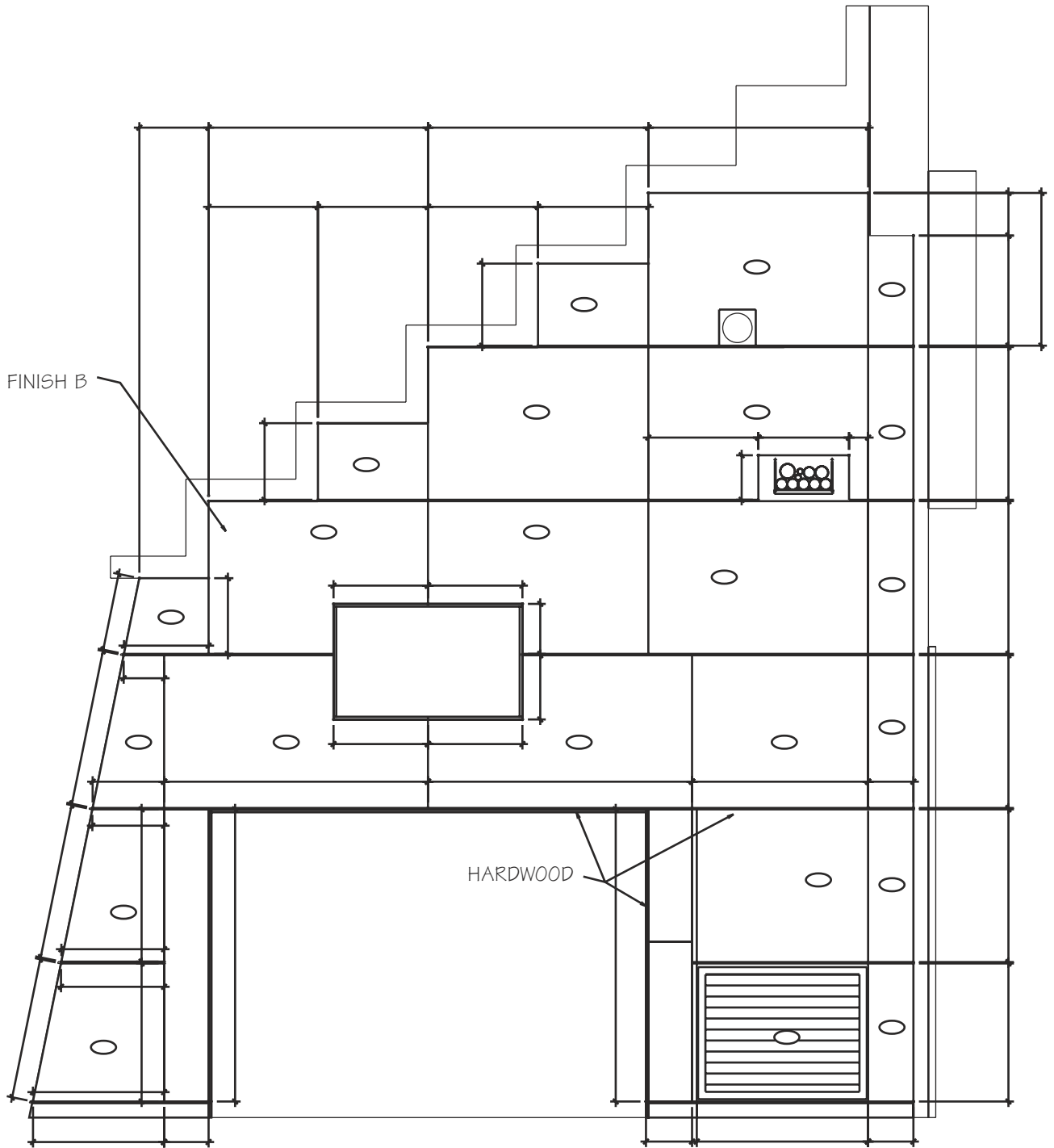
- Complete adaptability: By using custom woodwork, the architect or designer can readily conceal plumbing, electrical and other mechanical equipment without compromising the design criteria.

- No restrictions: Custom architectural woodwork permits complete freedom of selection of any of the numerous hardwoods and softwoods available for transparent or opaque finish. Other unique materials available from woodwork manufacturers require no further finishing at all, such as plastic laminates and decorative overlays. These materials can be fashioned into a wide variety of profiles, sizes, and configurations. The owner and design professional have the best of both worlds – high quality and freedom of choice.

- Dimensional flexibility: Since custom woodwork is normally produced by a specialty architectural woodwork firm, dimensions can easily be changed prior to actual fabrication, if required by job conditions. Special situations such as designing for the handicapped can readily be accommodated by the custom architectural woodwork manufacturer.

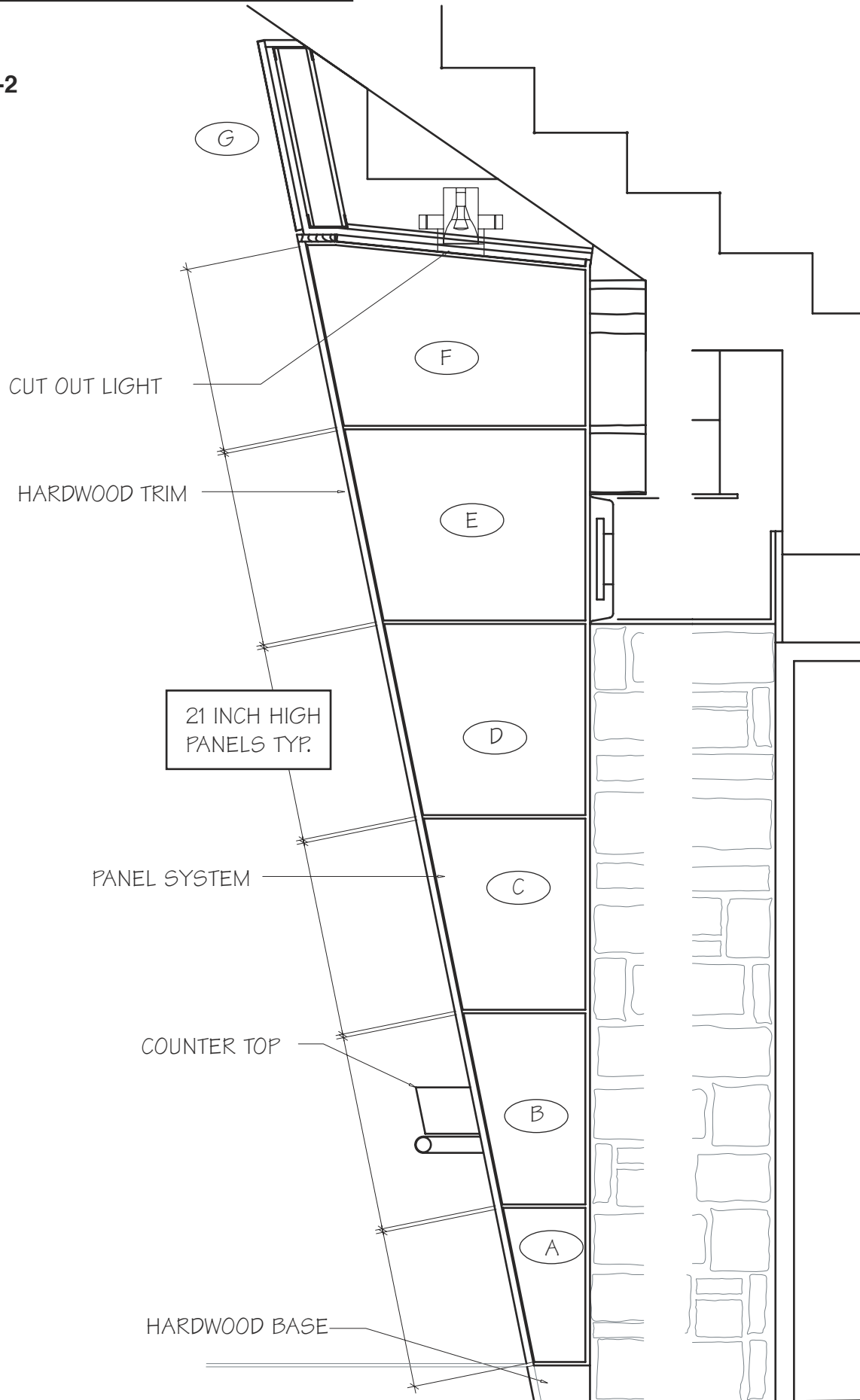
- Quality assurance: Adherence to the QSI and specifications will provide the design professional a quality product at a competitive price. Use of a qualified AWI/AWMAC member firm will help ensure the woodworker's understanding of the quality level required.

500-D-1



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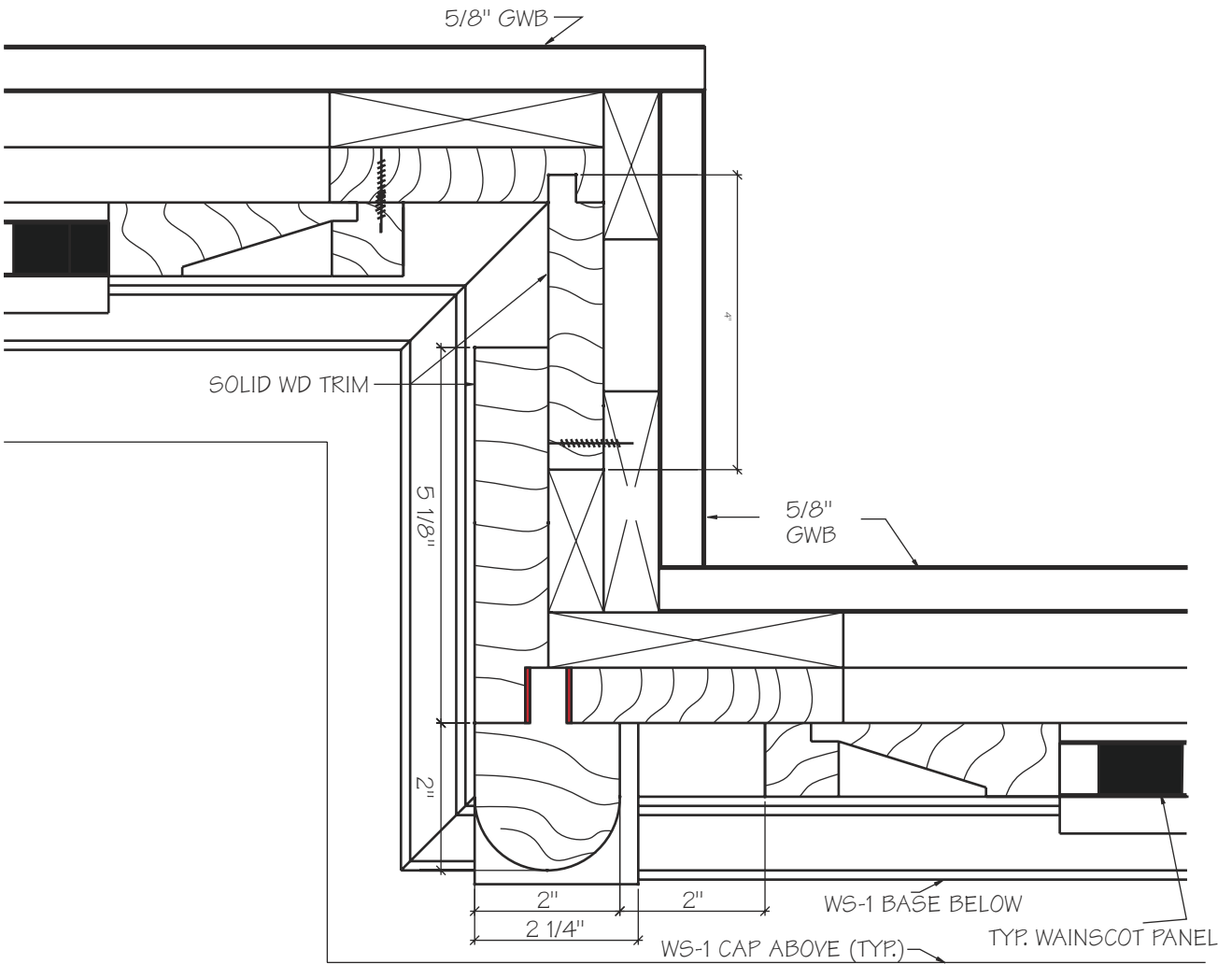
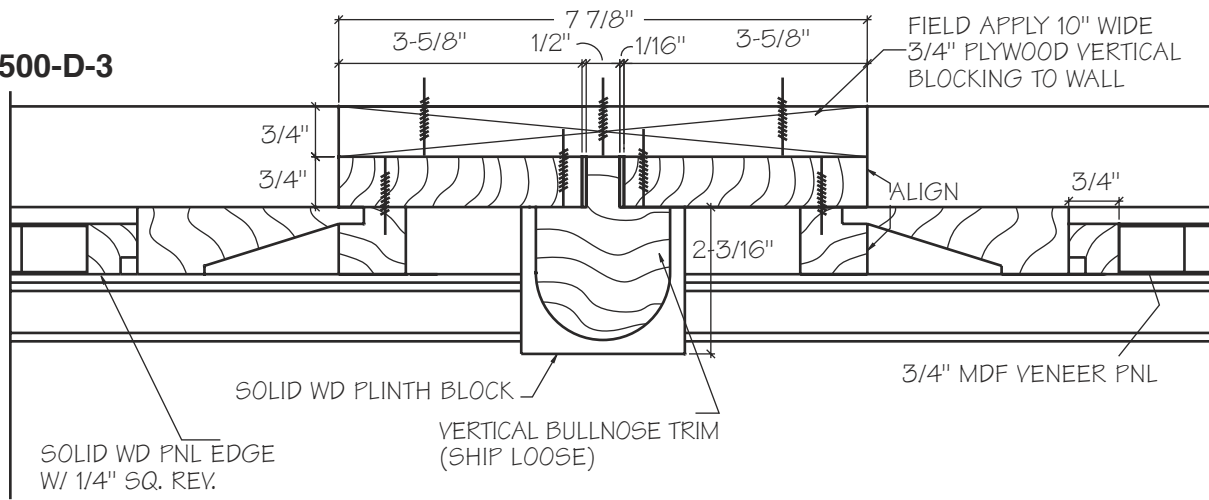
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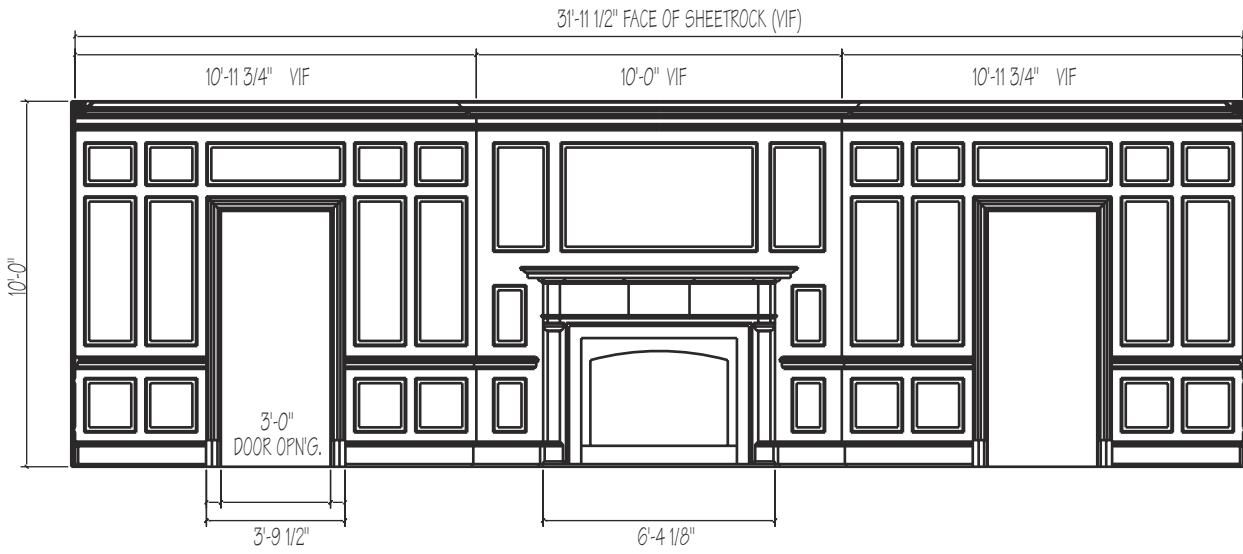
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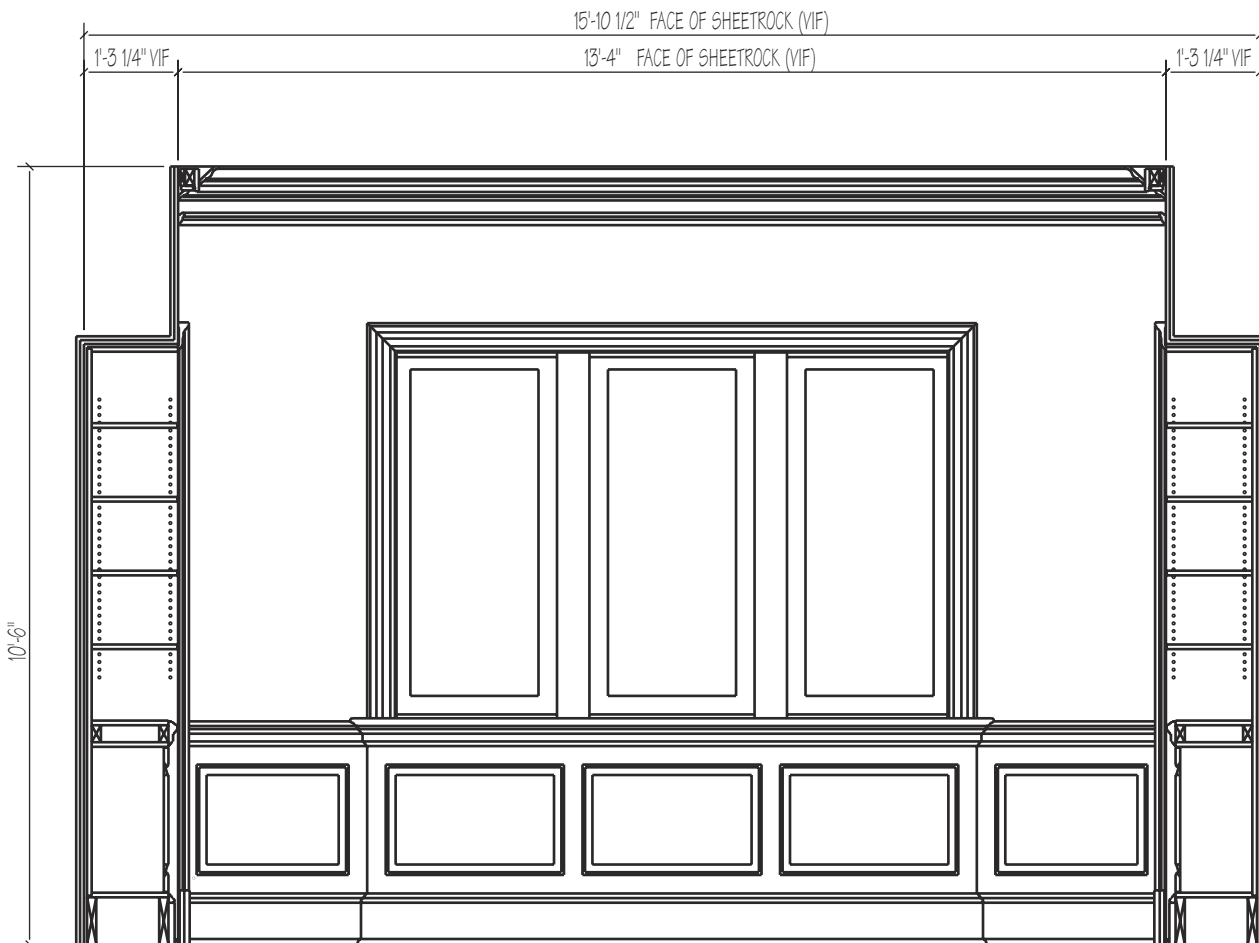
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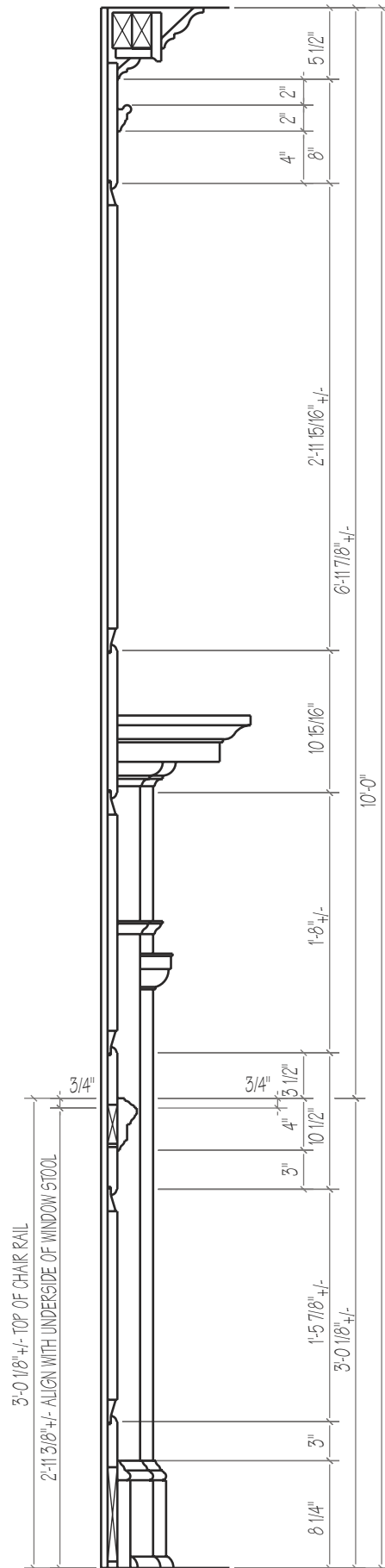
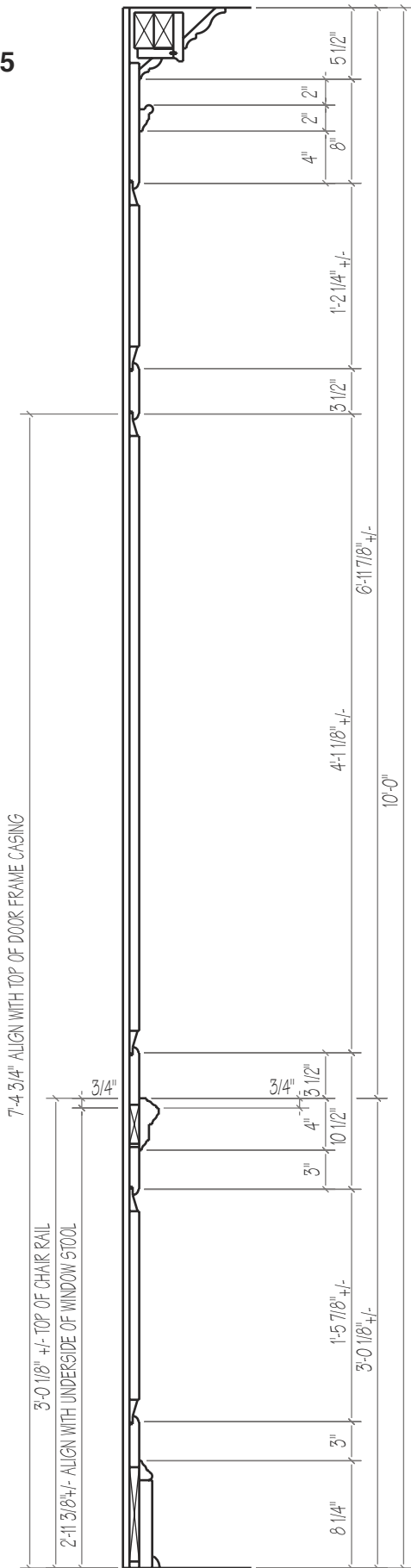
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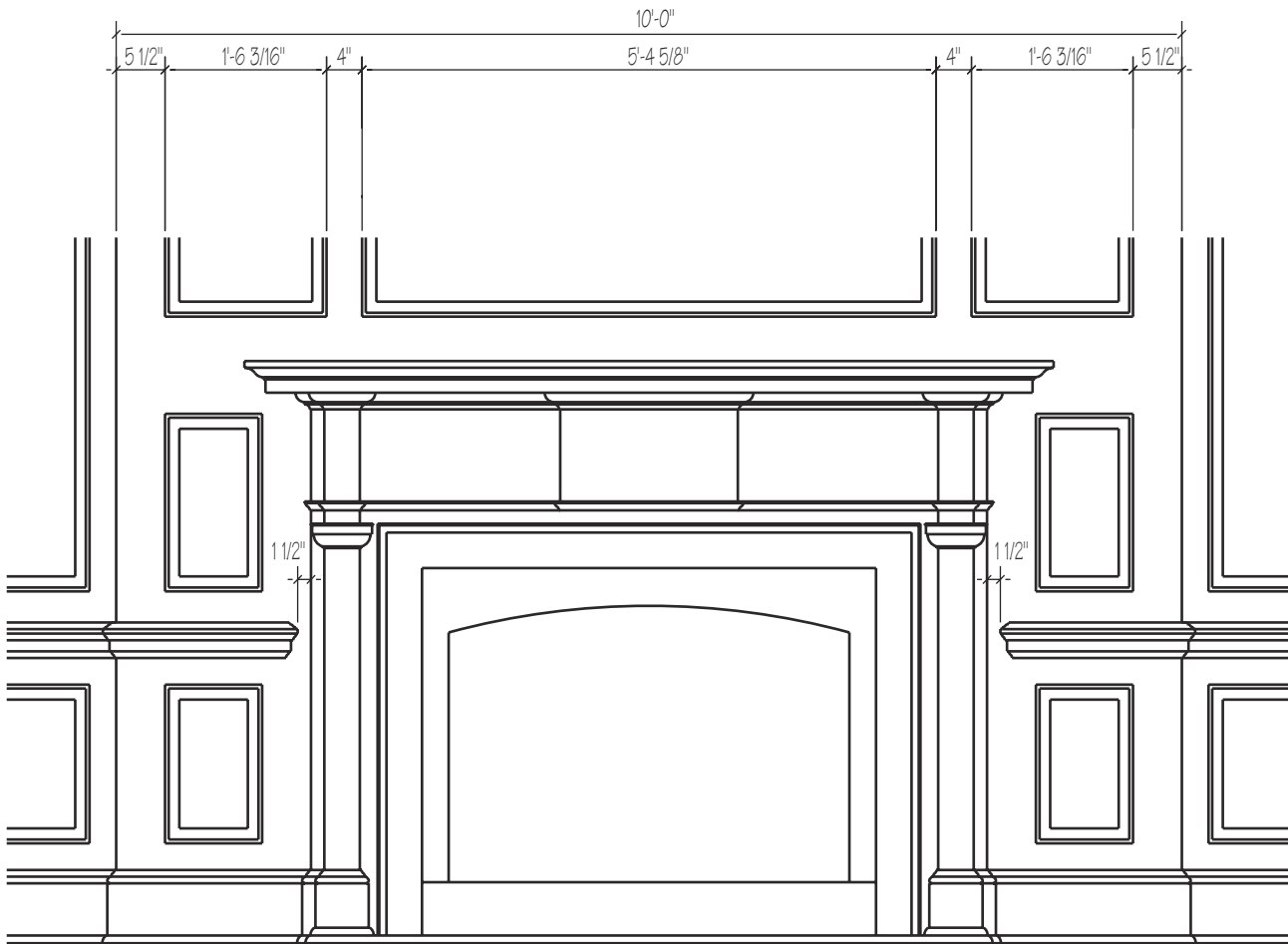
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500-D-5

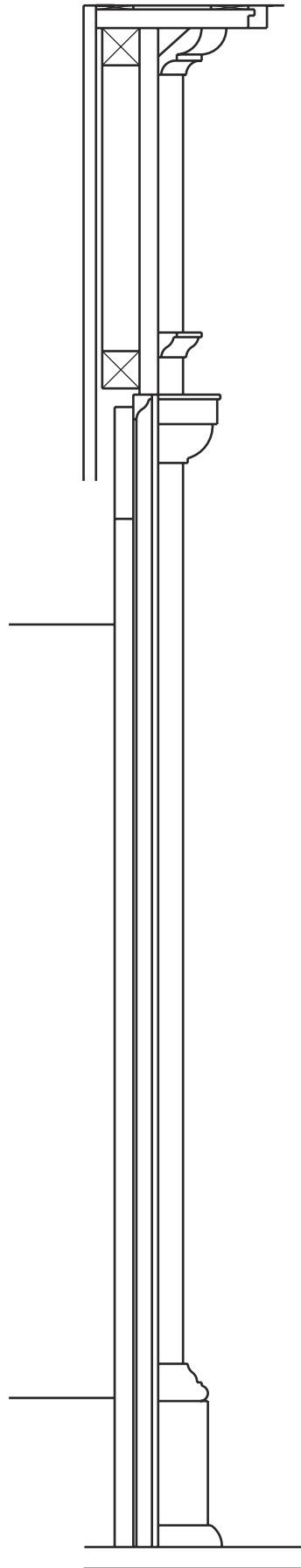


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500-D-7



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