ARCHITECTURAL CABINETS

SECTION 400

Section 400 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 æsthetic.

- 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. Cabinet style(s): [Flush overlay] [Reveal overlay] [Reveal overlay on face frame] [Flush inset] [Flush inset with face frame]; specify which elevations get which style.

E. Underside wall cabinet finish style commensurate with the cabinet style specified above: [Type A] [Type B] [Type C].

F. Cabinet shelf thickness and/or construction to accommodate exceptional client requirements such as long spans or anticipated heavy loading here.

G. Grain direction and matching criteria if other than AWI/AWMAC Standards here, otherwise accept the matching for the Grade of Work specified above.

H. Stile and rail door panel retention profile and/or hardware if other than AWI/AWMAC Standards.

I. Drawer body requirements here if other than AWI/AWMAC Standards.

J. Adjustable shelf techniques here if other than AWI/AWMAC Standards.

K. Wall cabinet hanging techniques here if other than AWI/AWMAC Standards.

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

400-G-1

Scope

Includes:

This section covers casework, cabinets, and fixtures, custom manufactured in units or modules to a design for a particular function or project. The terms *cabinet* and *casework* are used, often interchangeably, and refer to kitchen and bath cabinets, reception and registration desks, bank fixtures, courtroom fittings, store and museum display cabinets, etc. The three sections will deal with:

400A. Wood Cabinets (Transparent & Opaque Finish)

400B. Laminate Clad Cabinets

400C. Countertops

Excludes:

Modular Cabinets (Covered in Section 1600)

400-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 these 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.

Seismic Requirements Must be Specified - In the absence of specifications, cabinets will not be fabricated to meet any seismic code requirements prevalent in some areas of the world.

Note: Structural lumber (S-DRY) is generally not a suitable casework material. Rib materials, base frames and kicks, etc. should be made from kiln dried hardwoods or softwoods with a moisture content of 5 to 10%, or a suitable panel product.

400-G-3

Identification of Parts

A. **Exposed Parts** - Surfaces visible when:

1. Drawer fronts and doors are closed;
2. Cabinets and shelving are open-type or behind clear glass doors;
3. Bottoms of cabinets are seen 1219 mm [48"] or more above finished floor;
4. Tops of cabinets are seen below 1829 mm [72"] above finished floor, or are visible from an upper floor or staircase after installation;
5. Portions of cabinets are visible after fixed appliances are installed;
6. Front edges of cabinet body members are visible or seen through a gap of greater than 3.2 mm [1/8"] with doors and drawers closed (sim. Tests 400A-C-1 & 400B-C-1).

Note: for the purpose of factory finishing, both sides of cabinet doors shall be considered *Exposed*.

B. **Semi-Exposed Parts** - Surfaces visible when:

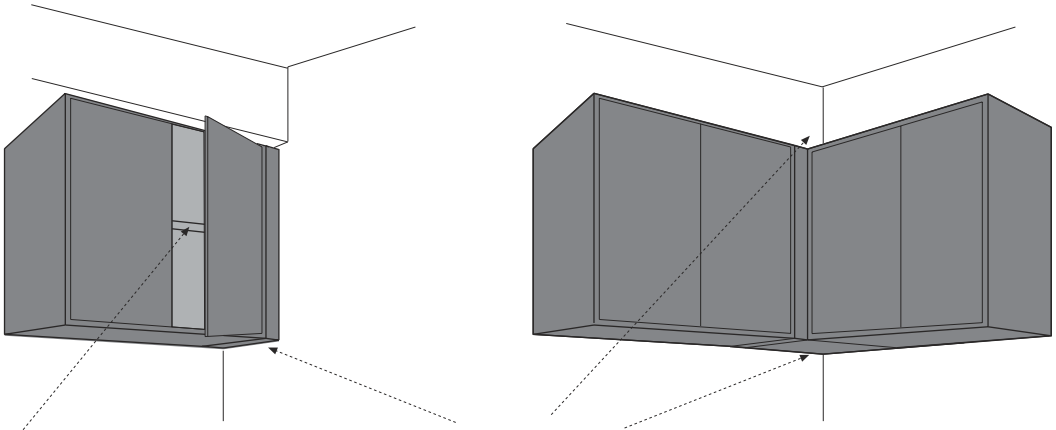
1. Drawers/doors are in the open position;
2. Bottoms of cabinets are between 762 mm [30"] and up to 1219 mm [48"] above finish floor;
3. All front edges of shelving behind doors.

C. **Concealed Surfaces** - Surfaces are concealed when:

1. Surfaces are not visible after installation;
2. Bottoms of cabinets are less than 762 mm [30"] above finish floor;
3. Tops of cabinets are 1829 mm [72"] or more above finished floor and are not visible from an upper level;
4. Stretchers, blocking and/or components are concealed by drawers.
5. corners are created by tall, wall, or base cabinets, and shall be non-accessible.

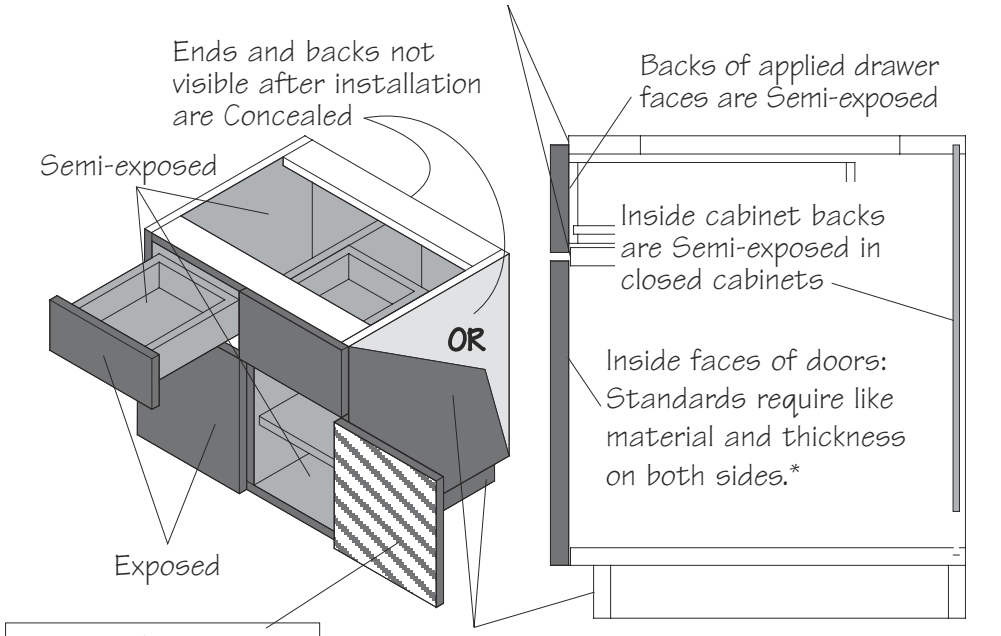
Caution

Special consideration should be given to raw wood parts on high-pressure decorative laminate-clad (HPDL) cabinets such as wood pulls, wood trims, applied mouldings, banded doors, drawer bodies and wood cabinet interiors. Specifications regarding the responsibility for finishing (if any) should be clarified by the design professional.



Top and bottom fillers and corner panels are required in Premium Grade, but optional for Custom Grade work.

Contrasting colors may occur (e.g. at door/drawer gaps) unless Exposed and Semi-Exposed finishes are carefully specified by the design professional.



* NOTE: Requirements for Grade "AA" or "A" interiors must be clearly specified by the owner or design professional. HPVA "B" Grade veneer of the same species and cut is permitted for use on the interior face of flush cabinet doors as a "balanced" construction, but both sides must be finished in the same manner, see Sec. 1500. For Custom Grade HPDL-clad doors, the selection of the "inside" color is at the option of the woodwork manufacturer in the absence of specifications.

Identification of Parts - Figure 400-01

400-G-4

Plant Assembly

All cabinets shall be plant assembled. Where design, delivery, or site conditions require, cabinets may be assembled in component units with provisions made for field connecting. Toe kicks and bases may be shipped loose depending on the engineering of the cabinet construction and/or site and installation conditions. Shop drawings shall indicate unitizing of cabinet construction so as to be subject for review by owners' representatives.

400-G-5

Work Included

- Woodworker shall furnish and install cabinet hardware.
- If not specified, hardware furnished shall be standard with the woodworker.
- If woodworker is to furnish other than woodworker's standard hardware, it must be itemized, and sources identified by the specifications.
- The woodworker shall install special hardware furnished by others, providing :
  1. The specifications require it.
  2. The hardware is delivered to the woodworker prior to starting assembly of the cabinets.

400-G-6

Work Not Included

Unless otherwise specified, the woodworker shall not provide:

- finishing or backpriming;
- for any electrical, telephone, mechanical or plumbing equipment;
- common blocking (within a wall or ceiling) for the support of cabinets;
- exposed bases other than decorative laminate or wood;
- or, dust panels.

Finishing Recommendation

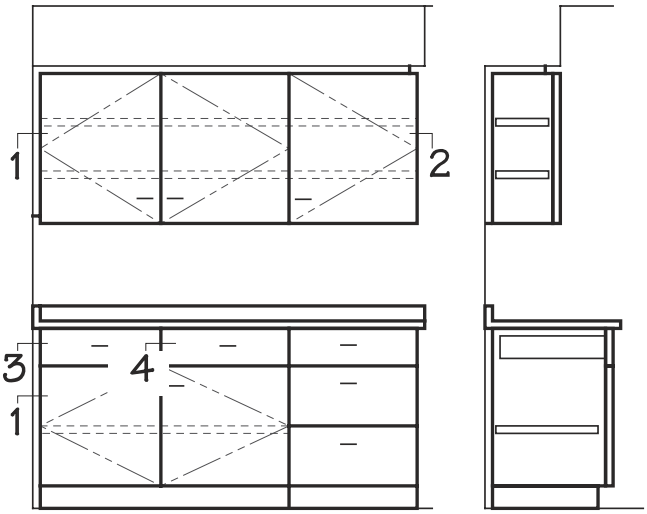
This section does not cover finishing. However, site conditions for finishing are rarely conducive to good results. Poor lighting, dust-laden air, and techniques available are limiting factors. Depending upon local practice, in many areas woodworkers will factory finish, yielding better results than can be achieved from field finishing. See Section 1500 for details.

Note: When incorporating lumber and veneer with HPDL cabinets shown in Section 400B, careful consideration must be given to the finishing requirements and responsibilities. Wood trims, wood drawers, wood pulls, etc. require finishing. The finishing responsibilities must be addressed. Specifications regarding the responsibility for finishing (if any) shall be clarified by the design professional.

400-G-7

Styles of Cabinets, Scribes, and Fillers

When type of cabinet is not specified or clearly shown, type will be woodworker's option.

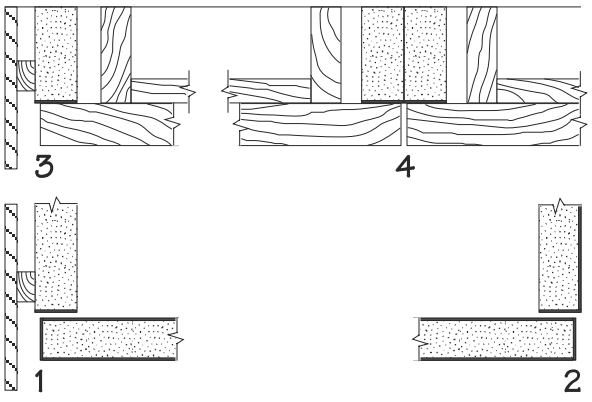


Key Elevation - Figure 400-02

A. Flush Overlay

Doors (1, 2) and drawer faces (3) cover (or nearly cover) the body members (4) of the cabinet, with spaces left between adjacent surfaces sufficient for operating clearance.

Flush overlay construction offers a very clean, contemporary look because only the doors and drawer fronts are visible in elevation. When specified, grain matching between doors and drawer fronts can be achieved by having all pieces cut from the same panel. This style is increasingly popular and lends itself well to the use of plastic laminate for exposed surfaces. Conventional as well as concealed hinges are available for a variety of door thicknesses.



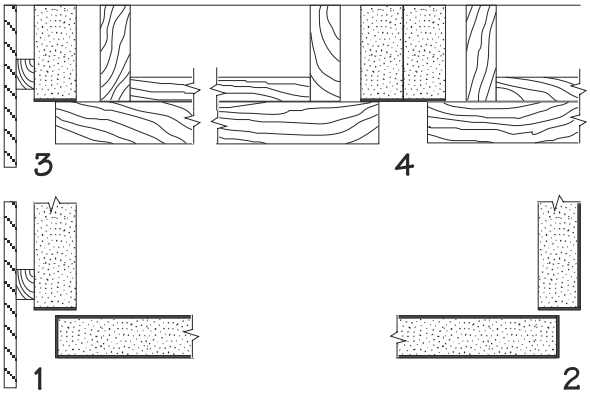
Plan Section - Flush Overlay - Figure 400-03

400-G-7 (continued)

B. Reveal Overlay

Doors (1, 2) and drawer faces (3) partially cover the body members or face frames (4) of the cabinet, with spaces between face surfaces sufficient for operating clearance.

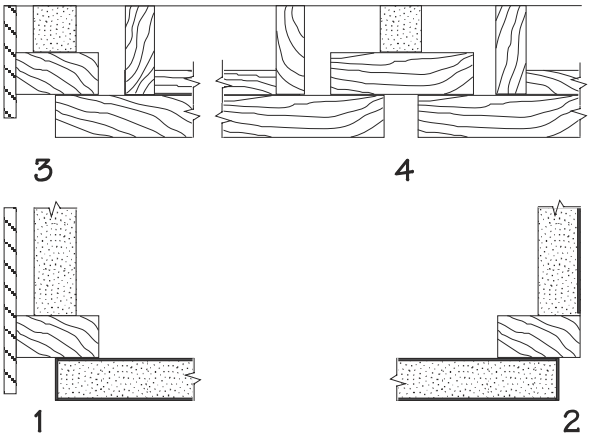
In this style, the separation between doors and drawer fronts is accented by the reveal. The style is equally suited to either wood or plastic laminate construction. Although the detail shown here incorporates a reveal at all horizontal and vertical joints, this can be varied by the designer. It should be noted that a reveal over 12.7 mm [1/2"] may, at the woodworker's option, require the addition of a face frame. The addition of a face frame will change the hinge requirements. With or without a face frame, this style allows the use of conventional or concealed hinges.



Plan Section - Reveal Overlay - Figure 400-04

C. Reveal Overlay on Face Frame

Doors (1, 2) and drawer faces (3) are set over face frames or face members (4) on the cabinet. Finished end and scribe details vary with the manufacturer and the QSI Grade specified for the project by the design professional.



Plan Section - Reveal Overlay (Frame) - Figure 400-05

D. Flush Inset

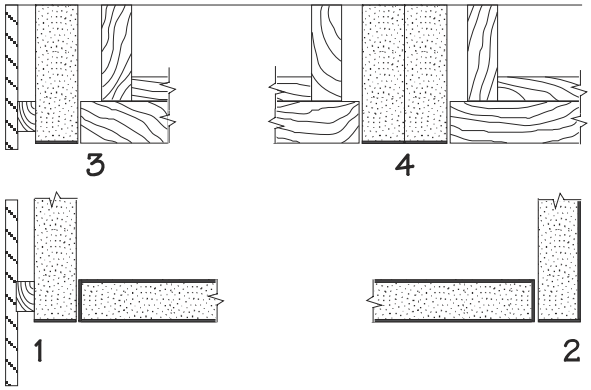
Doors (1, 2) and drawer faces (3) are inset within members (4) of the cabinet. Gaps between the case and the doors or drawers are often dictated by the operating clearances of the fittings.

With this style of construction, all door and drawer faces are flush with the face of the cabinet. This style is highly functional and allows the use of different thicknesses of door and drawer fronts.

Conventional as well as concealed hinges are available for a variety of door thicknesses. The choice of case and door/drawer material influence the choice of hinges. Conventional butt hinges should be avoided when hinge screws would be attached to the edge-grain of panel products.

This is generally an expensive style due to the increased care necessary in the fitting and aligning of the doors and drawers.

The design features of this casework style are the same as conventional flush with face frame except that the face frame has been eliminated. This style does not lend itself to the economical use of plastic laminate covering finishes.



Plan Section - Flush Inset - Figure 400-06

400-G-7 (continued)

E. Flush Inset with Face Frame

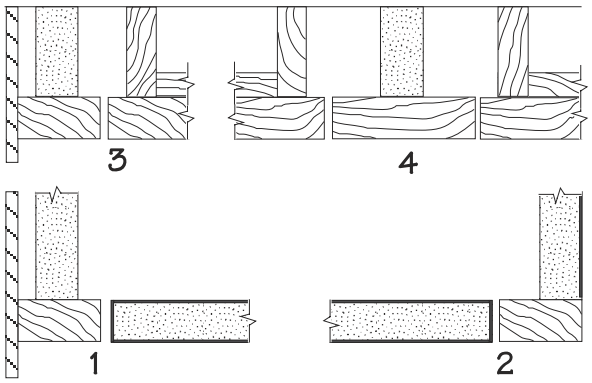
Doors (1, 2) and drawer faces (3) are inset next to face frames or face members (4) on the cabinet. Finished end and scribe details vary with the manufacturer and the QSI Grade specified for the project by the design professional. Gaps between the case and the doors or drawers are often dictated by the operating clearances of the fittings.

With this style of construction, all door and drawer faces are flush with the face of the cabinet. This style is highly functional and allows the use of different thicknesses of door and drawer fronts.

Conventional as well as concealed hinges are available for a variety of door thicknesses. The choice of case and door/drawer material influence the choice of hinges. Conventional butt hinges should be avoided when hinge screws would be attached to the edge-grain of panel products.

This is generally the most expensive of the four styles shown in this publication due to the increased care necessary in the fitting and aligning of the doors and drawers, in addition to the cost of providing the face frame.

This style does not lend itself to the economical use of plastic laminate covering.

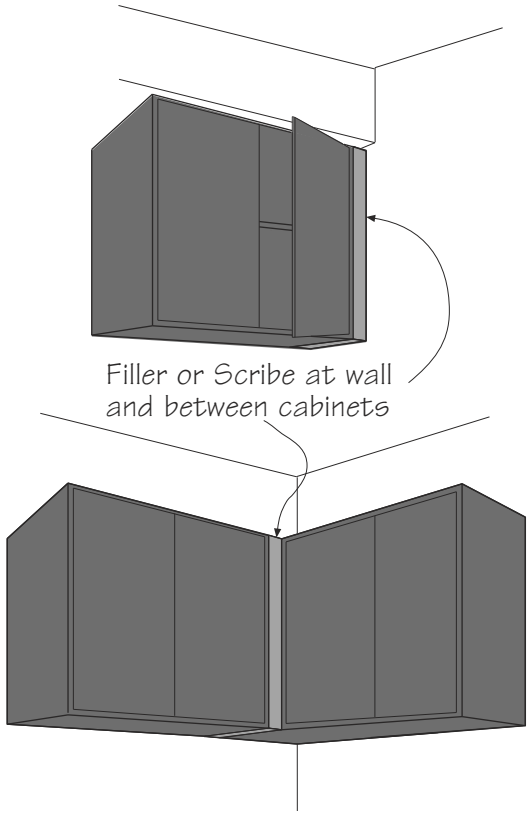


Plan Section - Flush Inset (Frame) - Figure 400-07

Scribes, and Fillers

Small extensions or elements added to the bottoms, sides, or tops of cabinets where they meet the walls or other cabinets are permitted in all cabinet styles as follows:

- Minimum dimension exposed - 19 mm [3/4"] all grades
- Maximum dimension exposed, Premium Grade - 38 mm [1-1/2"]. except when 38 mm [3"] is needed at a 90° corner to clear hardware.
- Maximum dimension exposed, Custom and Economy Grades - 76 mm [3"]

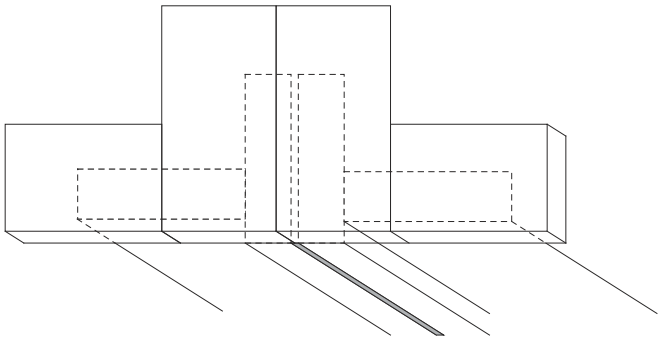


Fillers - Figure 400-08

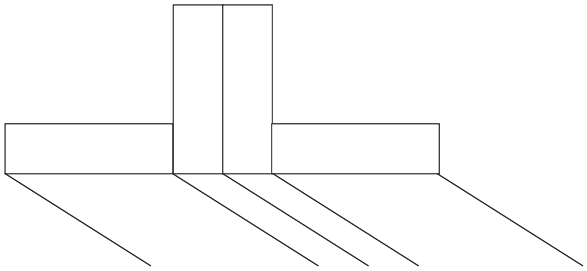
400-G-7 (continued)

NOTE: The selection of joinery for the underside of typical wall cabinets is the option of the manufacturer in the absence of specifications. Design professionals shall consult with manufacturers early in the design process for suggestions and solutions. When a particular style is required it shall be specified.

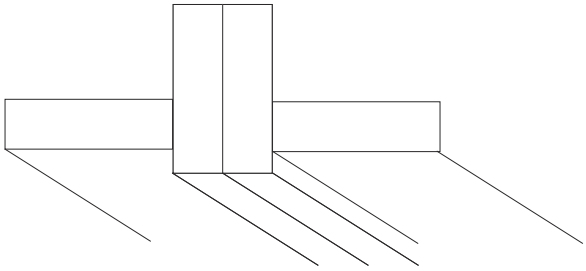
NOTE: Traditional face frame cabinets will often be built so the frame extends beyond the vertical edge of the case body. This allows the cabinets to be fastened to each other through the edges of the frames. The resulting joint is very tight and smooth. A small gap between cases, 6 mm [1/4"] or less, is visible on the underside, and is acceptable for this style cabinet.



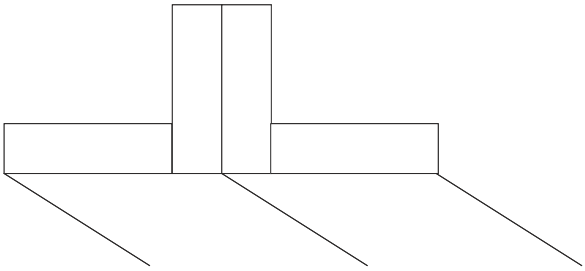
Underside of wall cabinets:
Traditional face frame type



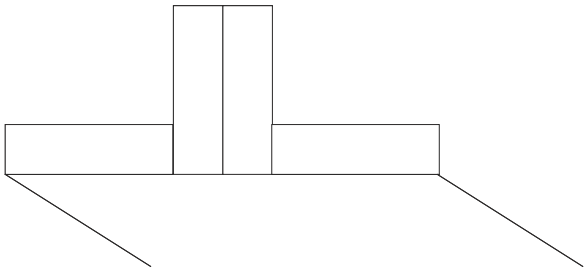
Underside of wall cabinets: Type "A" flush
Each element clad/finished individually



Underside of wall cabinets: Type "A" reveal
Each element clad/finished individually



Underside of wall cabinets: Type "B" flush
Each cabinet clad/finished individually



Underside of wall cabinets: Type "C" flush
Underside clad/finished after assembly

Wall Cabinet Bottom Finish Conditions - Figure 400-09

400-G-8

Minimum Nominal Thickness and Material for Cabinet Components (other than doors)

These general minimums apply to all 400A and 400B cabinet standards. In the absence of specifications, or specific criteria in these standards, 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.

Cabinet Components	Materials	Minimum Nominal Thickness
Body Members - (ends [gables], divisions, fixed shelves, bottoms, tops)	Panel product	19 mm [3/4"]
Face Frames, Rails, Toe Kicks, Cab. Bases	Lumber or Panel product	19 mm [3/4"]
Adjustable Shelves - Consult your woodwork manufacturer during the design phase for engineering suggestions to minimize deflection of heavily loaded shelves or long spans. No shelf in conventional base or wall cabinets at these dimensions shall be expected to carry over 23 kg [50 lbs.] per square foot total distributed load.	Lumber	19 mm [3/4"] for spans up to 914 mm [36"] 27 mm [1-1/16"] for spans up to 1219 mm [48"]
	Veneer Core Plywood	19 mm [3/4"] for spans up to 914 mm [36"] 27 mm [1-1/16"] for spans up to 1219 mm [48"]
	Medium Density Particleboard or Medium Density Fiberboard	19 mm [3/4"] for spans up to 813 mm [32] 25.4 mm [1"] for spans up to 1067 mm [42"]
Backs	Panel Product	6.4 mm [1/4"]
Mounting or hanger strips	Lumber or Panel Product	12.7 mm [1/2"]
Drawer sides, backs, and subfronts	Lumber or Panel Product	12.7 mm [1/2"]
Drawer bottoms	Panel Product	6.4 mm [1/4"]
Drawer fronts	Lumber or Panel Product	19 mm [3/4"]
Stile and rail cabinet door and drawer thickness - 19 mm [3/4"] minimum nominal thickness. Special consideration should be given to building very wide and/or very tall doors of this thickness. Consult your manufacturer for guidelines."		
Glass doors - Frames: 19 mm [3/4"] minimum nominal thickness, glass to meet local code. Frameless glass: 6.4 mm [1/4"] nominal thickness.		
Flush cabinet door limits - 19 mm [3/4"] medium density particleboard or medium density fiberboard core up to 762 mm [30"] width by 2032 mm [80"] height, with like materials and thicknesses both faces. Veneer core doors will not be guaranteed against warping, telegraphing, or delamination. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers shall work together to develop sound solutions.		

Shelf Deflection Information

The Department of Wood Science in the Division of Forestry at West Virginia University conducted a study for the Architectural Woodwork Institute regarding the deflection of wood shelving materials under various amount of stress. The following table represents their findings with the various products tested.

The table shows total uniformly distributed load requirements necessary to cause deflection of 1/4 inch in shelves 8 and 12 inches wide with spans (i.e. unfixed, supported at each end) of 30, 36, 42, and 48 inches. Load required to deflect shelves more or less than 1/4 inch may be estimated by direct proportion.

For example, the uniformly distributed load required to cause a deflection of 1/8 inch is one-half that of the value in the table. For width different than 8 or 12 inches (the values used in the table), load required to cause a 1/4 inch deflection may also be determined by direct proportion. A 6 inch wide shelf, for example, will deflect twice as much as a 12 inch wide shelf under the same load.

The following equation shows how deflection is related to shelf dimensions, width, thickness, span, load per inch of span and E-value, a material property which measures stiffness or resistance to deflection. The higher the E-value the less the deflection. When a shelf is made with several materials, each with its own E-value, a composite E-value must be determined. The study was developed in the inch-pound method and is not converted to metric for this example.

To compute deflection:

$$D = \frac{0.1563wl^4}{Ebh^3}$$

In which the values are:

D = deflection (in inches)

w = load per lineal inch of span

l = span (length)

E = modulus of elasticity

b = base (width)

h = depth (thickness)

Shelf Deflection of 1/4" by Estimated Total Distributed Load in Pounds

Material	Thickness		Span	30"		36"		42"		48"	
			Width	8"	12"	8"	12"	8"	12"	8"	12"
Yellow-Poplar Red Gum Sweet Gum	lumber	3/4" 1-1/16"		322 lbs. 912	483 lbs. 1368	189 lbs. 528	284 lbs. 790	117 lbs. 332	175 lbs. 498	78 lbs. 221	117 lbs. 332
Hard Maple Pecan Red Oak	lumber	3/4" 1-1/16"		356 lbs. 1021	534 lbs. 1536	209 lbs. 592	313 lbs. 888	133 lbs. 373	206 lbs. 560	88 lbs. 249	133 lbs. 374
Birch Hickory	lumber	3/4" 1-1/16"		400 1134	600 1701	232 660	348 990	146 414	219 621	98 277	146 415
Medium density particleboard (raw or covered with " melamine")		3/4" 1"		78 185	117 277	46 109	69 164	29 69	43 102	19 45	28 66
Medium density fiberboard (raw or covered with " melamine")		3/4" 1"		100 237	150 356	58 137	87 206	36 85	54 128	25 59	38 90
Birch faced plywood, veneer core		3/4"		145	218	86	129	54	81	36	54
Birch faced plywood, medium density particleboard core		3/4"		125	188	72	109	46	68	31	46
Medium density particleboard covered two sides and one edge with nominal 0.028" high pressure decorative laminate		3/4" (core)		174	261	100	139	64	96	42	63
Medium density particleboard covered two sides and one edge with nominal 0.050" high pressure decorative laminate		3/4" (core)		234	350	137	205	86	129	58	87
Medium density particleboard with 1/8" solid lumber edge		3/4"		89	139	53	79	33	50	22	33
Medium density particleboard with 3/4" solid lumber edge		3/4"		100	150	60	90	42	63	25	38
Medium density particleboard with 3/4" x 1-1/2" solid lumber dropped edge		3/4"		384	435	216	241	132	152	92	107
NOTE: All medium density particle board is ANSI 208.1-1998 Type M-2. The information and ratings stated here pertain to material currently offered and represent results of tests believed to be reliable. However, due to variations in handling and in methods not known or under our control, neither the AWI nor the AWMAC can make any warranties or guarantees as to end results.											

400-G-9

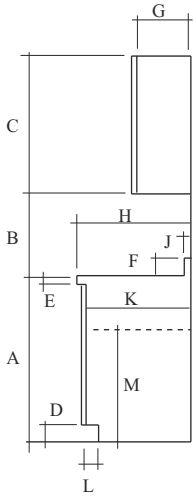
Casework Standard Dimensions

The casework dimensions given here represent long-established standard dimensions of the casework industry. They are intended for use as guidelines only. The design professional shall specify interior minimum or maximum dimensions if these are critical for the use intended. Because "architectural casework" is by definition custom designed and manufactured, any and all of the dimensions given here can be changed to suit special design considerations. (Dimensions are in inches.)

Good design involves the proper specification of materials, their thickness, and support to meet load requirements, not to exceed 90 kg [± 200 lbs.] on any one shelf in any case. Realistic industry standards rarely exceed 23 kg [± 50 lbs.] per square foot.

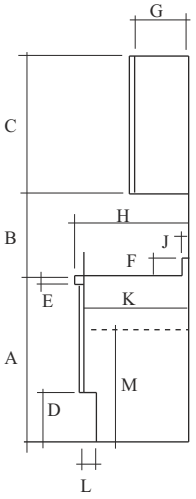
The ADA guidelines are just that, *guidelines*, and do not constitute legal advice. For complete information, design professionals shall consult a reprint of the U.S. Department of Justice *28 Code of Federal Regulations Part 36, Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities,* latest edition, and specify accordingly. Guidelines may vary for work in Canada. Consult the *National Building Code of Canada,* latest edition, for complete information.

Standard Cabinets



A. Standup - 36
Sit Down - 30
Vanity - 31
Sewing, Typing - 26
B. 18
C. 18 to 36 typical range
D. 4
E. 1-1/2 or 1-1/4
F. 4
G. 12
H. 24; Vanity 22-1/2
J. 3/4 to 1-1/2 typical range
K. 21 to 22-1/2 typical range
L. 3 to 4
M. 24-1/2 (knee space)

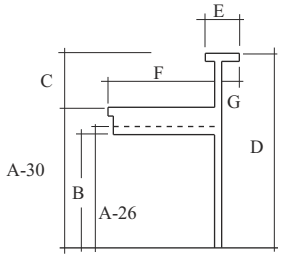
ADA Compliant Guidelines
See Appendix and 28 CFR Part 36



A. Side reach - 34
Vanity - 34 sink rim
B. (not regulated)
C. 44 to 54 reach limits
see 28 CFR/36
D. (not regulated)
E. (not regulated)
F. (not regulated)
G. (not regulated)
H. 24; Vanity 22-1/2
J. 3/4 to 1-1/2 typical range
K. 21 to 22-1/2 typical range
L. (not regulated)
M. 27 (knee clearance)

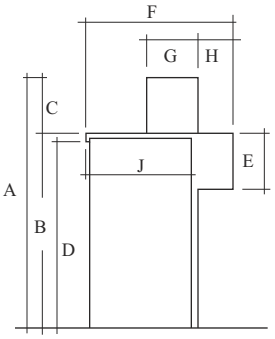
Figure 400-10

A. 30 Sit down; 26 Typing
B. 24-1/2
C. 12
D. 42 - ADA 34 cutaway
E. 8
F. 24
G. 4

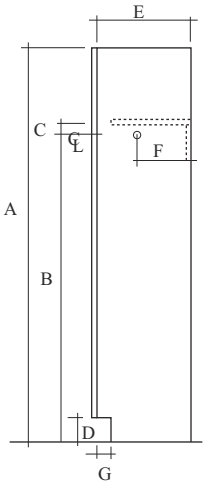


Reception counter

A. 50 to 54
B. 40 to 42
C. 12
D. 38-1/2 to 40-1/2
E. Optional
F. 32 to 24
G. 12
H. 8
J. 24



Teller counter



A. 84
B. 66
C. 1-7/8
D. 4
E. 12 to 24
F. 11
(Requires 24 depth)
G. 3

Door thickness
1-3/8 to 1-3/4
recommended:
hollow core
or solid core

Tall cabinets

Figure 400-11

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Technical Criteria

400A-T-1 Flush Wood Exposed and Semi-exposed Materials

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.. A check indicates permitted for the Grade specified.

Materials for Transparent Finish	Premium	Custom	Economy
Exposed Panel Products (Transparent Finish) [Face veneer standards are defined in Section 200]			
"AA" Face Veneer (core: particleboard if not specified)	√	√	√
"A" Face Veneer (core: particleboard if not specified)		√	√
"B" Face Veneer (core: particleboard if not specified)			√
Blending of Panel Products across multiple cabinet faces in one elevation			
Fabricated from sequenced and numbered panel sets, well matched for grain, figure, and color. Specify for center matched or balanced matched components. See NOTE below.	√	√	√
Warehouse stock panels, compatible for color		√	√
No match required, not selected for grain or color			√
Direction and matching of exposed wood grain on vertical surfaces of individual cabinets			
Continuous vertical figure (length of material permitting) and selection for pleasing blend of figure and color per elevation	√	√	√
Continuous vertical figure across doors of individual cabinet (length of material permitting); drawer fronts may be horizontal or vertical figure without sequence (not required from cabinet to cabinet)		√	√
No Match Required			√
NOTE: Sequence matching on one item or a suite of items, and/or balance or center match on each panel is available and must be specified if required in any grade. For Premium Grade wood cabinets, continuous run areas (elevations) must be identified by drawings and specifications, including the veneer matching method required. In the absence of such information, premanufactured panel sets will be utilized. See Section 200 for data on matching.			
Exposed Solid Lumber Parts (Transparent Finish) [Lumber standards are defined in Section 100]			
Grade I (well matched for color and grain) Same species as adjacent face veneer on panel product unless otherwise specified	√	√	√
Grade II (compatible for color) Same species as adjacent face veneer on panel product unless otherwise specified		√	√
Grade III (no selection required)			√
Semi-exposed Parts (Transparent Finish) [not including drawer bodies and backs of flush doors]			
B Face Veneer (compatible species to exposed, cut or slicing at option of the manufacturer)	√	√	√
Thermoset Decorative Overlay, solid color ("melamine")		√	√
Grade II solid lumber (compatible species to exposed, cut or sawing at option of the manufacturer)	√	√	√
Mill option panel product and/or veneer and/or solid lumber			√
Concealed Parts (Transparent Finish)			
Kiln dried lumber, SCL, panel products - 5-10% M.C.: Mill Option	√	√	√
Flush Cabinet Door Limits - 19mm [3/4"] medium density particleboard or medium density fiberboard core up to 762mm [30"] width by 2032mm [80"] height, with like materials and thicknesses both faces. Veneer core doors will not be guaranteed against warping, telegraphing, or delamination. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers shall work together to develop sound solutions.			

Wood Cabinets

400A-T-1

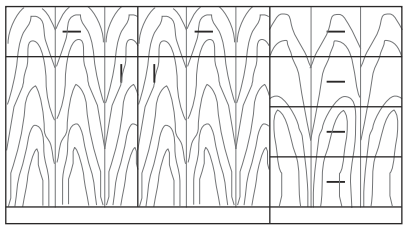
Flush Wood Exposed and Semi-exposed Materials (continued)

Materials for Opaque Finish	Premium	Custom	Economy
Exposed Panel Products (Opaque Finish)			
Medium density fiberboard or medium density overlay	√	√	
Mill option			√
Exposed Solid Lumber Parts (Opaque Finish)			
Close grained hardwood	√	√	
Mill option			√
Semi-exposed or Concealed Parts (Opaque Finish)			
Mill option	√	√	√
Flush Cabinet Door & Drawer Front Thickness - 19 mm [3/4"] up to 762 mm [30"] width by 2032 mm [80"] height using either medium density particleboard or medium density fiberboard core with like materials and thicknesses on both faces. Beginning with the 7th edition, veneer core plywood doors were not allowed in Premium Grade and are not generally guaranteed against warping, telegraphing, or delamination in any Grade. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers should work together to develop sound solutions.			

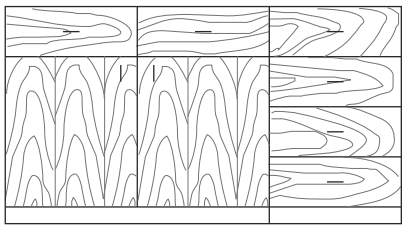
Note: Structural Lumber (S-DRY) is not a suitable casework material. Rib materials, base frames and kicks, etc. shall be made from kiln-dried hardwoods or softwoods with a moisture content of 5 to 10%, or a suitable panel product.

Veneer core plywood has been used in the past. Its use today and in the future will become much less prevalent. The use of veneer core plywood is only recommended in circumstances where the structural strength and moisture resistance of the plywood outweighs the negative characteristics of warping, telegraphing, and inconsistent thickness. The use of veneer core is not recommended for use on doors and/or drawer fronts and will not be guaranteed.

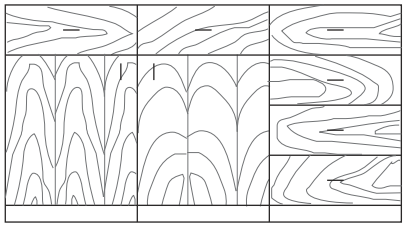
Grain direction (the appearance of the figure) shall run vertically for all doors in every Grade, and shall run vertically or horizontally on drawer fronts in Custom and Economy, with the same direction maintained on any one cabinet or elevation of cabinets. Premium and Custom doors shall be set matched.



Premium Grade
Doors & Drawer fronts
from sequenced panel sets, well
matched for grain, figure & color



Custom Grade
Drawer fronts no
match required. May be
solid or panel product.



Economy Grade

It is unusual to carry the figure of the cabinet fronts on to the toe kicks. If that is to be part of the design æsthetic, it shall be clearly specified by the design team.

Direction and matching - Figure 400-12

400A-T-2

Edge Treatment of Exposed and Semi-exposed Panel Products

In the absence of specifications, the following Standards will apply. Where more than one method or material is listed for a Grade, manufacturers will supply their choice from the alternatives. There are no requirements for concealed surfaces.

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. Body members or shelves in semi-exposed conditions shall have an edgeband that matches the body member or shelf. Back edges and ends of adjustable shelves within cases are not considered to be visible. Edges may be banded before or after (industry standard) 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 PVC or self-edged cabinet parts. Special design considerations may require special solutions by the woodworker. Thickness dimension tolerance is ± 0.05 mm [0.002"]. Close Grain is defined in the Glossary in the Appendix.

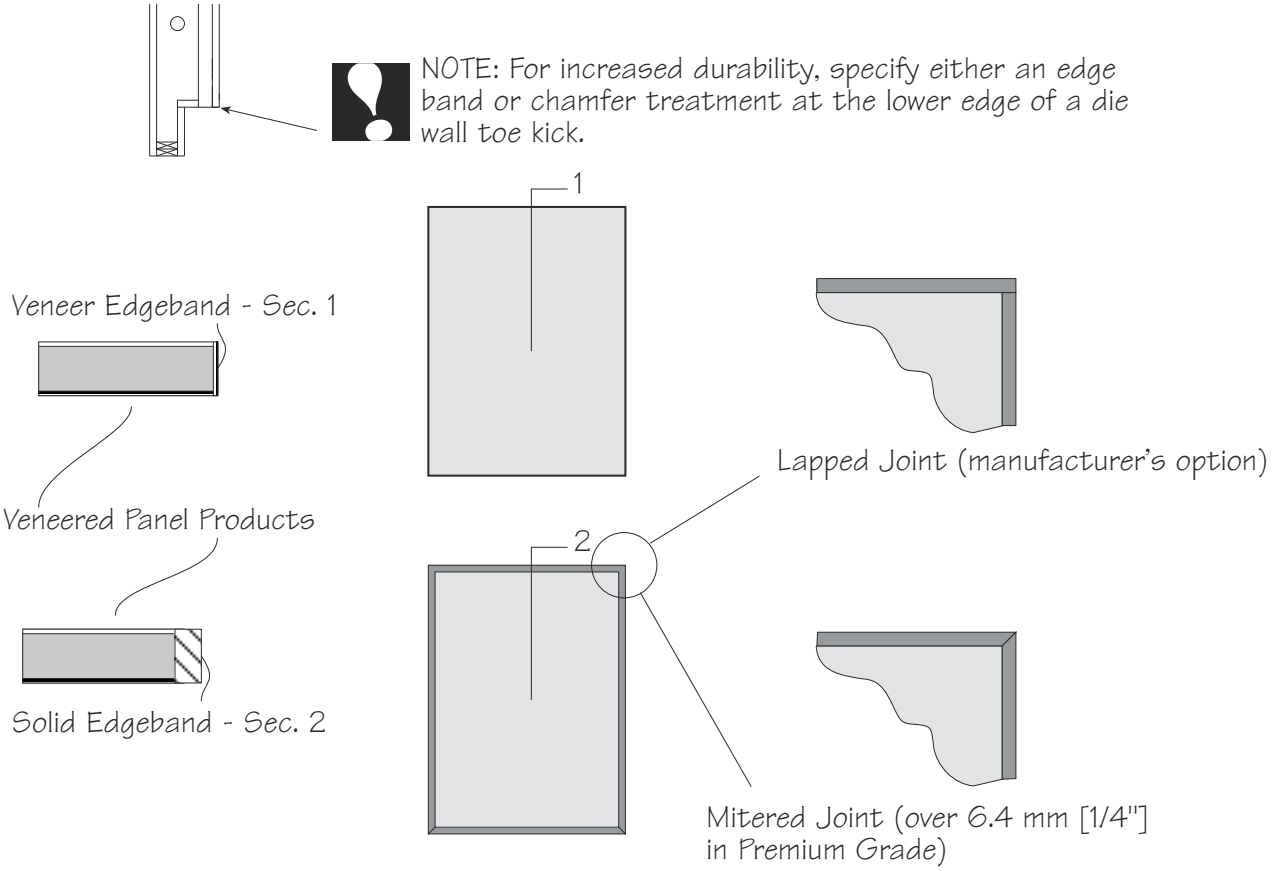
Component	Edge Material and Application	Premium Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Same Species and Cut as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Same Species as Body Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Compatible with self
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (1)	Material	Same Species and Cut as Member Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	

Component	Edge Material and Application	Custom Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Same Species as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Same Species as Body Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Compatible with self
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (2)	Material	Same Species as Member Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	

Component	Edge Material and Application	Economy Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (3)	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	

NOTES:
(1) Premium Grade - All edges must be banded. (Edges showing more than 6.4 mm [1/4"] on face will be mitered.)
(2) Custom Grade - All edges must be banded. (This was an additional requirement of the 6th edition.)
(3) Economy Grade - All edges must be banded, where banding is required.

Wood Cabinets



Edge Treatment - Figure 400-13

400A-T-3

Flush Wood Cabinet Doors and Drawer Fronts

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. Face veneer Standards are defined in Section 200. A check indicates permitted for the Grade specified.

Transparent Finish	**Premium**	**Custom**	**Economy**
"AA" face veneer, "B" back veneer, same species & cut, with veneer edgebanding, same species & cut	√	√	√
"A" face veneer, "B" back veneer, same species & cut with veneer edgebanding, same species		√	√
"B" face veneer, mill option back veneer with veneer edgebanding, same species			√
Solid Lumber (drawer fronts only)		√	√
Glass Doors - Frames: 19mm [3/4"] minimum nominal thickness, glass to meet local code Frameless Glass: 6.4mm [1/4"] nominal			
Flush Cabinet Door Limits - 19mm [3/4"] medium density particleboard or medium density fiberboard core up to 762mm [30"] width by 2032mm [80"] height, with like materials and thicknesses both faces. Veneer core doors will not be guaranteed against warping, telegraphing, or delamination. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers shall work together to develop sound solutions.			
Opaque Finish	**Premium**	**Custom**	**Economy**
Medium density fiberboard	√	√	√
Medium density particleboard			√

400A-T-4

Stile and Rail Wood Doors, Drawer Fronts, and Exposed Materials

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.

Materials	Premium		Custom		Economy	
	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Lumber grade for Exposed Parts (see Section 100)						
Stiles, rails, mullions and applied mouldings	I Well matched for grain and color between veneer and lumber	Close grain hardwood or MDF	II Compatible for color between veneer and lumber	Close grain hardwood or MDF	II With no selection for grain or color	Mill option
Flat panels	Not permitted, panel product required		II Permitted for panels less than 356 mm [14"] 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 356 mm [14"] across the grain			
Panel Products for Exposed Parts (see Section 200)						
Core for veneered stiles and rails	Particleboard or fiberboard		Particleboard or fiberboard		Mill option	
Core for veneered flat and raised panels	Particleboard or fiberboard		Particleboard or fiberboard	Particleboard or fiberboard recommended	Particleboard or fiberboard recommended	Mill option
Face veneer grade for transparent finish and material for opaque finish	"AA" face well matched for grain and color between veneer and lumber	MDF	"A" face compatible for color between veneer and lumber	MDF	"B" face veneer	Mill option
Minimum Assembly Width (some hardware requires wider stiles or rails)						
Stiles and rails, lumber	63.5 mm [2-1/2"]		63.5 mm [2-1/2"]		Mill option	
Stiles and rails, MDF	89 mm [3-1/2"]		89 mm [3-1/2"]		Mill option	
Minimum Assembly Thickness						
Stiles and rails	19 mm [3/4"]		19 mm [3/4"]		19 mm [3/4"]	
Flat panels	6.4 mm [1/4"]		6.4 mm [1/4"]		6.4 mm [1/4"]	
Raised panels	12.7 mm [1/2"]		12.7 mm [1/2"]		12.7 mm [1/2"]	

NOTE: 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. 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.

400A-T-5

Stile and Rail Workmanship

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.

Workmanship	Premium		Custom		Economy	
Finish Condition	**Transparent**	**Opaque**	**Transparent**	**Opaque**	**Transparent**	**Opaque**
Cut of Lumber	Plain sawn	Plain sawn	Plain sawn	Plain sawn	Mill option	
Cut of Veneer	Plain sliced	Mill option	Plain sliced	Mill option		
Matching Considerations						
Stile and rail orientation	Top, cross & bottom rails shall run between the vertical stiles. Mullions shall run between horizontal rails. For Transparent finish, components shall be well matched for grain and color, member-to-member. No selection required for opaque finish.				Mill option	
Veneer match between adjacent leaves on a single panel face	Book match	Mill option	Book match	Mill option	Mill option	
Note on Special 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. Sequence match on one item or a suite of items, and/or balance or center match on each panel is available and must be specified if required in any grade. For Premium Grade wood cabinets, continuous run areas must be identified by drawings and specifications, including the veneer matching method required. In the absence of such information, premanufactured panel sets will be utilized. See Section 200 for data on matching. Consult a member manufacturer for design solutions.						
Veneer match within each panel face	Balance	Mill option	Running	Mill option	Mill option	
Veneer sequence between adjacent panels (Blueprint match available. See Section 200.)	Pleasing blend of figure and color from sequenced and numbered premanufactured panel sets	Mill option	Warehouse stock, pleasing match for grain and color	Mill option	Mill option	
Solid lumber panel	Not permitted		Selected for compatibility of color (transparent finish only)		Mill option	
Fiberboard or MDO panel	Permitted with or without veneer, as specified, for transparent or opaque finish in any Grade					
Raised Panels						
	Rim Raised, Veneered Center	Solid MDF	Solid Raised Panel, glued for width - Maximum [356 mm] 14" or Solid simulated raised panel, veneered MDF		Mill option	
NOTE: All panels on a project must be either Rim Raised or Solid but not mixed.						
Flat Panels						
	Veneered MDF	Solid MDF	Veneered MDF	Mill option	Mill option	
NOTE: Veneered panels, for transparent finish, over [6 mm] 1/4" core thickness may be Particleboard Core panel product						

400A-T-6

Stile and Rail Machining and Joinery

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.

Machining	Premium	Custom	Economy
Plant Machining Considerations			
Door sizing	Doors shall be manufactured to a thickness tolerance of ±0.8 mm [± 1/32"] of specified thickness.		
Panel retention note	Regardless of method of retention, panels must have freedom and room to expand and contract in reaction to ambient humidity changes.		
Hardware clearance	Stile width must be designed to allow for hardware clearances. A minimum of 12.7 mm [1/2"] of stile must remain between the hardware and the edge of adjacent panel or glass.		
Joinery and Assembly Considerations			
Stiles, rails, and mullions	Mortise and tenon, dowels or loose tenon joinery, glued under pressure	Mating male/female sticking, glued under pressure	Mill option
Moulded profiles (sticking) shall be at the option of the manufacturer, unless full size details are shown in bid documents.			
Solid lumber panels	Not permitted	Edge glued and planed/sanded to thickness (up to 356 mm [14"])	Edge glued and planed/sanded to thickness
Raised panel rims	Mitered; glued to panel body under pressure	Mitered; glued to panel body under pressure	Mitered; glued to panel body under pressure
Panel product centers	Panel core must be covered by veneer or concealed by rim moulding	Panel core must be covered by veneer or concealed by rim moulding	No edge treatment required
Applied mouldings	Plant fastened; spot glued, fine finish nailed, set, filled and sanded	Plant fastened; spot glued, fine finish nailed	Plant fastened; spot glued, fine finish nailed
Minimum Veneer Thickness (visible surface species)			
Veneer on stile and rail	Industry standard (varies by species) of sufficient thickness to preclude show through or telegraphing of core after sanding.		
Veneer on panels			

Edge Treatments of Stiles and Rails						
Finish ---->	Transparent	Opaque	Transparent	Opaque	Transparent	Opaque
Outside square edge: solid lumber (top and bottom not considered exposed edges)	All exposed edges one piece (no joints), same species as face	Mill option	All exposed edges one piece (no joints), compatible species to face	Mill option	Mill option	Mill option
Inside Moulded Edge	Permitted only in solid lumber. Profile must be capable of being coped without feather edge.					

NOTE: Site applied mouldings are governed by Sections 300 and 1700. This table 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.

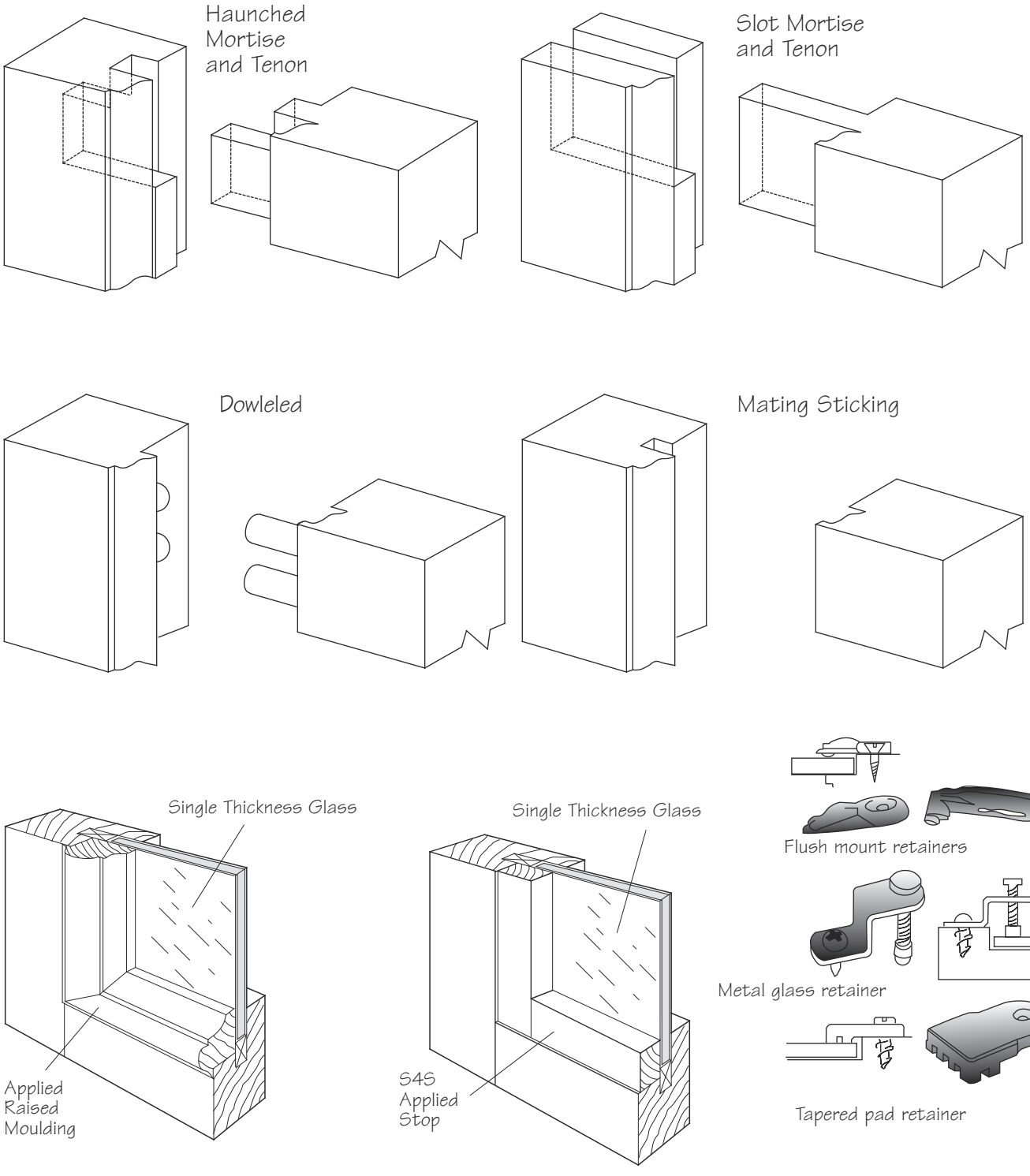
Glass and Glazing

Type, thickness, and manufacturer of glass, particularly decorative glass, must be specified as its construction dictates details of the receiving members. Specfications regarding code compliance are the responsibility of the design professional.

The woodwork manufacturer shall furnish glass and glass retention only when specified. In the absence of specification, glass and glass retention methods are mill option.

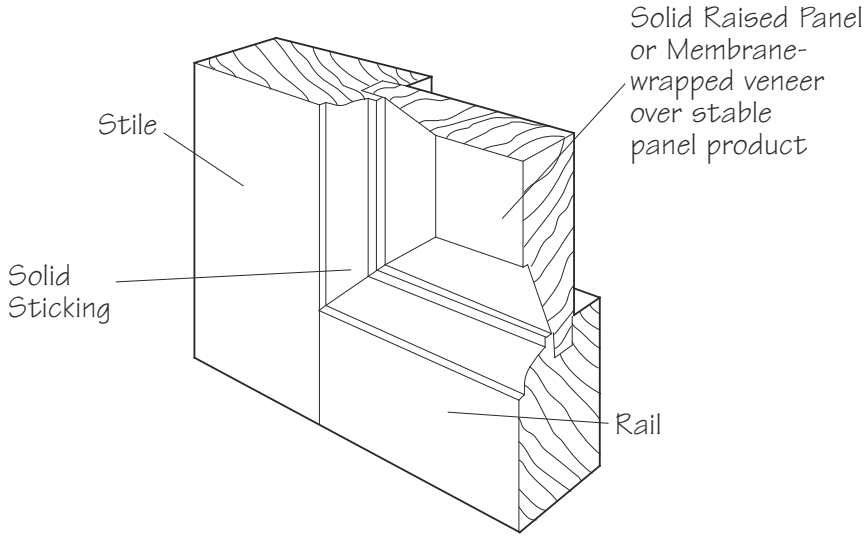
Wood Cabinets

Stile and rail construction: These examples illustrate some of the possible joinery techniques and glass retention options for cabinet doors. They are intended as a guide to assist the design professional. They are not the only possible solutions.

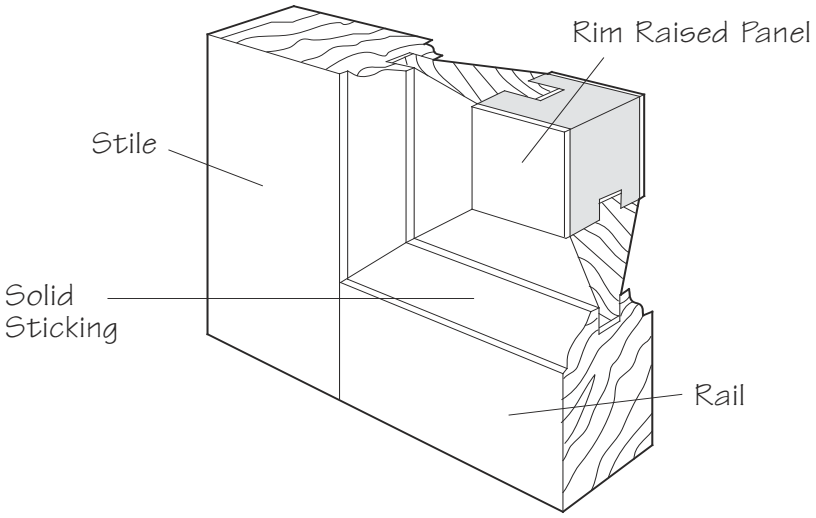


Stile and Rail Joinery Options - Figure 400-14

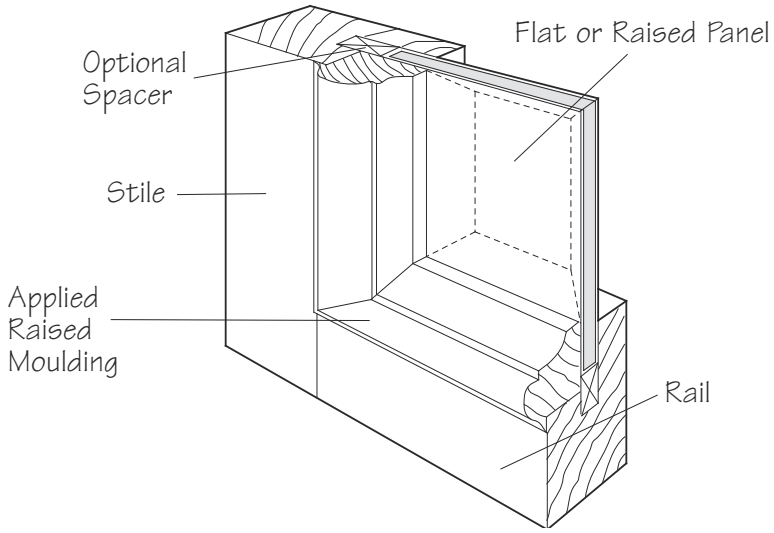
Panel cabinet doors: These examples illustrate three styles of raised panel and flat panel doors. Applied Moulding could be used for glass inserts as well. They are intended as a guide to assist the design professional. They are not the only possible solutions.



Solid Raised Panel - Figure 400-15



Rim Raised Panel - Figure 400-16



Applied Moulding - Figure 400-17

400A-T-7

Drawer Sides and Backs

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

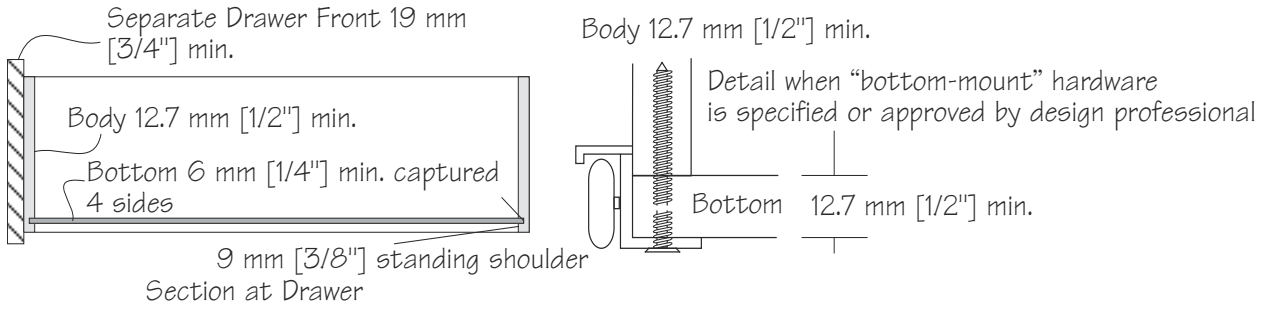
Drawer Side Materials	Premium	Custom	Economy
Single species solid lumber with a Section 100-G-1 hardness rating of *Medium* or better (minimum 12.7 mm [1/2"] finished thickness)	√	√	√
7 ply all hardwood veneer core plywood, no voids (minimum 12.7 mm [1/2"] thickness); No edge band required.	√	√	√
High pressure decorative laminate (HPDL) on 7 ply veneer core substrate (minimum 12.7 mm [1/2"] thickness)	√	√	√
Edgebanded HPDL or thermoset decorative overlay on particleboard core (minimum 12.7 mm [1/2"] thickness)		√	√
Medium density particleboard or medium density fiberboard (minimum 9.5 mm [3/8"] thickness)			√
Note: Premanufactured drawer systems are available from many woodwork manufacturers and must be evaluated and specified or approved by the design professional when desired.			

400A-T-8

Drawer Bottoms 6.4 mm [¼"] Minimum Nominal Thickness

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

Drawer Bottom Materials	Premium	Custom	Economy
Veneer core panel product, "B" face hardwood veneer	√	√	√
Thermoset decorative overlay panel product	√	√	√
Hardboard (smooth side visible inside)		√	√



Drawer Section - Figure 400-18

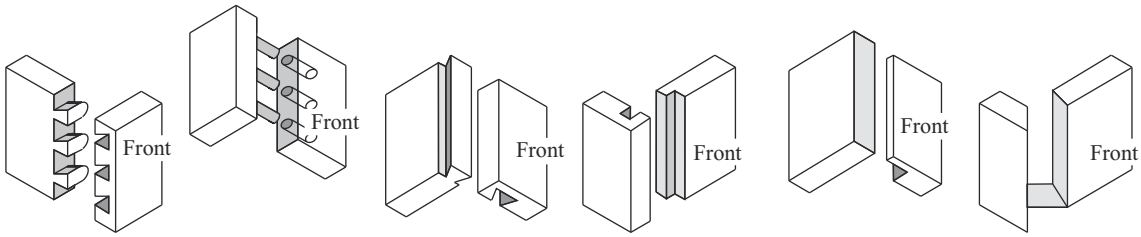
400A-T-9

Drawer Construction Techniques/Supports

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. Premanufactured drawer systems, when approved or specified, will be assumed to meet the Grade of work for which the approval was granted or the specification written. A check indicates permitted for the Grade specified.

Construction Technique	Premium	Custom	Economy
Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure	√	√	√
Doweled, glued under pressure (min. 32 mm dowel spacing to 102 mm [4"] high, 64 mm dowel spacing above 102 mm [4"])	√	√	√
Lock shoulder, glued and pin nailed	√	√	√
Miterfolded from a single panel in one machining process	√	√	√
Lock shoulder, glued and pin nailed		√	√
Square Shoulder, nailed or stapled			√
Bottoms shall be set into sides, back and front, 6.4 mm [1/4"] deep groove with minimum 9 mm [3/8"] standing shoulder	√	√	√
Bottoms shall be set into sides and front, 6.4mm [1/4"] deep groove with minimum 9 mm [3/8"] standing shoulder		√	√
Bottom installation technique mill option			√
Hardware (Static Load)	**Premium**	**Custom**	**Economy**
Combination metal and roller bearing drawer slides, pencil drawer - 23 kg [50 lb.], three-quarter extension; box drawer (up to 152mm [6"] deep) - 34 kg [75 lb.], three-quarter extension; deep drawer (above 152mm [6"]) - 45 kg [100 lb.], three-quarter extension; designated file drawers - 45 kg [100 lb.], full extension; lateral file longer than 610mm [24"] - 57 kg [175 lb.]	√	√	√
Combination metal and roller bearing drawer slides, pencil drawer - 23 kg [50 lb.], three-quarter extension; box drawer (up to 152mm [6"] deep) - 34 kg [75 lb.], three-quarter extension; deep drawer (above 152mm [6"]) - 45 kg [100 lb.], three-quarter extension; designated file drawers - 45 kg [100 lb.], full extension; lateral file longer than 610mm [24"] - 57 kg [175 lb.]		√	√
Plastic roller or friction drawer glides/guides			√
Wood drawer guides with tip rail			√
Spring loaded tip-down stops shall be provided on all drawers (design permitting) unless a stop is built into a metal drawer slide.	√	√	√
Spring loaded tip-down stops shall be provided on all drawers (design permitting) unless a stop is built into a metal drawer slide.		√	√
No tip-down stops required			√
Mechanical stops prevent impact on the drawer front.	√	√	√
Designated file drawers shall have a minimum inside clear height of 267mm [10-1/2"] and have a follower mechanism or be of a size to allow the use of hanging folders on a system stand or integral rails.	√	√	√
Note: Premanufactured drawer systems, including bottom-mounted and epoxy-coated slides, are available from many woodwork manufacturers and must be evaluated and specified or approved by the design professional when desired. Drawers shall operate smoothly, properly fitted to the cabinet without excessive play. All drawers shall fill the cabinet depth, less a maximum of 5 mm [2"], and from top to bottom to the greatest extent practical.			

Wood Cabinets



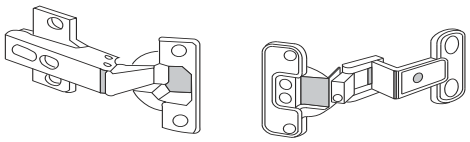
	Dovetail	Dowel	French Dovetail	Lock Shoulder	Square Shoulder	Miterfold
Permitted in Grade	Premium Custom Economy	Premium Custom Economy	Premium Custom Economy	Premium Custom Economy	Economy	Premium Custom Economy
Notes: and Recommended Material Choices [3]		1	2			All four sides and the bottom are machined from one piece
Solid Lumber	√	√	√	√	√	
Veneer Core		√	√	√	√	
Combo. Core		√		√	√	√
Particle Core		√			√	√
Fiber Core		√			√	√

NOTES: 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.
1 - The "European" system assembly screw or dowel screw with matching caps is permitted in this configuration when material is 19mm [3/4"] or thicker.
2 - Fully captured bottoms are not feasible when French Dovetail joinery is employed.
3 - While virtually all materials can be painted, stained, finished, or clad with veneers or overlays, solid lumber is usually selected for species and then painted, stained and/or finished. Panel products may also be painted, stained, and/or finished in their raw state as well as veneered or clad with another product. Thermoset Decorative Overlays are generally limited to particle core panel products.

Drawer Joinery - Figure 400-19

400A-T-10

Concealed 35 mm cup Hinge Installation Requirements



Concealed Hinges Styles - Figure 400-20

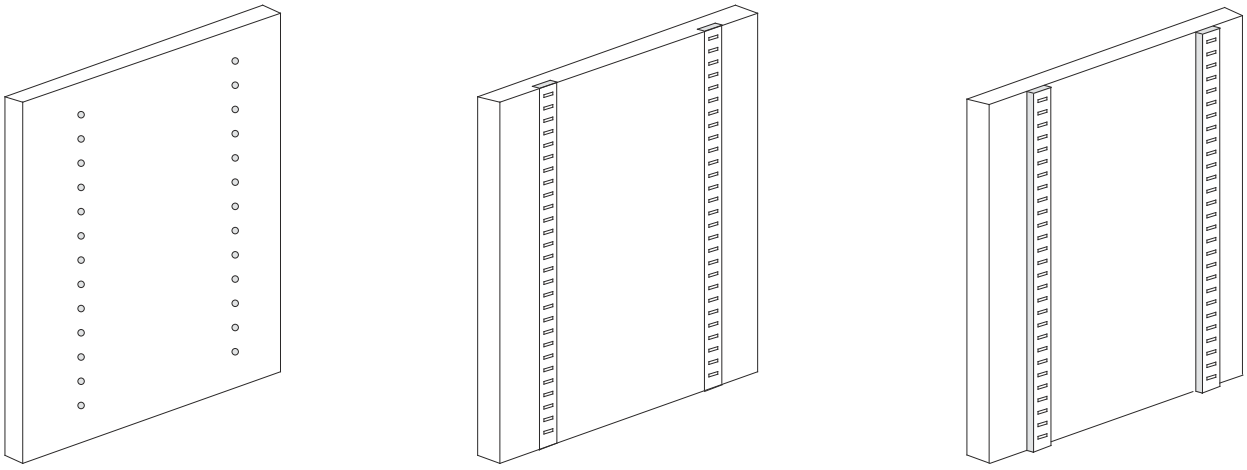
When 35 mm cup hinges are used, plastic insertion dowels to receive the screws of the hinge and 5 mm "Euroscrews" to attach the baseplate are required. The attachment of hinge bodies to particleboard or fiberboard doors with wood screws in the absence of the plastic insertion dowels is not acceptable in Premium or Custom Grade. Manufacturers may use other solutions to assure long-term functionality, as agreed between buyer and seller. At the time of this printing, only hinges showing a small knuckle meet BHMA Grade 1, and no fully concealed 35 mm cup is available tested to BHMA Grade 1.

400A-T-11

Adjustable Shelf Techniques/Supports

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

Support, Materials, and Gap Tolerance	Premium	Custom	Economy
Adjustable shelf metal shelf standards (recessed flush)	√	√	√
Adjustable shelf multiple holes (min. 5 mm diameter, dual pins)	√	√	√
Adjustable shelf metal shelf standards (surface mounted)		√	√
Adjustable shelf multiple holes (min. 5 mm diameter, single pin)		√	√
Adjustable shelf mill Option supports			√
Maximum gap between each end of shelf and case side or standard	1.6 mm [1/16"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Center line of holes or standards shall be a min. of 24.5 mm [1"] and a max. of 76 mm [3"] from the front and back edge of the depth of shelf to be supported, with a spread of no less than 60% of the shelf depth in any case.			
Unsupported fixed shelf and/or cabinet bottom 1067 mm [42"] to 1220 mm [48"] to support 40 lb. total distributed load	25 mm [1"] particleboard or better	25 mm [1"] particleboard or better	19 mm [3/4"] particleboard or better
Fixed shelf and/or cabinet bottom 1220 mm [48"] or more supported by cleat at back edge or securely fastened thru back	19 mm [3/4"] particleboard or better		
Fixed shelf and/or cabinet bottom 1220 mm [48"] or more supported by center divider or other intermediate support	19 mm [3/4"] particleboard or better		
Note: A variety of engineered shelf supports are available from member manufacturers and should be evaluated and specified or approved by the design professional when desired. Gaps at adjustable shelf ends shall be greater when required by design, selected shelf hardware, or shelf material thickness considerations. Unsupported shelves or cabinet bottoms in excess of 1220 mm [48"] not permitted in any Grade.			



Adjustable Shelves - Figure 400-21

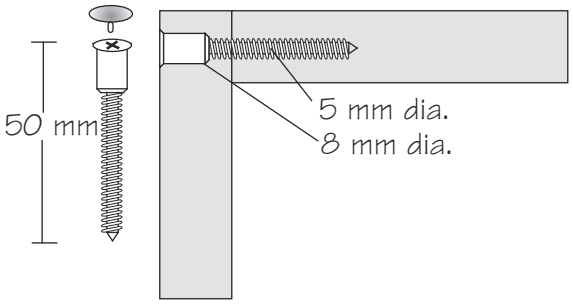
400A-T-12

Joinery of Case Body Members

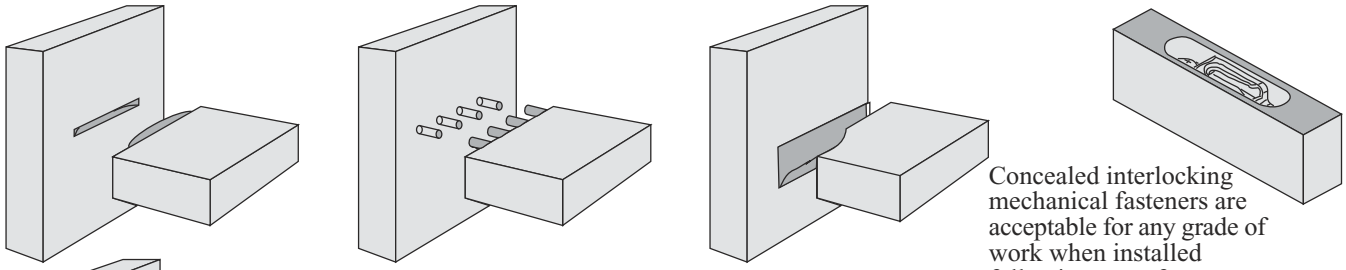
In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, manufacturers will supply their choice from the alternatives. A check indicates permitted for the Grade specified.

Joinery Table	Premium	Custom	Economy
Tops, exposed ends and bottoms (finished ends on casework shall be integral, not applied secondarily)			
Stop dado*, glued with pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts)	√	√	√
Doweled, glued with pressure; approx. 1 per 75 mm of joint [4/foot]	√	√	√
European assembly screws (37 mm from end, 128 mm on center, fasteners will not be visible on exposed parts)	√	√	√
Fully concealed interlocking mechanical system	√	√	√
Spline or biscuit, glued with pressure (approx. 1 per 100 mm of joint)		√	√
Through dado, glued with pressure; or exposed European assembly screws with trim caps			√
Exposed end corner details and face frame attachment			
Mitered joint: lock miter or spline or biscuit, glued under pressure (no visible fasteners)	√	√	√
Non-mitered joints, i.e. 90 degree applications: butt joint glued under pressure (no visible fasteners)	√	√	√
Fully concealed interlocking mechanical system	√	√	√
Butt joint, glued and finish nailed		√	√
Butt joint, finish nailed			√
Cabinet backs - Wall hung			
In all Grades, wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Hanging/mounting mechanisms should transfer load to case body member(s).			
Captured in grooves on cabinet sides and bottom; securely fastened	√	√	√
Side bound, captured in groove or rabbetts; securely fastened		√	√
Full overlay, plant-on backs: min. 12.7 mm [1/2"] thick attached with min. #8 low root, high thread (not "drywall") screws spaced max. 200 mm [8"] on center. Anchor strips not required for backs 12.7 mm [1/2"] or thicker, so attached.	√ Edge of back not exposed on finished ends	√ Edge of back not exposed on finished ends	√ Edge of back exposed on finished ends
Mill option, but backs are required when back is exposed to view after installation and for all wall cabinets in any Grade of Work.			√
Cabinet backs - Floor standing			
Side bound, captured in grooves; securely fastened to top and bottom	√	√	√
Side bound, placed in rabbets; securely fastened in rabbets		√	√
Full overlay, plant-on backs: min. 12.7 mm [1/2"] thick attached with min. #8 low root, high thread (not "drywall") screws spaced max. 200 mm [8"] on center. Anchor strips not required for backs 12.7 mm [1/2"] or thicker, so attached. (See illustrations following this table.)	√ Edge of back not exposed on finished ends	√ Edge of back not exposed on finished ends	√ Edge of back exposed on finished ends
Mill option, back required when specified or when exposed to view			√
Anchor strips (for cabinet backs less than 12.7 mm [1/2"] thick)			
Min. 12.7 mm [1/2"] thick lumber or panel product, min. 63.5 mm [2-1/2"] width; securely attached to cabinet body members on the wall side of the cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.	Required	Required	Not required

Wood Cabinets



The use of steel "European" assembly screws is acceptable for all grades of work. The illustrated screw is to be used no more than 37 mm from each end, with subsequent screws spaced no more than 128 mm on center. Glue is not required with this system. Screw heads and/or plastic trim caps may not be visible on exposed surfaces in Premium & Custom Grade. Trim caps may be visible on exposed surfaces in Economy Grade, and on semi-exposed surfaces in any Grade.

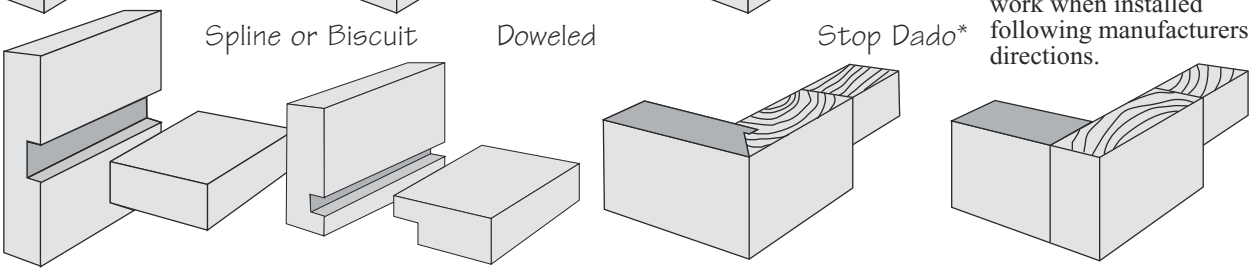


Spline or Biscuit

Doweled

Stop Dado*

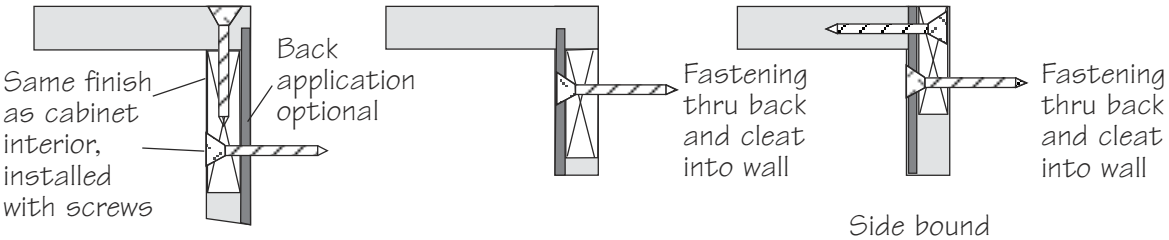
Concealed interlocking mechanical fasteners are acceptable for any grade of work when installed following manufacturers directions.



Thru Dado

Lock Miter

90 degree joint

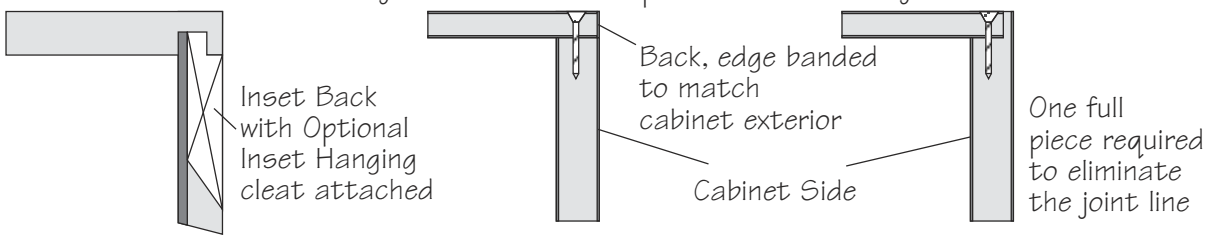


Special application Internal Anchor Strip

Full Bound Back

Side bound Recessed Back

NOTE ABOUT SCREWS: The use of "drywall" screws is not permitted. Use heavy shank steel screws.



Vertical Section
Special application
External Hanging Cleat

Horizontal Section
Semi-exposed
Plant-on Back

Horizontal Section
Exposed
Plant-on Back

* Stop dado not required when concealed behind face frames or similar covers at point of connection.

NOTE: When not in violation of design, leading edges of intersecting members may be set back not to exceed 3.2mm [1/8"] provided setback is consistent. Joints in backs must occur at divisions or fixed shelves for fastening; or be splined or otherwise reinforced or supported. See Section 1700 for mounting and hanging suggestions.

Case Joinery - Figure 400-21

400A-T-13

Joinery of Face Frames and Trims

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. Fillers are placed where installation conditions make their use appropriate. Style, width, and method of installation are at the option of the woodwork manufacturer. A check indicates permitted for the Grade specified.

Joinery table for face frames and trims	Premium	Custom	Economy
Face frame stile and rail assembly			
Glued mortise and tenon or concealed pocket screw	√	√	√
Dowel or biscuit joints, glued under pressure		√	√
Butt joint, glued and toe nailed			√
Attachment of face frame to body members			
Pressure glued (no nails or other visible fasteners)	√	√	√
Glue and finish nail		√	√
Nailed			√
NOTE: Site applied mouldings are governed by Section 300 and Section 1700. The following applies to mouldings contained wholly within an individual panel.			
Applied mouldings	Plant fastened; spot glued, fine finish nailed and set	Plant fastened; spot glued, fine finish nailed and set	Shipped loosed for field fitting
Note: Filling nail holes is done during finishing. When factory finishing is not specified and/or part of the manufacturer's contract, the responsibility for filling and smoothing of fill material lies with the finishing contractor. If panel products are used for face frames, door hinges shall be selected to avoid screwing only into panel product edges.			

400A-T-14

Smoothness of Exposed Surfaces (minimum requirements)

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.							

400A-T-15

Selection for Grain and Color

Plant Assemblies

For Transparent finish, adjacent members shall …

• Premium Grade … be well matched for grain and color.

• Custom Grade … be compatible for color.

• Economy Grade … 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

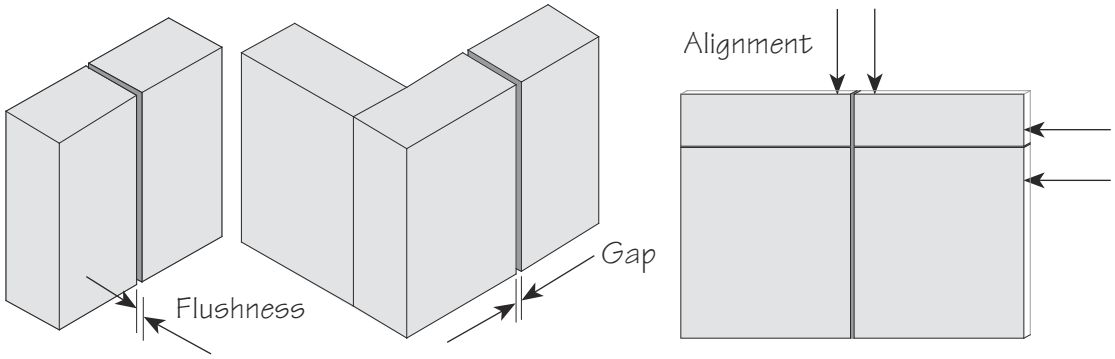
Selection of adjacent members for compatibility is the responsibility of the installation contractor.

Compliance Criteria

400A-C-1

Fitting of Exposed Cabinet Doors, Drawers and Removable Panels

Target Fitting Tolerances, i.e., door to door; door to drawer; drawer to drawer	Premium	Custom	Economy
Gap between doors, drawers, panels, and frames	3.2 mm [1/8"] ± 0.8 mm [1/32"]	3.2 mm [1/8"] ± 1.6 mm [1/16"]	3.2 mm [1/8"] ± 2.4 mm [3/32"]
Maximum variation in vertical and horizontal alignment between adjacent door and drawer edges, in the normal closed position at rest	0.8 mm [1/32"]	0.8 mm [1/32"]	1.6 mm [1/16"]
Maximum variation in flushness of adjacent door and drawer faces	0.8 mm [1/32"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Note: Tolerances are subject to component size, hardware choices, allowable warp, installation variations, etc. The maximum deviations listed are subject to the above conditions.			

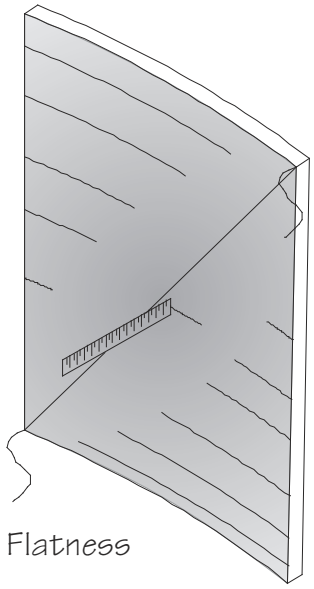


Fitting Tests - Figure 400-22

400A-C-2

Flatness of Cabinet Doors and Exposed 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 [$^{9}/_{64}$"] in Custom Grade – 4 times 0.9 mm = 3.6 mm [0.142"]			

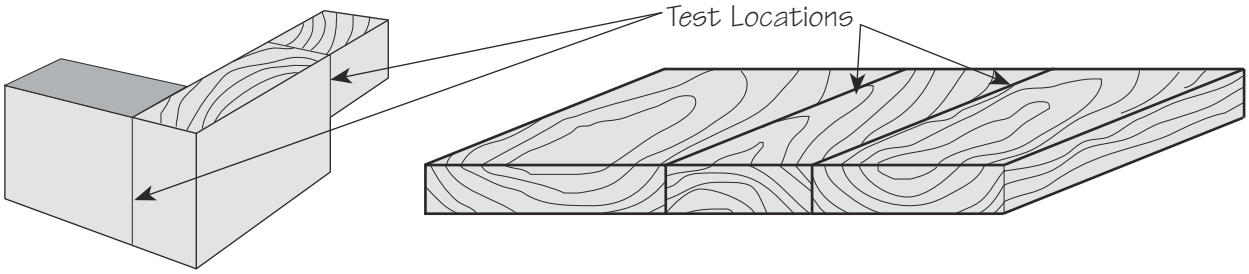


Flatness Test - Figure 400-23

400A-C-3

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 400-24

400A-C-4

Gap Tolerances

The following table is used to test compliance with the gap tolerances allowed.

Gap Tolerances	Premium	Custom	Economy
Maximum gap between fixed Exposed components	.4 mm [1/64"]	.8 mm [1/32"]	1.6 mm [1/16"]
Maximum length of gap in fixed Exposed components	76 mm [3"]	127 mm [5"]	203 mm [8"]
Maximum gap between fixed Semi-exposed components	.8 mm [1/32"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Maximum length of gap in fixed Semi-exposed components	152 mm [6"]	203 mm [8"]	305 mm [12"]
Maximum gap between each end of adjustable shelf and case side	1.6 mm [1/16"]	1.6 mm [1/16"]	3.2 mm [1/8"]
NOTE: Gaps at adjustable shelf ends may be greater if required by selected shelf hardware or material thickness considerations. No gap permitted in joints of stile and rail work or joints of face frame stiles and rails. No gap may occur within 1219 mm [48"] of another gap (except adjustable shelf ends.)			

400A-C-5

Tests for Smoothness of Exposed Surfaces

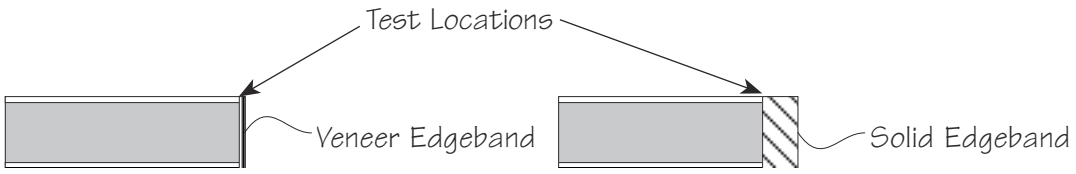
KCPI (Knife Cuts Per Inch) can be determined by holding the surfaced board at an angle to a strong light source and counting the visible ridges per inch, usually perpendicular to the profile.

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.

400A-C-6

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 400-25

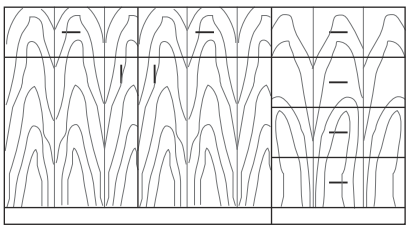
Test Criteria

400B-T-1

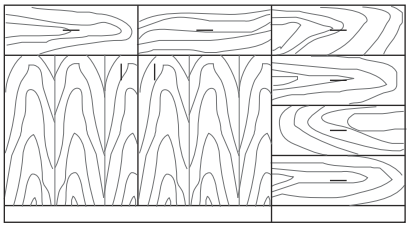
Materials: High Pressure Decorative Laminate

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. A check indicates permitted for the Grade specified.

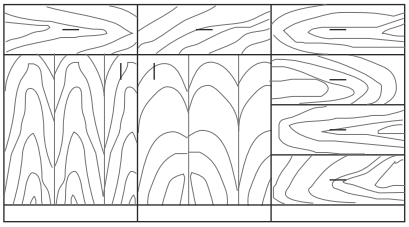
Laminate Materials	Premium	Custom	Economy
Exposed surfaces			
High-pressure laminate, nominal 0.7 mm [.028"] thick (core: particleboard or MDF)	√	√	√
Thermoset decorative overlay (color and pattern selections limited; core: particleboard or MDF)		√	√
Blending of laminate across multiple cabinet faces in one elevation (grained/patterned decorative laminate)			
Continuous pattern (not necessarily balance and/or center matched), material permitting	√	√	√
No match required			√
Direction and matching of wood grain or pattern on individual cabinet			
Continuous vertical figure across doors and drawer fronts and selection for pleasing blend of figure and color per elevation	√	√	√
Continuous vertical figure across doors of individual cabinet; drawer fronts may be horizontal or vertical figure without sequence (not required from cabinet to cabinet)		√	√
No match required			√
Semi-exposed parts (not including drawer bodies and backs of flush doors)			
High-pressure laminate (mill option color), nominal 0.7 mm [.028"] thick	√	√	√
Thermoset decorative overlay, solid color or nominal 0.5 mm [.020"] Cabinet liner on particleboard core	√	√	√
Particleboard (sealed or painted), or paper impregnated decorative overlay			√
Concealed parts			
Mill option	√	√	√
Flush cabinet door limits - 19 mm [3/4"] medium density particleboard or medium density fiberboard core up to 762 mm [30"] width by 2032 mm [80"] height, with like materials and thicknesses both faces. Veneer core doors will not be guaranteed against warping, telegraphing, or delamination. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers shall work together to develop sound solutions.			



Premium Grade



Custom Grade



Economy Grade

Direction and matching - Figure 400-26

400B-T-2

Balanced Construction for Cabinet Components

HPDL cabinet fabrication shall incorporate balanced construction for unrestrained components, such as cabinet doors and adjustable shelves. Experience shows that unbalanced laminations have the tendency to warp.

Just as balance is defined for veneered work as an odd number of plys, so balanced construction in HPDL work shall contain an odd number of layers. The substrate forms the core for the inner layer. On each side of the core, or substrate, the fabricator shall apply the same material in the same machine direction. All HPDL has a machine direction, which can be determined by observing the scuff marks on the back of the laminate sheet.

Restrained components, such as cabinet sides (gables), may be fabricated with HPDL on one side of the substrate and a different material (cabinet liner or thermoset decorative overlay, for example) on the other side. The risk of warp for these components is very low.

Lamination Over Existing Overlays

The application of any thickness of HPDL over the top of existing HPDL is not permitted, even if the fabricator attempts to apply the HPDL to both sides of the existing lamination. Experience shows that the adhesion of the new laminate to the existing surface is very low, often resulting in delamination and failure of the glue line.

Likewise, the application of HPDL over existing thermoset decorative overlay (melamine) is strongly discouraged. Some fabricators report success by agressively sanding the melamine surface, followed by applying sufficient contact adhesive and adequate pressure. Delamination is a defect. The risk of delamination is high. Specify or use this procedure with care.

Laminate Cabinets

400B-T-3

Edge Treatment of Exposed and Semi-exposed Components

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

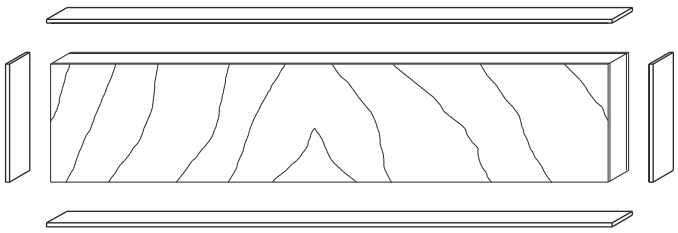
Visible edges of panel products shall be treated by applying edge bandings using automatic edgebander or glue and pressure or, in the case of Economy Grade, fillers as indicated below. In cases where raw MDF is intended to have a clear or opaque finish, no edge banding is required. Body members or shelves in semi-exposed conditions shall have an edgeband that matches the body member or shelf. Back edges and ends of adjustable shelves within cases are not considered to be visible. Edges may be banded before or after (industry standard) 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 PVC or self-edged cabinet parts. Special design considerations may require special solutions by the woodworker. Thickness dimension tolerance is ± 0.05 mm [0.002"]. Close Grain is defined in the Glossary in the Appendix.

Component	Edge Material and Application	Premium Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Same Species and Cut as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Same Species as Body Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Compatible with self
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (1)	Material	Same Species and Cut as Member Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	

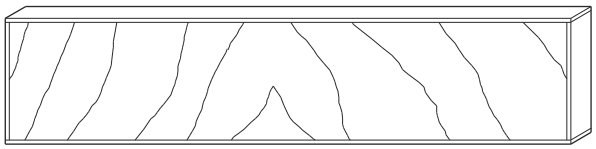
Component	Edge Material and Application	Custom Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Same Species as Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Same Species as Body Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Compatible with self
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (2)	Material	Same Species as Member Face	Close Grain Material
	Nominal Thickness	.5 mm [.020"]	

Component	Edge Material and Application	Economy Grade	
		Transparent	Opaque
Body Members, Face Frames	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Exposed Shelves	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Semi-exposed Shelves	Material	Compatible with self	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	
Doors and Drawer Fronts (3)	Material	Compatible Species	Filled and Sanded
	Nominal Thickness	.5 mm [.020"]	

NOTES:
(1) Premium Grade - All edges must be banded. (Edges showing more than 6.4 mm [1/4"] on face will be mitered.)
(2) Custom Grade - All edges must be banded. (This was an additional requirement of the 6th edition.)
(3) Economy Grade - All edges must be banded, where banding is required.



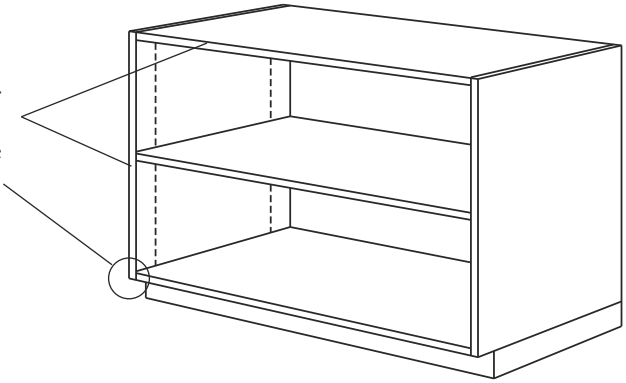
Unless specified, sequence of lamination determined by woodworker

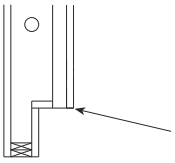


400

Hot melt applied HPDL edge banding shall be primed before application for proper adhesion unless the hot melt adhesive used has been specially formulated for the application of HPDL without requiring pre-application of a primer.

NOTE: Edgebands, to the extent of standard length materials, run the full length of a single vertical or horizonal member without a joint or splice. Edges of the band are trimmed flush with, and align with, the plane of the case body to which they are applied. Finishing all front edges of cases with a single piece of laminate, without joints at the corners, is not standard practice, and must be specified if desired.





NOTE: For increased durability either edgeband or chamfer the lower edge of a die wall toe kick. Must be specified. Otherwise will be treated as a concealed surface.

Edge Treatment - Figure 400-27

Laminate Cabinets

400B-T-4

Flush Cabinet Doors and Drawer Fronts

In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, manufacturers will supply their choice from the alternatives. Laminate shall be applied to both faces in the same machine direction. A check indicates permitted for the Grade specified.

HPDL or Thermoset Decorative Overlay Finish	Premium	Custom	Economy
Edgebanded laminate, same pattern, color and thickness both face and back (core: particleboard or medium density fiberboard [MDF], veneer core not permitted for doors)	√	√	√
Edgebanded laminate, with laminate of same nominal thickness on back (core: particleboard or medium density fiberboard [MDF], veneer core not recommended)		√	√
Edgebanded thermoset decorative overlay both face and back, (core: particleboard or medium density fiberboard [MDF], veneer core not recommended)		√	√
Note: Laminate face side and thermoset decorative overlay back side not permitted on doors in any grade of work.			
Flush cabinet door limits - 19 mm [3/4"] medium density particleboard or medium density fiberboard core up to 762 mm [30"] width by 2032 mm [80"] height, with like materials and thicknesses both faces. Veneer core doors will not be guaranteed against warping, telegraphing, or delamination. Larger doors require special design, engineering, and fabrication. Design teams and manufacturers shall work together to develop sound solutions.			

400B-T-5

Drawer Sides and Backs

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. Premanufactured drawer systems, when approved or specified, will be assumed to meet the Grade of Work for which the approval was granted or the specification written. A check indicates permitted for the Grade specified.

Drawer Side Materials	Premium	Custom	Economy
Single species solid lumber with a Section 100-G-1 hardness rating of *Medium* or better (minimum 12.7 mm [1/2"] finished thickness)	√	√	√
7 ply all hardwood veneer core plywood, no voids (minimum 12.7 mm [1/2"] thickness); No edge band required.	√	√	√
High pressure decorative laminate (HPDL) on 7 ply veneer core substrate (minimum 12.7 mm [1/2"] thickness)	√	√	√
Edgebanded HPDL or thermoset decorative overlay on particleboard core (minimum 12.7 mm [1/2"] thickness)		√	√
Medium density particleboard or medium density fiberboard (minimum 9.5 mm [3/8"] thickness)			√
Note: Premanufactured drawer systems are available from many woodwork manufacturers and must be evaluated and specified or approved by the design professional when desired.			

Caution

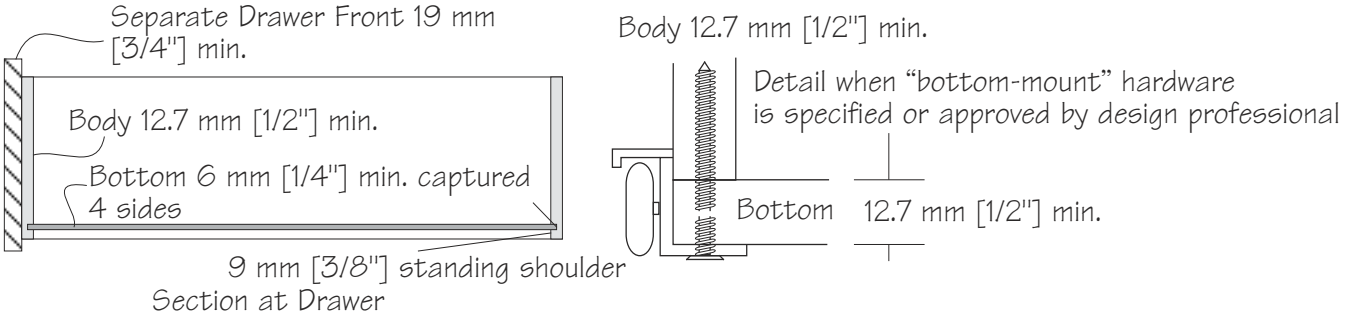
Special consideration should be given to raw wood parts on high pressure decorative laminate-clad (HPDL) cabinets such as wood pulls, wood trims, applied mouldings, banded doors, drawer bodies, wood cabinet interiors. Specifications regarding the responsibility for finishing (if any) shall be clarified by the design professional. When solid lumber or veneer core plywood drawer bodies are furnished in HPDL cabinets, the responsibility for finishing the drawer bodies rests with the fabricator,

400B-T-6

Drawer Bottoms (6.4 mm [¼"] Minimum Nominal Thickness)

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

Drawer Bottom Materials	Premium	Custom	Economy
Veneer core panel product, "B" face hardwood veneer	√	√	√
Thermoset decorative overlay panel product	√	√	√
Hardboard (smooth side visible inside)		√	√



Drawer Section - Figure 400-28

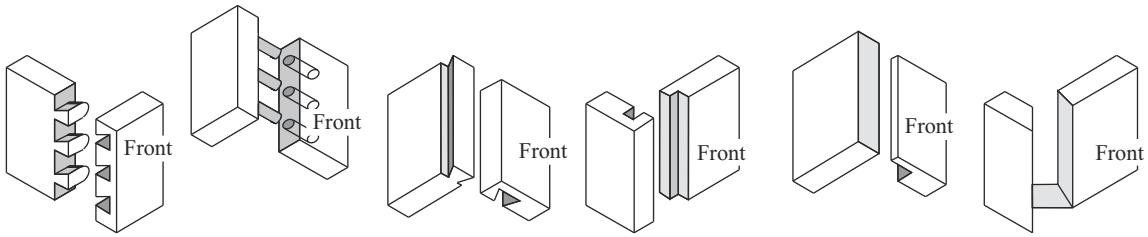
Laminate Cabinets

400B-T-7

Drawer Construction Techniques/Supports

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

Construction Technique	Premium	Custom	Economy
Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure	√	√	√
Doweled, glued under pressure (min. 32 mm dowel spacing to 102 mm [4"] high, 64 mm dowel spacing above 102 mm [4"])	√	√	√
Lock shoulder, glued and pin nailed	√	√	√
Miterfolded from a single panel in one machining process	√	√	√
Lock shoulder, glued and pin nailed		√	√
Square Shoulder, nailed or stapled			√
Bottoms shall be set into sides, back and front, 6.4 mm [1/4"] deep groove with minimum 9 mm [3/8"] standing shoulder	√	√	√
Bottoms shall be set into sides and front, 6.4mm [1/4"] deep groove with minimum 9 mm [3/8"] standing shoulder		√	√
Bottom installation technique mill option			√
Hardware (Static Load)	**Premium**	**Custom**	**Economy**
Combination metal and roller bearing drawer slides, pencil drawer - 23 kg [50 lb.], three-quarter extension; box drawer (up to 152mm [6"] deep) - 34 kg [75 lb.], three-quarter extension; deep drawer (above 152mm [6"]) - 45 kg [100 lb.], three-quarter extension; designated file drawers - 45 kg [100 lb.], full extension; lateral file longer than 610mm [24"] - 57 kg [175 lb.]	√	√	√
Combination metal and roller bearing drawer slides, pencil drawer - 23 kg [50 lb.], three-quarter extension; box drawer (up to 152mm [6"] deep) - 34 kg [75 lb.], three-quarter extension; deep drawer (above 152mm [6"]) - 45 kg [100 lb.], three-quarter extension; designated file drawers - 45 kg [100 lb.], full extension; lateral file longer than 610mm [24"] - 57 kg [175 lb.]		√	√
Plastic roller or friction drawer glides/guides			√
Wood drawer guides with tip rail			√
Spring loaded tip-down stops shall be provided on all drawers (design permitting) unless a stop is built into a metal drawer slide.	√	√	√
Spring loaded tip-down stops shall be provided on all drawers (design permitting) unless a stop is built into a metal drawer slide.		√	√
No tip-down stops required			√
Mechanical stops prevent impact on the drawer front.	√	√	√
Designated file drawers shall have a minimum inside clear height of 267mm [10-1/2"] and have a follower mechanism or be of a size to allow the use of hanging folders on a system stand or integral rails.	√	√	√
Note: Premanufactured drawer systems, including bottom-mounted and epoxy-coated slides, are available from many woodwork manufacturers and must be evaluated and specified or approved by the design professional when desired. Drawers shall operate smoothly, properly fitted to the cabinet without excessive play. All drawers shall fill the cabinet depth, less a maximum of 5 mm [2"], and from top to bottom to the greatest extent practical.			

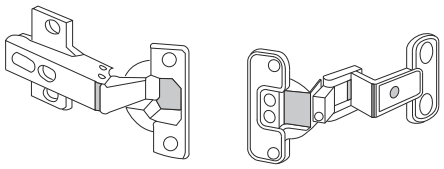


	Dovetail	Dowel	French Dovetail	Lock Shoulder	Square Shoulder	Miterfold
Permitted in Grade	Premium Custom Economy	Premium Custom Economy	Premium Custom Economy	Premium Custom Economy	Economy	Premium Custom Economy
Notes: and Recommended Material Choices [3]		1	2			All four sides and the bottom are machined from one piece
Solid Lumber	√	√	√	√	√	
Veneer Core		√	√	√	√	
Combo. Core		√		√	√	√
Particle Core		√			√	√
Fiber Core		√			√	√

NOTES: 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.
1 - The "European" system assembly screw or dowel screw with matching caps is permitted in this configuration when material is 19mm [3/4"] or thicker.
2 - Fully captured bottoms are not feasible when French Dovetail joinery is employed.
3 - While virtually all materials can be painted, stained, finished, or clad with veneers or overlays, solid lumber is usually selected for species and then painted, stained and/or finished. Panel products may also be painted, stained, and/or finished in their raw state as well as veneered or clad with another product. Thermoset Decorative Overlays are generally limited to particle core panel products.

Drawer Joinery - Figure 400-29

400B-T-8
Concealed 35 mm cup Hinge Installation Requirements



Concealed Hinges Styles - Figure 400-30

When 35 mm cup hinges are used, plastic insertion dowels to receive the screws of the hinge and 5 mm "Euroscrews" to attach the baseplate are required. The attachment of hinge bodies to particleboard or fiberboard doors with wood screws in the absence of the plastic insertion dowels is not acceptable in Premium or Custom Grade. Manufacturers may use other solutions to assure long-term functionality, as agreed between buyer and seller. At the time of this printing, only hinges showing a small knuckle meet BHMA Grade 1, and no fully concealed 35 mm cup is available tested to BHMA Grade 1

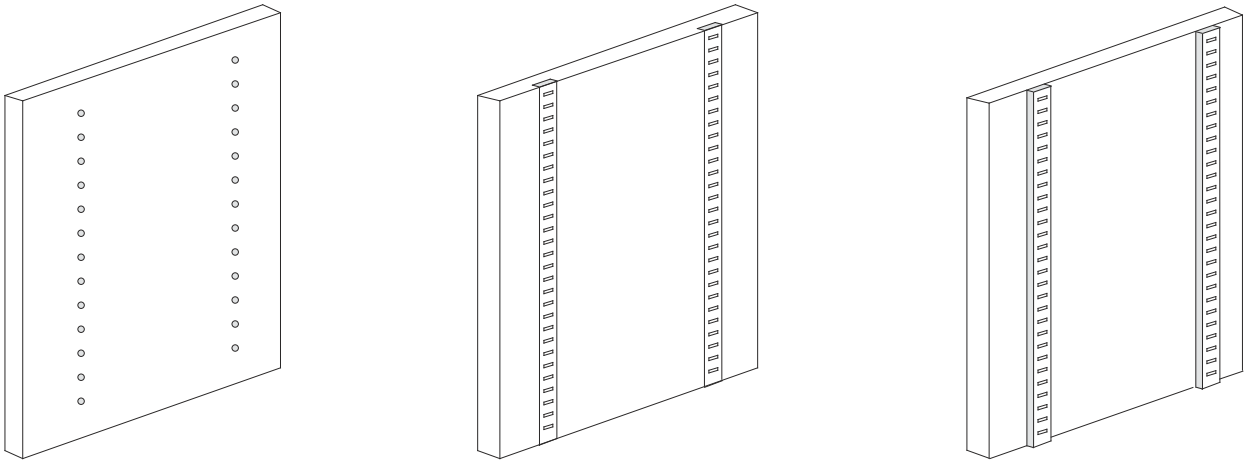
Laminate Cabinets

400B-T-9

Adjustable Shelf Techniques/Supports

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

Support, Materials, and Gap Tolerance	Premium	Custom	Economy
Adjustable shelf metal shelf standards (recessed flush)	√	√	√
Adjustable shelf multiple holes (min. 5 mm diameter, dual pins)	√	√	√
Adjustable shelf metal shelf standards (surface mounted)		√	√
Adjustable shelf multiple holes (min. 5 mm diameter, single pin)		√	√
Adjustable shelf mill Option supports			√
Maximum gap between each end of shelf and case side or standard	1.6 mm [1/16"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Center line of holes or standards shall be a min. of 24.5 mm [1"] and a max. of 76 mm [3"] from the front and back edge of the depth of shelf to be supported, with a spread of no less than 60% of the shelf depth in any case.			
Unsupported fixed shelf and/or cabinet bottom 1067 mm [42"] to 1220 mm [48"] to support 40 lb. total distributed load	25 mm [1"] particleboard or better	25 mm [1"] particleboard or better	19 mm [3/4"] particleboard or better
Fixed shelf and/or cabinet bottom 1220 mm [48"] or more supported by cleat at back edge or securely fastened thru back	19 mm [3/4"] particleboard or better		
Fixed shelf and/or cabinet bottom 1220 mm [48"] or more supported by center divider or other intermediate support	19 mm [3/4"] particleboard or better		
Note: A variety of engineered shelf supports are available from member manufacturers and should be evaluated and specified or approved by the design professional when desired. Gaps at adjustable shelf ends shall be greater when required by design, selected shelf hardware, or shelf material thickness considerations. Unsupported shelves or cabinet bottoms in excess of 1220 mm [48"] not permitted in any Grade.			



Adjustable Shelves - Figure 400-31

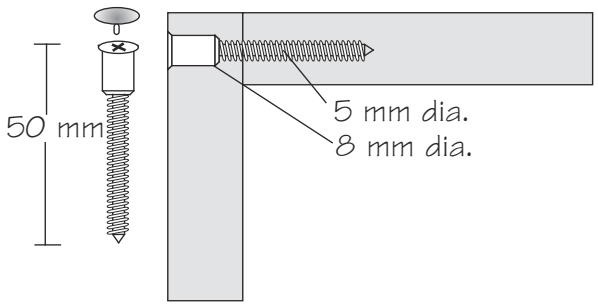
400B-T-10

Joinery of Case Body Members

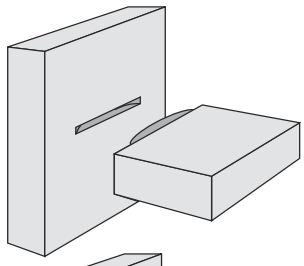
In the absence of specifications, the following standards will apply. Where more than one method or material is listed for a Grade, manufacturers will supply their choice from the alternatives. A check indicates permitted for the Grade specified.

Joinery Table	Premium	Custom	Economy
Tops, exposed ends and bottoms (finished ends on casework shall be integral, not applied secondarily)			
Stop dado*, glued with pressure, and either nailed, stapled or screwed (fasteners will not be visible on exposed parts)	√	√	√
Doweled, glued with pressure; approx. 1 per 75 mm of joint [4/foot]	√	√	√
European assembly screws (37 mm from end, 128 mm on center, fasteners will not be visible on exposed parts)	√	√	√
Fully concealed interlocking mechanical system	√	√	√
Spline or biscuit, glued with pressure (approx. 1 per 100 mm of joint)		√	√
Through dado, glued with pressure; or exposed European assembly screws with trim caps			√
Exposed end corner details and face frame attachment			
Mitered joint: lock miter or spline or biscuit, glued under pressure (no visible fasteners)	√	√	√
Non-mitered joints, i.e. 90 degree applications: butt joint glued under pressure (no visible fasteners)	√	√	√
Fully concealed interlocking mechanical system	√	√	√
Butt joint, glued and finish nailed		√	√
Butt joint, finish nailed			√
Cabinet backs - Wall hung			
In all Grades, wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Hanging/mounting mechanisms should transfer load to case body member(s).			
Captured in grooves on cabinet sides and bottom; securely fastened	√	√	√
Side bound, captured in groove or rabbetts; securely fastened		√	√
Full overlay, plant-on backs: min. 12.7 mm [1/2"] thick attached with min. #8 low root, high thread (not "drywall") screws spaced max. 200 mm [8"] on center. Anchor strips not required for backs 12.7 mm [1/2"] or thicker, so attached.	√ Edge of back not exposed on finished ends	√ Edge of back not exposed on finished ends	√ Edge of back exposed on finished ends
Mill option, but backs are required when back is exposed to view after installation and for all wall cabinets in any Grade of Work.			√
Cabinet backs - Floor standing			
Side bound, captured in grooves; securely fastened to top and bottom	√	√	√
Side bound, placed in rabbets; securely fastened in rabbets		√	√
Full overlay, plant-on backs: min. 12.7 mm [1/2"] thick attached with min. #8 low root, high thread (not "drywall") screws spaced max. 200 mm [8"] on center. Anchor strips not required for backs 12.7 mm [1/2"] or thicker, so attached. (See illustrations following this table.)	√ Edge of back not exposed on finished ends	√ Edge of back not exposed on finished ends	√ Edge of back exposed on finished ends
Mill option, back required when specified or when exposed to view			√
Anchor strips (for cabinet backs less than 12.7 mm [1/2"] thick)			
Min. 12.7 mm [1/2"] thick lumber or panel product, min. 63.5 mm [2-1/2"] width; securely attached to cabinet body members on the wall side of the cabinet back - top and bottom for wall hung cabinets, top only for floor standing cabinets.	Required	Required	Not required

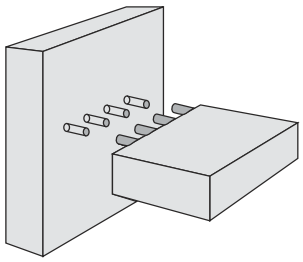
Laminate Cabinets



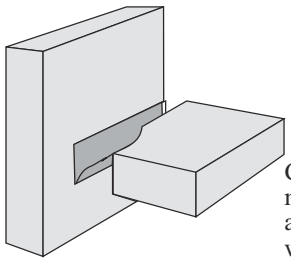
The use of steel "European" assembly screws is acceptable for all grades of work. The illustrated screw is to be used no more than 37 mm from each end, with subsequent screws spaced no more than 128 mm on center. Glue is not required with this system. Screw heads and/or plastic trim caps may not be visible on exposed surfaces in Premium & Custom Grade. Trim caps may be visible on exposed surfaces in Economy Grade, and on semi-exposed surfaces in any Grade.



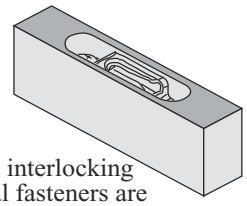
Spline or Biscuit



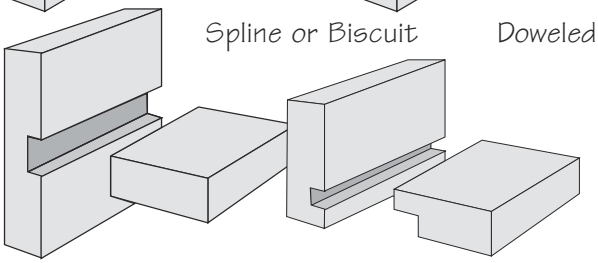
Doweled



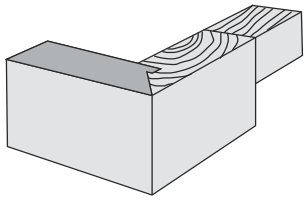
Stop Dado*



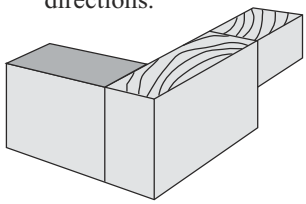
Concealed interlocking mechanical fasteners are acceptable for any grade of work when installed following manufacturers directions.



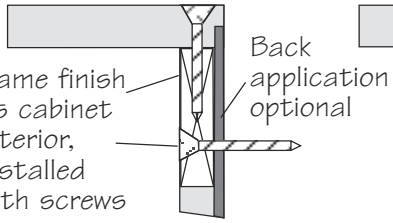
Thru Dado



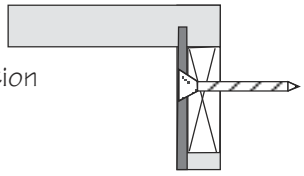
Lock Miter



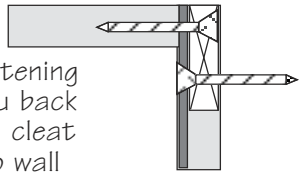
90 degree joint



Special application Internal Anchor Strip

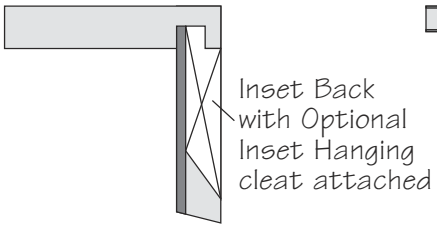


Full Bound Back

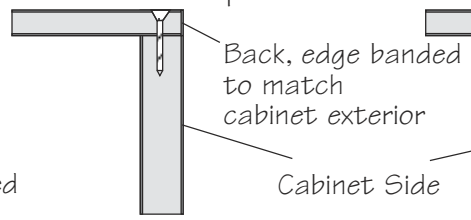


Side bound Recessed Back

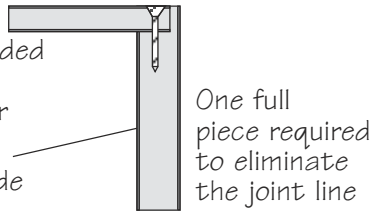
NOTE ABOUT SCREWS: The use of "drywall" screws is not permitted. Use heavy shank steel screws.



Vertical Section
Special application
External Hanging Cleat



Horizontal Section
Semi-exposed
Plant-on Back



Horizontal Section
Exposed
Plant-on Back

* Stop dado not required when concealed behind face frames or similar covers at point of connection.
NOTE: When not in violation of design, leading edges of intersecting members may be set back not to exceed 3.2mm [1/8"] provided setback is consistent. Joints in backs must occur at divisions or fixed shelves for fastening; or be splined or otherwise reinforced or supported. See Section 1700 for mounting and hanging suggestions.

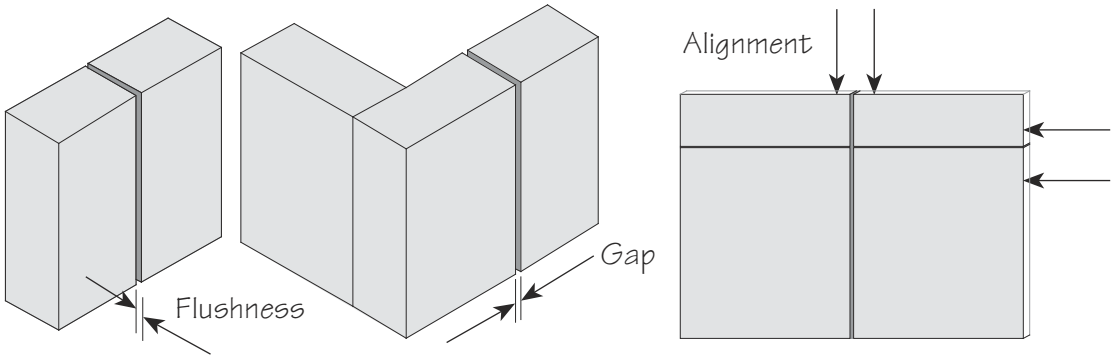
Case Joinery - Figure 400-32

Compliance Criteria

400B-C-1

Fitting of Exposed Casework Doors, Drawers and Removable Panels

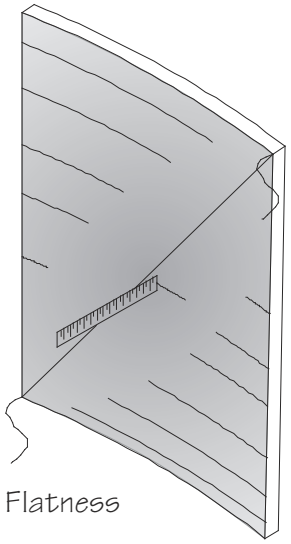
Target Fitting Tolerances	Premium	Custom	Economy
Gap between doors, drawers, panels, and frames Door to door; door to drawer; drawer to drawer	3.2 mm [1/8"] ± 0.8 mm [1/32"]	3.2 mm [1/8"] ± 1.6 mm [1/16"]	3.2 mm [1/8"] ± 2.4 mm [3/32"]
Maximum variation in vertical and horizontal alignment between adjacent door and drawer edges, in the normal closed position at rest Door to door; door to drawer; drawer to drawer	0.8 mm [1/32"]	0.8 mm [1/32"]	1.6 mm [1/16"]
Maximum variation in flushness of adjacent door and drawer faces Door to door; door to drawer; drawer to drawer	0.8 mm [1/32"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Note: Tolerances are subject to component size, hardware choices, allowable warp, installation variations, etc. The maximum deviations listed are subject to the above conditions.			



Fitting Tests - Figure 400-33

400B-C-2

Flatness of Exposed Case Doors (Maximum Deviation)



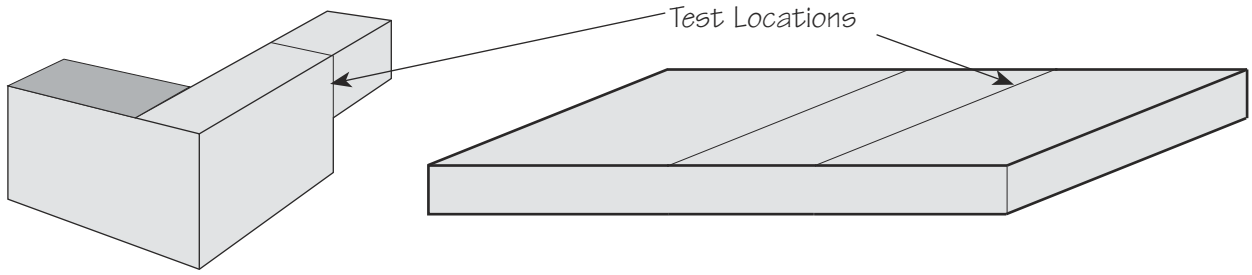
Flatness Test - Figure 400-34

Laminate Cabinets

400B-C-3

Flushness Between Exposed Factory Assembled Joints (Maximum Variation)

	Premium	Custom	Economy
Measured with a feeler gauge	.13 mm [.005"]	.25 mm [.010"]	.38 mm [.015"]



Flushness Tests - Figure 400-35

400B-C-4

Gap Tolerances

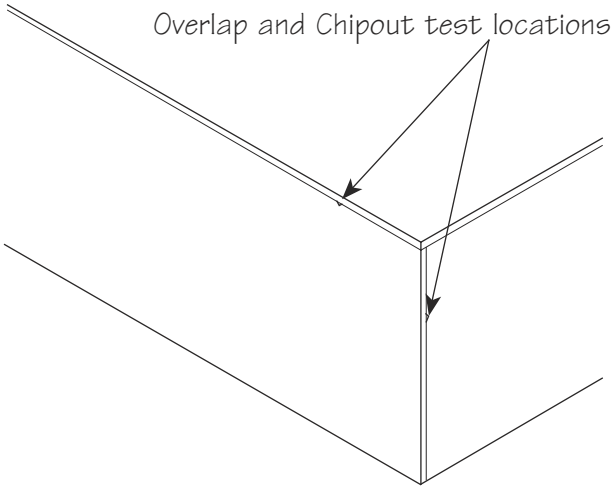
NOTE: Maximum gap between exposed components shall be tested at points designed to join; where members contact or touch. The following table is used to test compliance with the gap tolerances allowed.

Gap Tolerances	Premium	Custom	Economy
Maximum gap between fixed Exposed components	.4 mm [1/64"]	.8 mm [1/32"]	1.6 mm [1/16"]
Maximum length of gap in fixed Exposed components	76 mm [3"]	127 mm [5"]	203 mm [8"]
Maximum gap between fixed Semi-exposed components	.8 mm [1/32"]	1.6 mm [1/16"]	3.2 mm [1/8"]
Maximum length of gap in fixed Semi-exposed components	152 mm [6"]	203 mm [8"]	305 mm [12"]
Maximum gap between each end of adjustable shelf and case side	1.6 mm [1/16"]	1.6 mm [1/16"]	3.2 mm [1/8"]
NOTE: Gaps at adjustable shelf ends may be greater if required by selected shelf hardware or material thickness considerations. No gap permitted in joints of stile and rail work or joints of face frame stiles and rails. No gap may occur within 1219 mm [48"] of another gap (except adjustable shelf ends.)			

400B-C-5

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.

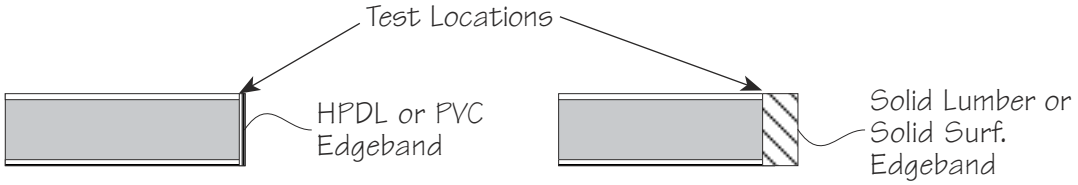


Edge/Joint Quality - Figure 400-36

400B-C-6

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 400-37

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General Criteria

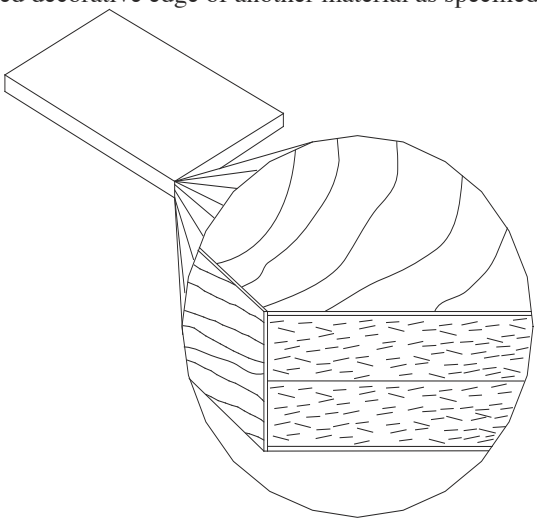
400C-G-1

Scope

Includes

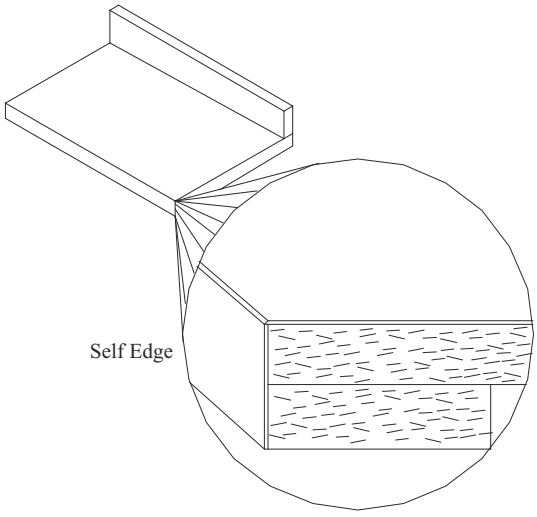
This section will cover the following countertops and their fabrication:

A. Panel Product Tops - This type of top consists of wood veneer over a stable substrate, veneer edge banded or with an applied decorative edge of another material as specified.

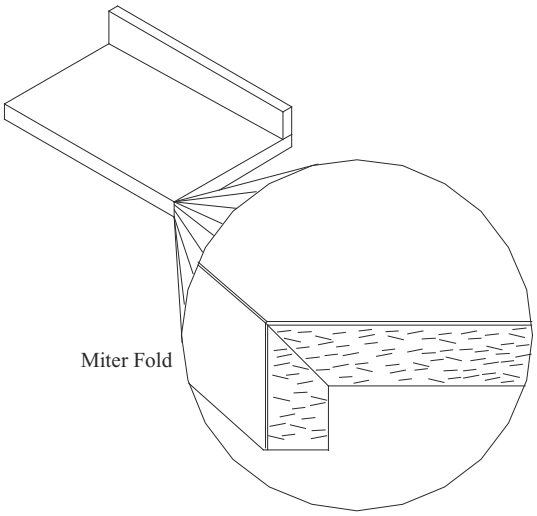


Panel Product - Figure 400-38

B. High Pressure Decorative Laminate (HPDL) Tops - This type of top consists of plastic laminate over a stable substrate, self edge banded or with an applied decorative edge of another material as specified.

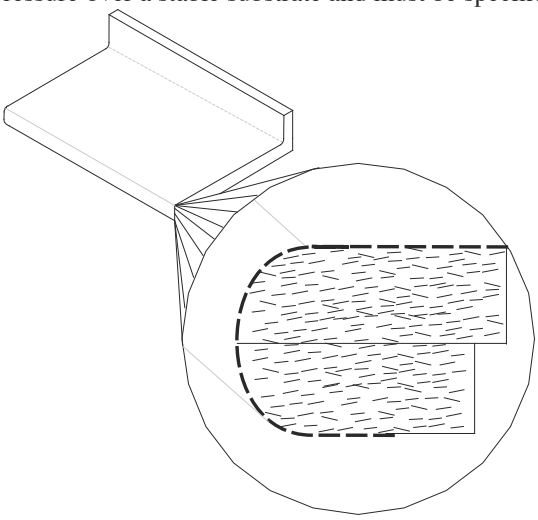


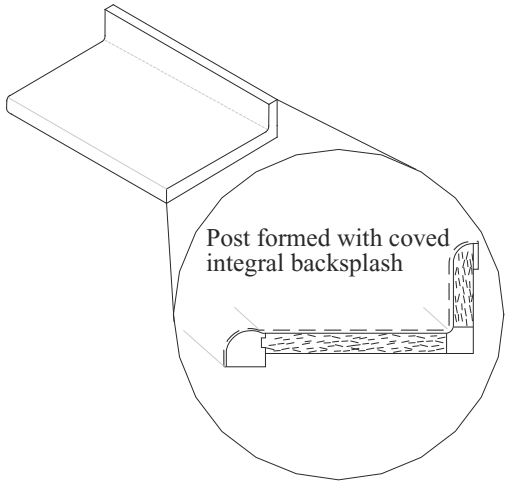
Self-edged HPDL - Figure 400-39



Miter Folded HPDL - Figure 400-40

C. Post-formed High Pressure Decorative Laminated Tops - This type of top consists of plastic laminate formed with heat and pressure over a stable substrate and must be specified.

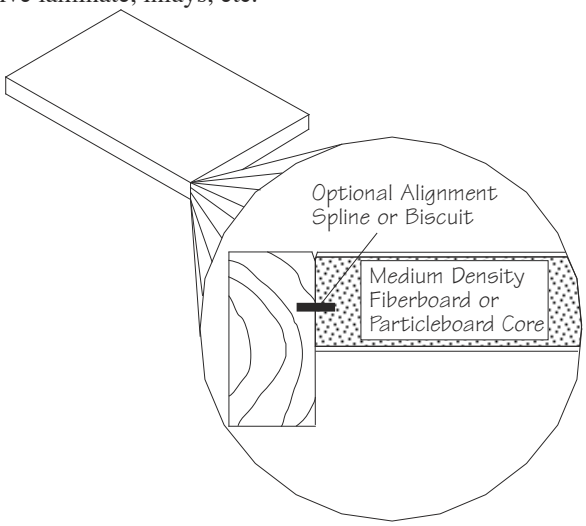




Post-formed - Figure 400-41

Countertops

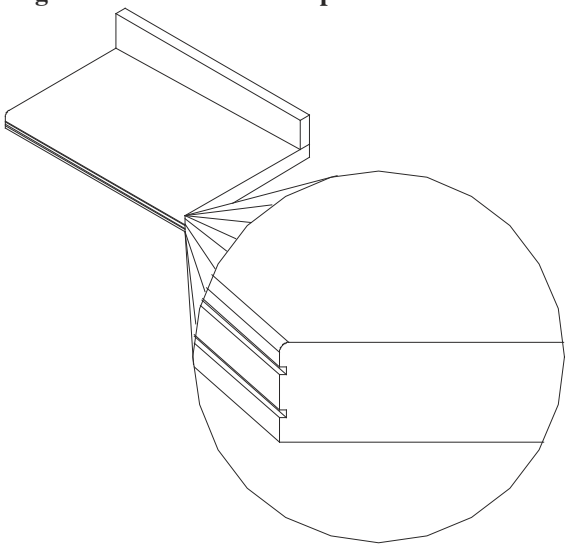
D. Combination Material Tops - This type of top may consist of a mixture of materials, such as wood, high pressure decorative laminate, inlays, etc.



Combination - Figure 400-42

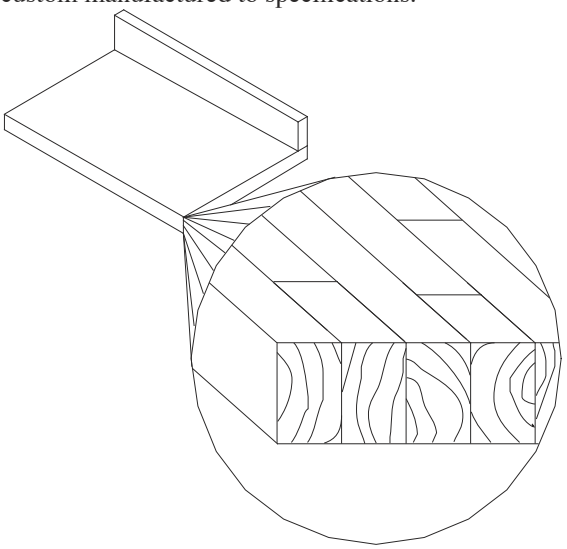
E. Solid Surfacing Materials - This type of top requires special fabrication techniques, depending upon the composition of the product. Many woodworkers fabricate and install the products. Must be specified by brand name and manufacturer. Manufacturing of these tops is not governed by these Standards.

Note: They must be fabricated and installed according to the manufacturer's specifications.



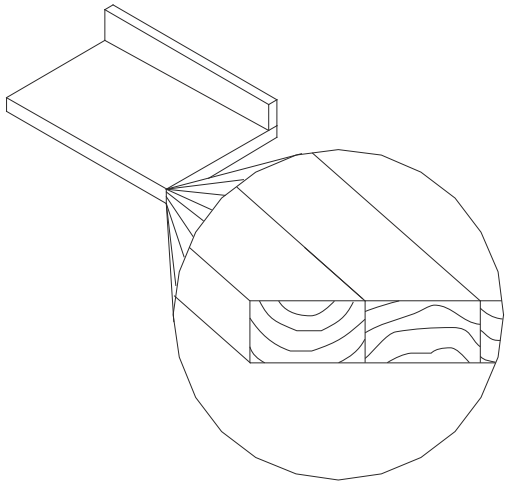
Solid Surface - Figure 400-43

F. Solid Laminated Tops - This type of top consists of narrow strips of wood, face glued together, similar to "butcher block" but custom manufactured to specifications.



Solid Laminated - Figure 400-44

G. Solid Wood Tops - This type of top consists of boards edge glued to a desired width. In this kind of top there is no assurance of matching grain or color at the edges or individual ends of the boards.



Solid Wood - Figure 400-45

H. Epoxy Resin Laboratory Tops and Splashes - Specially formulated resin tops designed to resist harsh chemicals. Must be specified by brand name and manufacturer. Manufacturing of these tops is not governed by these Standards.

Note: They must be fabricated and installed according to the manufacturer's specifications.

General Note: If the casework and the countertop are not made by the same company, it is the responsibility of the owner's representative to communicate finished heights, depths, and reveals. Any build-up required under the counter top is the responsibility of the counter top fabricator.

For base cabinets with countertops, the reveal between the lower edge of the top and the upper edge of the adjacent door or drawer front shall be consistent in light of the design æsthetic within a tolerance of ± 1.5 mm [$^{1}/_{16}$"] in all Grades of Work.

400C-G-2

General Guidelines for Fabrication and Installation for HPDL

Sections 400C-G-2 and 400C-G-3 are data taken in part from the National Electrical Manufacturers Association (NEMA), and are used with permission.

When making any cutout (as for electrical receptacles, ranges, sinks, grills, windows, chopping blocks, L-shaped counter tops, and so forth) all inside corners should be smoothly rounded using a minimum comer radius of 1/8" [3 mm] A router is an ideal tool for making cutouts. (1)

When removing large areas from a sheet of laminate (e.g., a sink cutout), the connecting strips between the remaining areas should be left as wide as possible. (2)

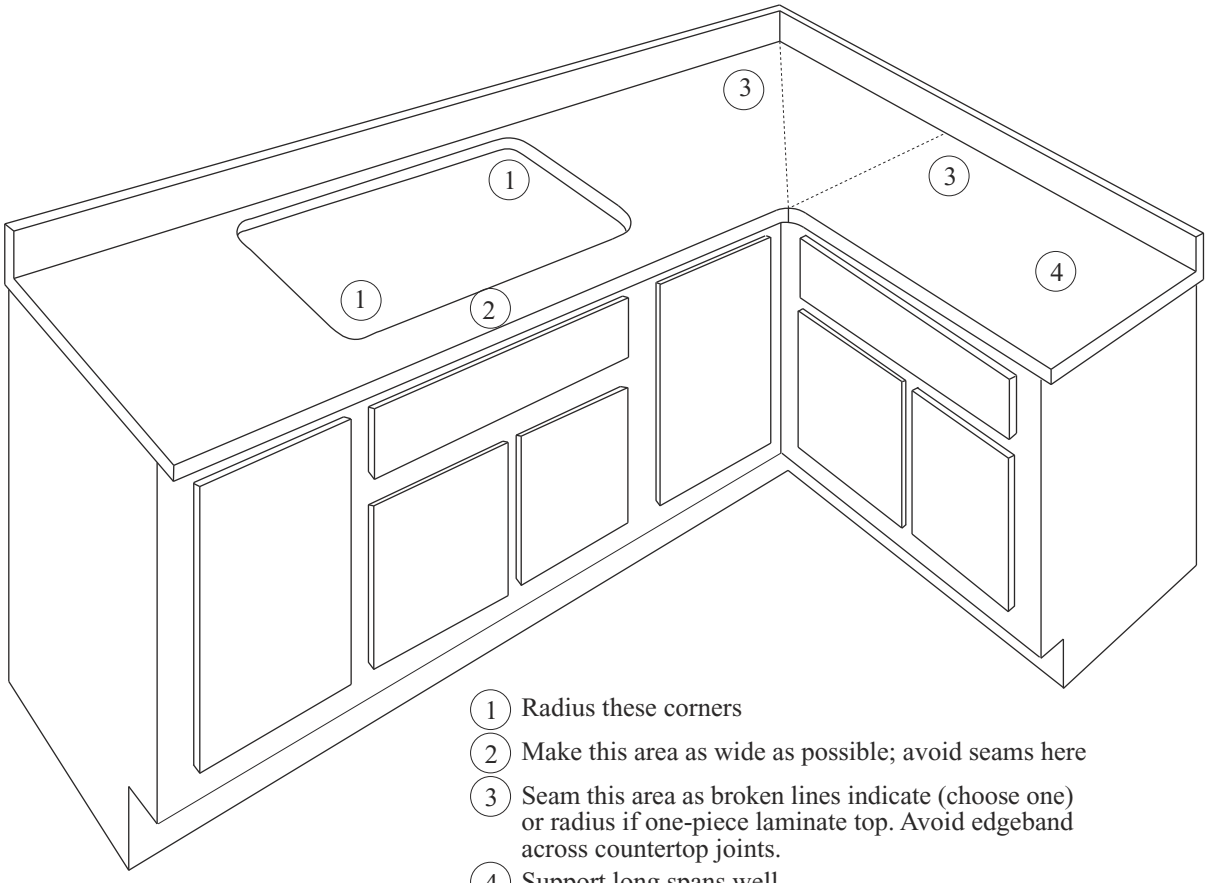
Factory-trimmed sheet edges and saw-cut edges should be routed or filed. Original edges on factory-cut laminates are not finished edges since oversized laminates are supplied to allow for proper fabrication.

All chips, saw marks, and hairline cracks should be removed from cuts by filing, sanding, or routing.

Backsplash seam areas on countertops which are exposed to spilled water or other fluids should be *sealed with caulking* to ensure a tight seal.

When laminate is bonded to a substrate, precaution should be taken to prevent warping of the assembly. Laminates used on shelves or in long unsupported spans should make use of a backer. A thick backer (approximately the same thickness as the face sheet) can provide more stability than a thin backer. Thicker laminates can offer better dimensional stability and resistance to stress (corner) cracking. Paint, varnish, vinyl film, and fiber backers will not balance HPDL.

Before using nails or screws, oversized holes should be drilled through the laminate with a sharp drill bit.



1. Radius these corners
2. Make this area as wide as possible; avoid seams here
3. Seam this area as broken lines indicate (choose one) or radius if one-piece laminate top. Avoid edgeband across countertop joints.
4. Support long spans well

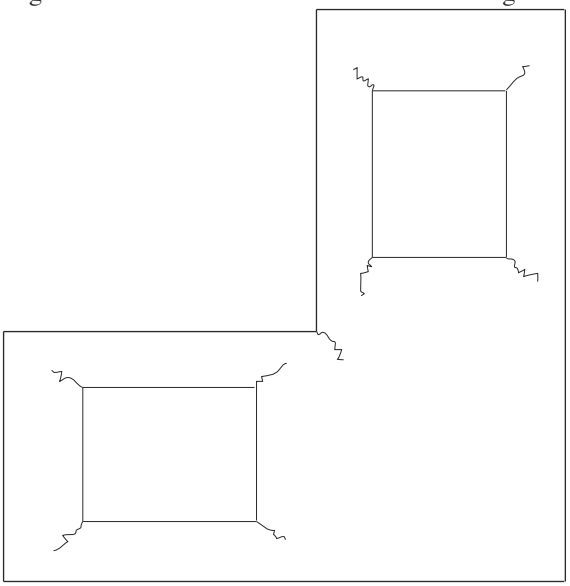
Laminate Cut-outs - Figure 400-46

400C-G-3

Typical Problems - Causes and Prevention

Some of the problems that may arise after laminates have been fabricated and installed are the following:

Cracking of the laminate at corners and around cutouts may be caused by improper conditioning, improper bonding and, sometimes, poor planning, or any combination of these reasons. Cracking may be caused by shrinkage; conditioning helps to prevent it. Rough edges, inside corners that have not been rounded, binding and/or forced fits can contribute to cracking.

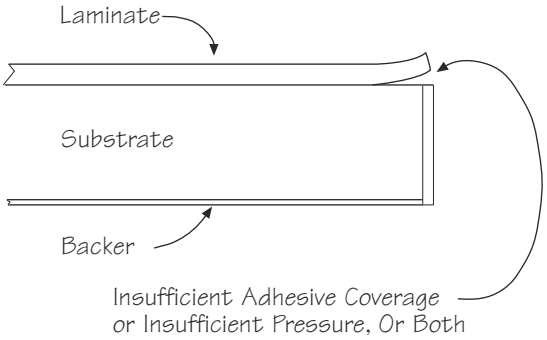


Cracking Cutouts - Figure 400-47

If the seams are properly placed in the layout of the laminate, stresses can be minimized.

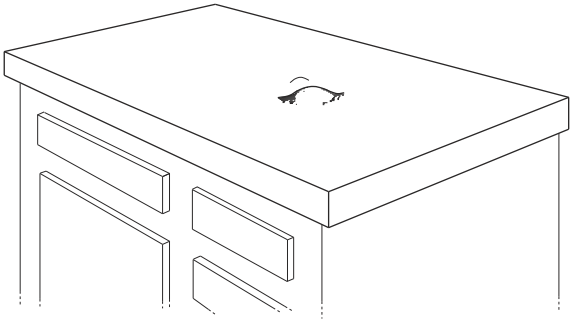
Separation of the laminate from the substrate may generally be caused by a poor adhesive bond. The bonding procedure should be reviewed with close attention to uniform glue line, uniform pressure and cleanliness of mating surfaces. If the edges fail to bond, extra adhesive may be applied and the product reclamped. Contact adhesives can often be reactivated by heat and rebonded by adequate pressure if the glue line is not starved.

NOTE: Some cleaning agents, excess heat, and moisture can contribute to bond failure at joints and edges.



Separation from Substrate - Figure 400-48

Blistering or bubbling of the laminate surface away from the substrate can be caused by excessive heat, starved glue line, improper conditioning, and inadequate pressure or drying. When contact adhesive is used, the condition can sometimes be corrected by applying heat and pressure. But uniform glue lines and pressure over clean conditioned laminates and substrate might have prevented the problem.

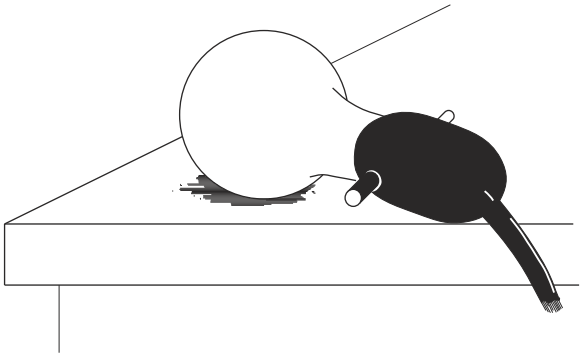


Blistering or Bubbling - Figure 400-49

Countertops

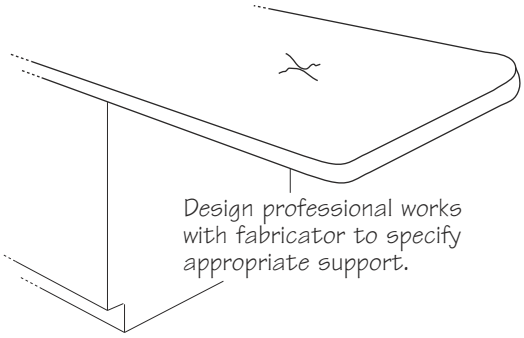
The forming of a blister or bubble over a small area, often accompanied by a darkening of the laminate can be caused by continual exposure to a source of heat. Electrical appliances which produce heat and light bulbs should not be placed in contact with or close proximity to laminate surfaces.

Repeated heating may cause the laminate and adhesive to react and finally deteriorate after continual exposure to temperatures above 66° C [150° F].



Exposure to Heat Source - Figure 400-50

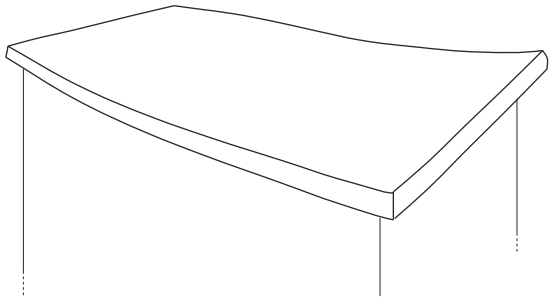
Cracking of the laminate in the center of the sheet may be caused by flexing of the substrate when it covers a wide span or by spot gluing. Wide spans call for sturdy framework, and special attention should be given to the uniformity of glue lines and gluing pressures. Also, care should be taken to avoid trapping foreign objects between the laminate and the substrate.



Laminate Cracking - Figure 400-51

Long, unsupported spans are generally avoided. Most manufacturers limit spans to between 760 to 915 mm [30 to 36"] before the addition of a support of some type. A wide variety of engineering solutions are available. Consult your AWI/AWMAC woodworker during the design phase of the project.

Warping of the assembly may be generally caused by unbalanced construction or unbalanced glue lines. Proper HPDL backer sheets should be chosen and aligned so that their grain direction is parallel to that of the face laminate. Proper gluing is also important. If the substrate is secured to a framework, the framework should be designed to hold the assembly to a flat plane. Conditioning is also helpful.



Laminate Warping - Figure 400-52

Technical Criteria

400C-T-1

Material Grades and Size Requirements

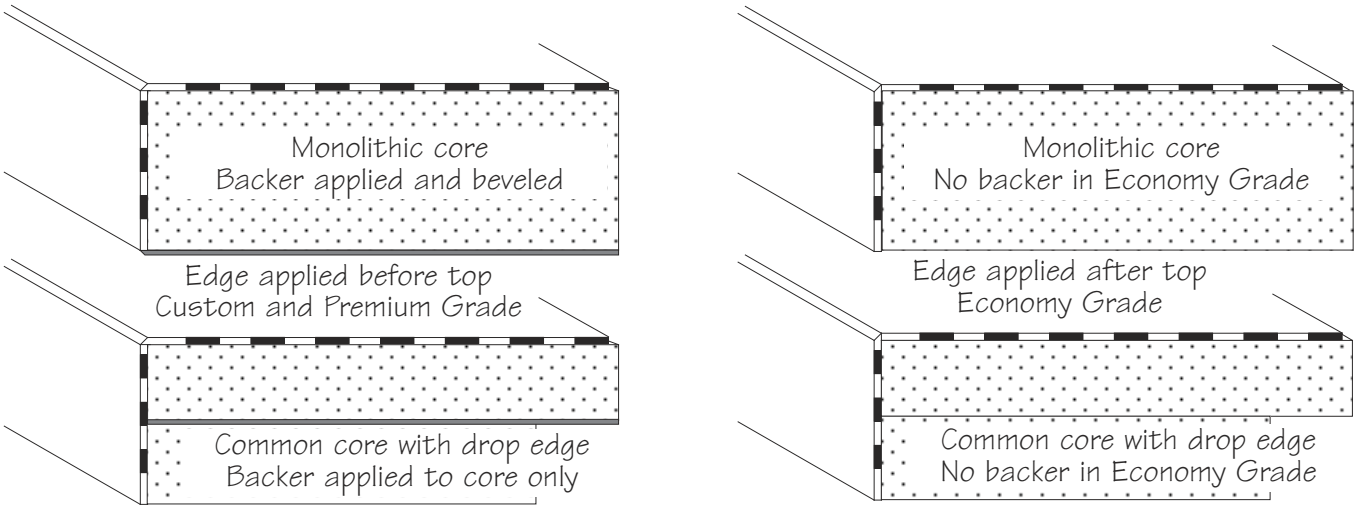
Type	Premium	Custom	Economy
Solid wood	Grade I	Grade II	Mill option
Solid laminated	Grade I	Grade II	Mill option
Panel products	"AA" Face Veneer	"A" Face Veneer	Mill option
HPDL Overlay (see Sect. 200)	HGS - 1.2 mm [.048"]	HGS - 1.2 mm [.048"]	HGS - 1.2 mm [.048"]
Width and Match			
Solid wood - Max. width of individual boards in glue-up: Hardwood - 108 mm [4-1/4"] Softwood - 184 mm [7-1/4"]	Well matched for grain and color	Compatible for color	No match required
Solid wood, face laminated	Well matched for grain and color	Compatible for color	No match required
Solid wood and veneer combined and/or adjacent*	Well matched for grain and color	Compatible for color	No match required
Panel products - If width exceeds 1219 mm [48"], shall have shop assembled joint	Sequence matched	Compatible for color	No match required
HPDL overlay - If width exceeds 1524 mm [60"], shall have shop assembled joint (some limited to 1219 mm [48"], determined by pattern selected or specified)	No match required	No match required	No match required
* It is recognized that the grain and color of solid lumber and the same species and cut of veneer will appear different. The cutting and pressing of the veneer often modifies the surface cells. These natural differences are acceptable in any grade.			
Length in one piece			
Solid wood: Most hardwoods - 3 m [9'-10"] Most softwoods - 4.5 m [14'-9"]	No match required	No match required	No match required
Solid Laminated: Most Hardwoods - 3 m [9'-10"] Most Softwoods - 4.5 m [14'-9"]	No match required	No match required	No match required
Panel products:	3 m [9'-10"] maximum End match, shop prepared	3 m [9'-10"] maximum Compatible for color	2.4 m [7'-10"] max. No match required
HPDL overlay: 3.6 m [11'-9"] provided pattern is available in that length	Match required, shop prepared joints	No match required, shop prepared joints	No match required, field joints
Minimum Thickness			
Solid wood	25.4 mm [1"]	25.4 mm [1"]	19 mm [3/4"]
Solid laminated	28.6 mm [1-1/8"]	28.6 mm [1-1/8"]	19 mm [3/4"]
Panel products	19 mm [3/4"]	19 mm [3/4"]	19 mm [3/4"]
HPDL substrate	19 mm [3/4"]	19 mm [3/4"]	19 mm [3/4"]
Core and substrate			
Panel product for HPDL	Industrial grade medium density particleboard or medium density fiberboard		
Premium and Custom Grade tops and backsplashes in which sinks occur	**Shop sanded exterior grade veneer core plywood; or industrial grade particleboard or fiberboard with a 24 hour thickness swell factor of 5% or less and a 24 hour water absorption factor of 10% or less**		Industrial grade medium density particleboard or medium density fiberboard

Countertops

400C-T-2

Workmanship

Workmanship Table	Premium	Custom	Economy
Delamination	None allowed	None allowed	None allowed
Selection at field joints on exposed surfaces	Selected for uniformity of grain, color, and/or pattern	Selected for pleasing blend of grain or pattern	No selection required
Selection for Solid Laminated (butcher block) components	Selected for pleasing blend of grain or pattern	No selection required	No selection required
End joints for solid laminated (butcher block) components	Shall meet joint tolerances for exposed components, and no more than 1 per 0.4 square m [4 sq ft]	Shall meet joint tolerances for exposed components, and no more than 1 per 0.2 square m [2 sq ft]	Shall meet joint tolerances for exposed components, and no more than 1 per 0.1 square m [1 sq ft]
End matching of veneers on exposed surfaces	Leaves individually book matched and end matched	Selected for pleasing blend of grain or pattern	No matching required
Backing sheet requirements for HPDL overlay, (required under narrow applied drop edge or return only if specified)	Standard 0.5 mm [.020"] phenolic backing minimum required in all cases	Paper backing required wherever unsupported area exceeds .6 square m [6 sq ft] and core is 19 mm [3/4"] thick; .8 square m [8 Sq Ft] and core is 25 mm [1"] thick; 1 square m [10 Sq Ft] and core is 28 mm [1-1/8"] or thicker	No backing sheet required
Application of Backing Sheet	Prior to application of drop edge and/or front edge lamination or finish material	Prior to application of drop edge and/or front edge lamination or finish material	No backing sheet required
Application of HPDL self edge	Edge laminated before top	Edge laminated before top	Edge laminated after top
Miter fold HPDL top	Made from a single panel in one machining process; miterfold edge and top laminated at the same time; tape, machining, adhesive, folding, glue, clamp, and clean		
Flatness (after installation) is a defect when maximum deviation exceeds	1 mm [1/16"] in any 1220 mm x 2440 mm [4' x 8' nom.] segment	3 mm [1/8"] in any 1220 mm x 2440 mm [4' x 8' nom.] segment	6 mm [1/4"] in any 1220 mm x 2440 mm [4' x 8' nom.] segment
Field Joints, (not permitted within 460 mm [18"] and water-tight if within 1220 mm [48"] of sink cut outs for any grade)	More than 1220 mm [48"] apart, and shall not occur within 1220 mm [48"] of the end of any top	More than 914 mm [36"] apart, and shall not occur within 914 mm [36"] of the end of any top	No requirement
NOTE: Site conditions often dictate the use and placement of field or factory joints. Factory or field openings and/or cutouts must have corner radii of no less than 3.2 mm [1/8"] (HPDL and substrate) at all inside corners. Consult your manufacturer for engineering suggestions prior to the beginning of fabrication.			
Sealing of substrate at sink cuts	Required	Required	No requirement
Maximum allowable separation between factory assembled splash and top components	0.4 mm [1/64"] x 76 mm [3"] and no more than 1 per 1219 mm [48"] section of top	0.8 mm [1/32"] x 127 mm [5"] and no more than 1 per 1219 mm [48"] section of top	1.6 mm [1/16"] x 203 mm [8"] and no more than 1 per 1219 mm [48"] section of top
Application of silicone sealant to factory assembled joint between HPDL top and splash	Required	Not required	Not required
Use of thermoset decorative overlay as backer material	Not allowed	Allowed	Allowed
Joint in top HPDL or top substrate at factory sink cut out	Not permitted within 460 mm [18"]	Not permitted within 229 mm [9"]	Not permitted at cut out



Note: In the absence of specifications, the sequence of all edge applications other than HPDL material shall be at the option of the manufacturer. Wood, 3 mm PVC, and T-mold edges are typically applied after the top is laminated.

Edge application for HPDL - Figure 400-53

400C-T-3

Smoothness of Exposed Surfaces (Minimum requirements for wood components)

Sanding	Premium	Custom	Economy
Finish Condition for flat face surfaces of wood and veneer (does not apply to High Pressure Decorative Laminate)			
Transparent	180 grit, no cross scratches	150 grit	100 grit
Opaque	180 grit	150 grit	100 grit
NOTE: Cross scratches are defined as any sanding scratch occurring at more than a 5 degree angle to the grain direction. Sand-through of veneer not acceptable in any Grade.			

400C-T-4

Selection for Grain and Color

Plant Assemblies

For Transparent finish, adjacent members shall …

• Premium Grade: … be well matched for grain and color.

• Custom Grade: … be compatible for color.

• Economy Grade: … 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.

Note: The 400C-T-4 criteria do not apply to high pressure decorative laminates or to solid surfacing materials. They are intended to apply to lumber and veneer members of countertop constructions.

400C-T-5

Engineering for Overhang and Cantilever

The maximum distance a countertop may cantilever, with or without sub top, from a support is 305 mm [12"], whether in the front, back, or end.

Note: High pressure decorative laminate (HPDL) is not 100% dimensionally stable and its dimensional behavior is similar to wood. Significant variations in humidity may result in dimensional changes which may have the effect of causing joints to open slightly. Conditioning of laminate is important to achieve moisture equilibrium of laminate and substrate before assembly. Maintenance of the built environment by the owner within relative humidity guidelines set forth in Section 1700 of this Standard is required to minimize expansion and contraction.

Countertops

400C-T-6

Wood Finished Edge Application

A check indicates permitted for the Grade specified.

Finished Wood Edge to Top	Premium	Custom	Economy
Pressure glued (no nails or other visible fasteners)	√	√	√
Glue and finish nail		√	√
Nailed			√
NOTE: Filling nail holes is done during finishing. When factory finishing is not specified and/or part of the manufacturer's contract, the responsibility for filling and smoothing of fill material lies with the finishing contractor. When panel products are used for tops, engineering shall be selected to avoid nailing only into panel product edges.			

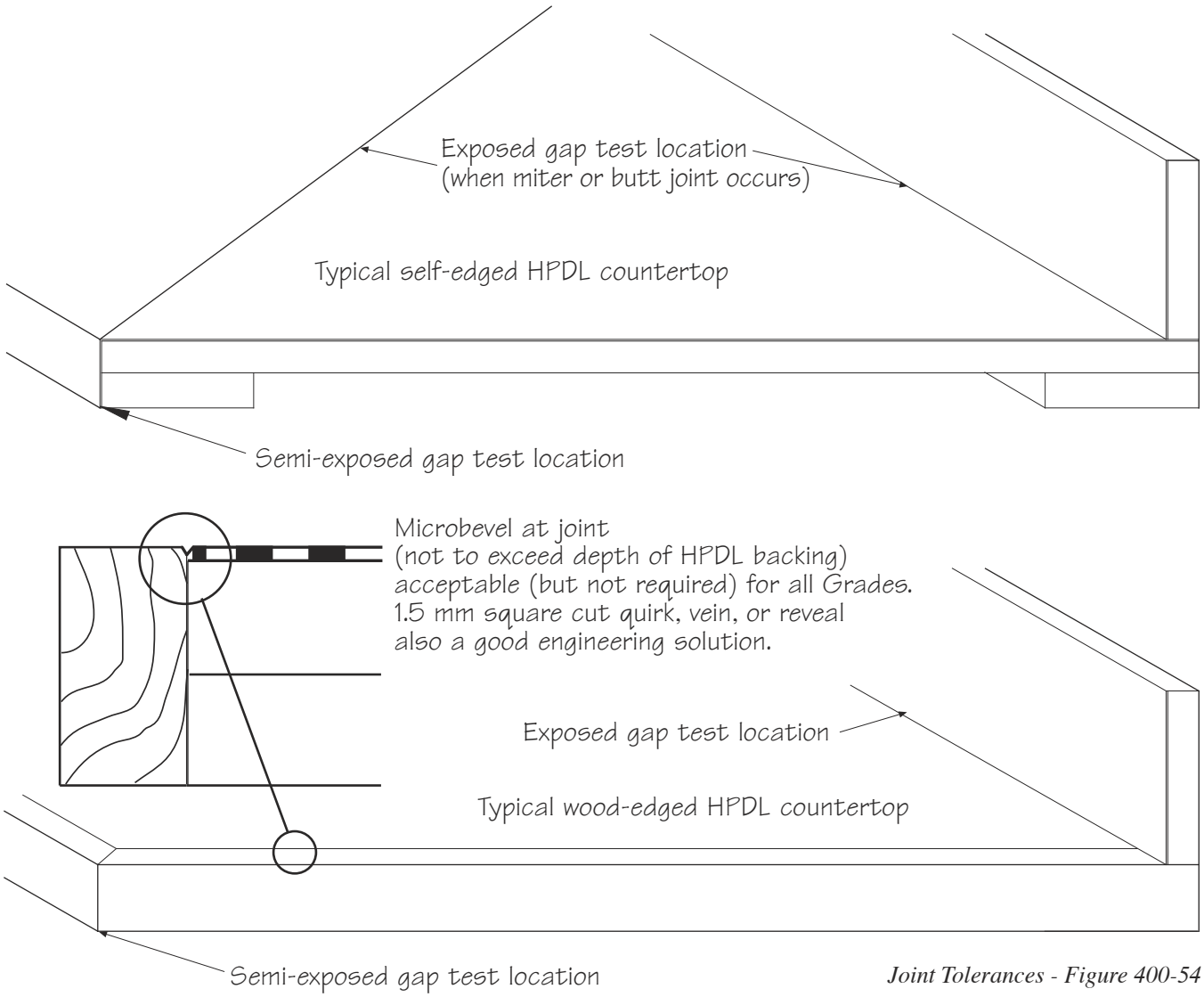
Compliance Criteria

400C-C-1

Joint Tolerances

Test criteria based on testing prior to the application of any fill material to the joint. Fill material is allowed, and often used, to create better joint appearance. Width of fill material greater than the following criteria is not permitted.

NOTE: Factory assembled components only, not field attached	Premium	Custom	Economy
Maximum gap between Exposed components	.4 mm [1/64"]	.8 mm [1/32"]	1.6 mm [1/16"]
Maximum length of gap in Exposed components	76 mm [3"]	127 mm [5"]	204 mm [8"]
Maximum gap between Semi-exposed components	.8 mm [1/32"]	1.6 mm [1/16"]	3 mm [1/8"]
Maximum length of gap in Semi-exposed components	152 mm [6"]	204 mm [8"]	305 mm [12"]
NOTE: No gap shall occur within 1220 mm [48"] of another gap (except adjustable shelf ends).			



Joint Tolerances - Figure 400-54

Countertops

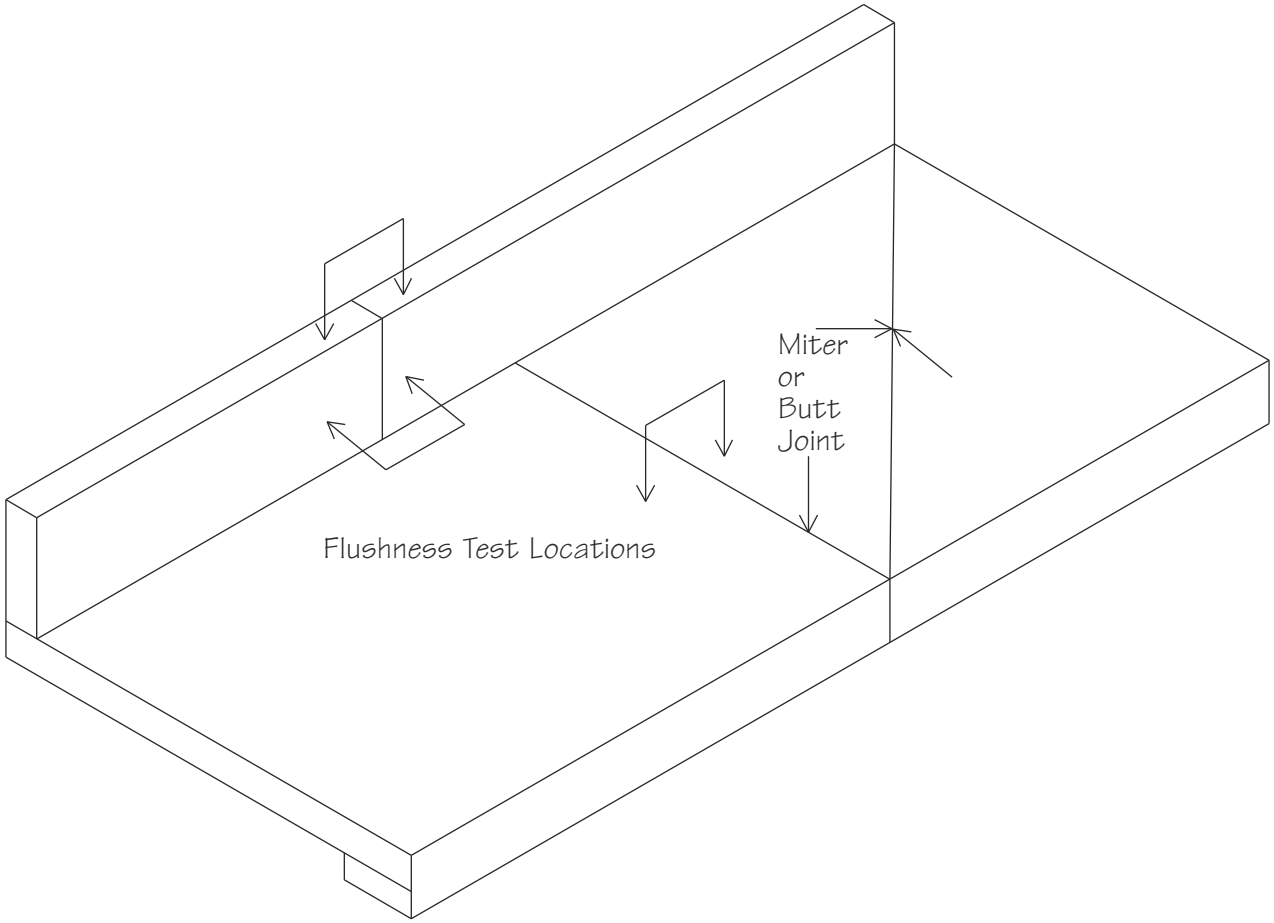
400C-C-2

Flushness Between Exposed Factory Assembled Joints (wood and non-wood)

Test criteria based on testing prior to the application of any fill material to the joint. Fill material is allowed, and often used, to create better joint appearance. Width of fill material greater than the following criteria is not permitted.

Note: HPDL is not dimensionally stable. Significant variations in humidity will result in dimensional changes which may have the effect of causing joints to open slightly. Conditioning of laminate and substrate to achieve moisture equilibrium is important before assembly. Maintenance of proper relative humidity by the owner is required in final use.

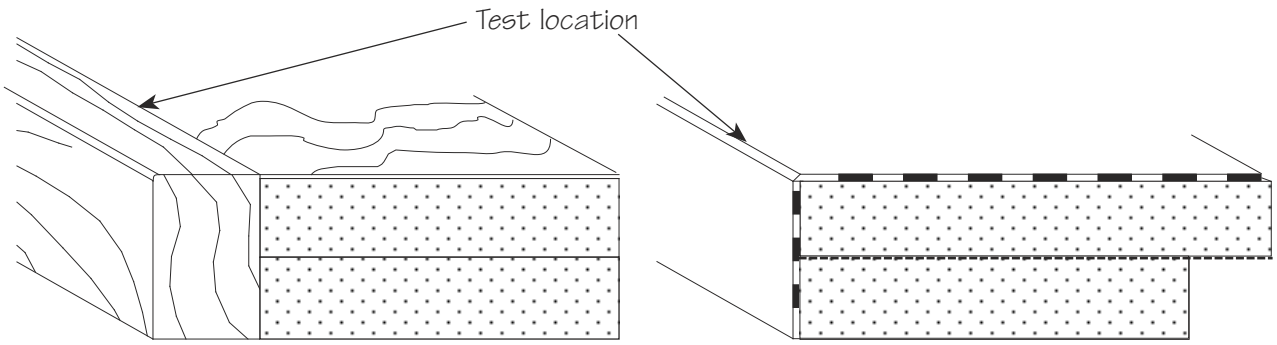
NOTE: Factory assembled components only, not field attached	Premium	Custom	Economy
Measured with a feeler gauge	0.1 mm (.005")	0.2 mm (.010")	0.3 mm (.015")



Flushness Tests - Figure 400-55

400C-C-3
Edge/Joint Quality

Premium	Custom	Economy
All wood edges shall be eased (sharp corner removed) unless profile or other treatment is specified. No chipout or tearout is allowed.	All wood edges shall be eased (sharp corner removed) unless profile or other treatment is specified. Chipout or tearout shall be inconspicuous when viewed at 610 mm [24"]. No chipout or tearout shall occur within 1220 mm [48"] of another.	All wood edges shall be eased (sharp corner removed) unless profile or other treatment is specified. Chipout or tearout shall be inconspicuous when viewed at 914 mm [36"]. No chipout or tearout shall occur within 1220 mm [48"] of another.
Joints and reveals shall be tightly fit. The use of fillers of any type shall not be allowed.	Joints and reveals shall be securely fit. The use of fillers of any type shall be inconspicuous when viewed at 610 mm [24"].	Joints and reveals shall be securely fit. The use of fillers of any type shall be inconspicuous when viewed at at 914 mm [36"].
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 inconspicuous 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 0.13 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 inconspicuous when viewed at 1220 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 0.13 mm [.005"] for a length of no more than 50.8 mm [2"] in any 1220 mm [48"] run. Chipout of the laminate shall be inconspicuous when viewed at 1829 mm [72"].
Removal of color/pattern of face material due to over-machining limited to 1.6 mm [1/16"] x 38.1 mm [1-1/2"] and may 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 may 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 may not occur within 1220 mm [48"] of a similar occurrence.
Miter fold edges shall have no open gaps on any exposed edge in any Grade of Work. Each edge shall be filed or sanded to ease sharp edge, just to remove sharpness with minimal exposure of inner layers.		
Note: HPDL is not dimensionally stable. Significant variations in humidity will result in dimensional changes which may have the effect of causing joints to open slightly. Conditioning of laminate and substrate to achieve moisture equilibrium is important before assembly. Maintenance of proper relative humidity by the owner is required in final use.		



Edge/Joint Quality - Figure 400-56

Design Ideas

400-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.

400-D-1

Detail Nomenclature

Familiarity with the labeled details on this page will facilitate communication between architects, designers, specifiers, and woodwork manufacturers by establishing common technical language.

Spline Joint: Used to strengthen and align faces when gluing panels in width or length, including items requiring site assembly.

Stub Tenon: Joinery method for assembling stile and rail type frames that are additionally supported, such as web or skeleton case frames.

Haunch Mortise and Tenon Joint: Joinery method for assembling paneled doors or stile and rail type paneling.

Conventional Mortise and Tenon Joint: Joinery method for assembling square-edged surfaces such as case face frames.

Dowel Joint: Alternative joinery method serving same function as Conventional Mortise and Tenon.

French Dovetail Joint: Method for joining drawer sides to fronts when fronts conceal metal extension slides or overlay the case faces.

Conventional Dovetail Joint: Traditional method for joining drawer sides to fronts or backs. Usually limited to flush or lipped type drawers.

Drawer Lock-Joint: Another joinery method for joining drawer sides to fronts. Usually used for flush type installation but can be adapted to lip or overlay type drawers.

Exposed End Details: Illustrates attachment of finished end of case body to front frame using a butt joint and a lock mitered joint.

Through Dado: Conventional joint used for assembly of case body members. Dado not concealed by application of case face frame.

Blind Dado: Variation of Through Dado with applied edge "stopping" or concealing dado groove.

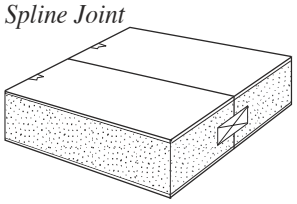
Stop Dado: Another method of concealing dado exposure. Applicable when veneer edging or solid lumber is used. Exposed End Detail illustrates attachment of finished end of case body to front frame using butt joint.

Dowel Joint: Fast becoming an industry standard assembly method, this versatile joinery technique is often based on 32 mm spacing of dowels.

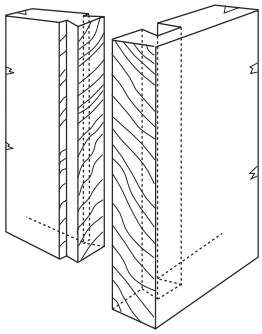
Edge Banding: Method of concealing plies or inner cores of plywood or particleboard when edges are exposed. Thickness or configuration will vary with manufacturers' practices.

Paneled Door Details: Joinery techniques when paneled effect is desired. Profiles are optional as is the use of flat or raised panels. Solid lumber raised panels may be used when width does not exceed the standard. Rim-raised panels recommended for Premium Grade or when widths exceed this Standard or when transparent finish is used.

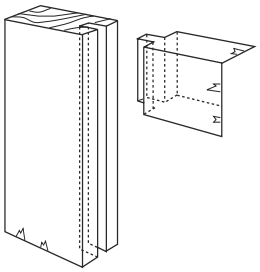
Spline Joint



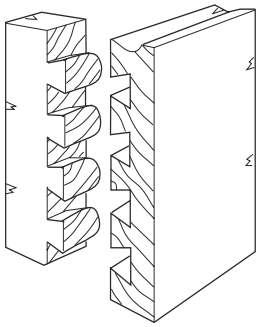
French Dovetail Joint



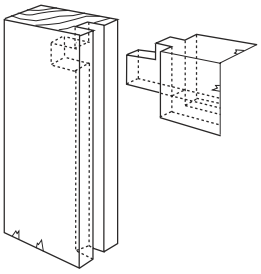
Stub Tenon



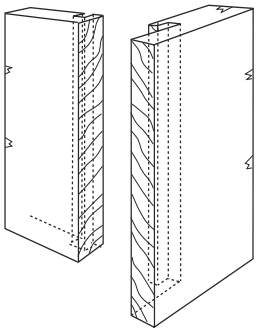
Conventional Dovetail Joint



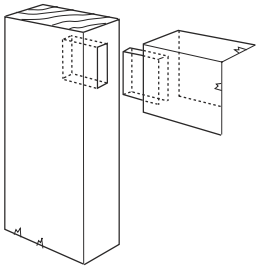
Haunch Mortise and Tenon Joint



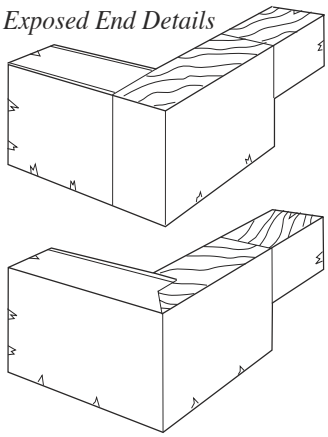
Drawer Lock-Joint



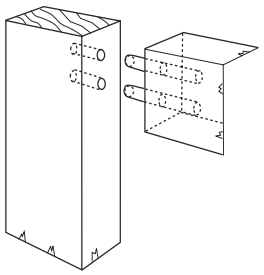
Conventional Mortise and Tenon Joint

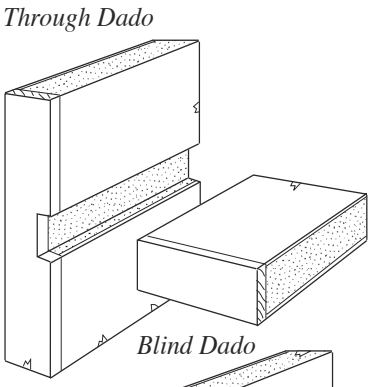


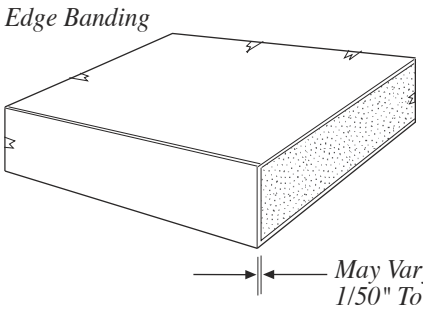
Exposed End Details

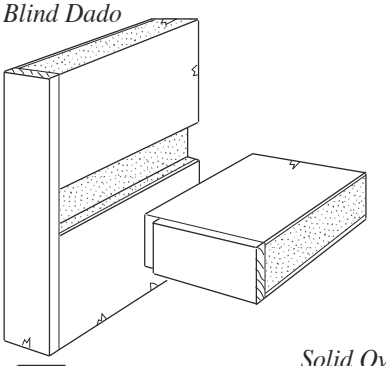


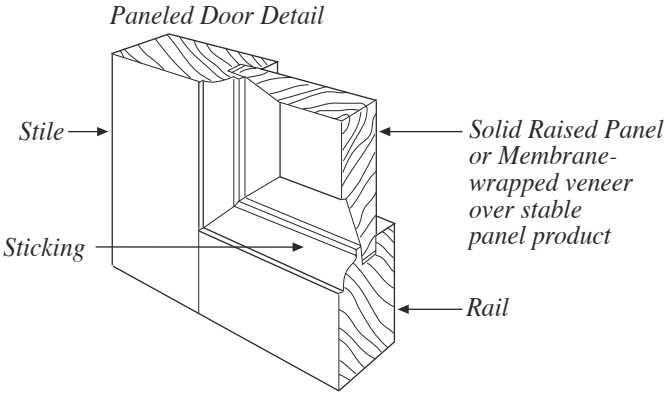
Dowel Joint

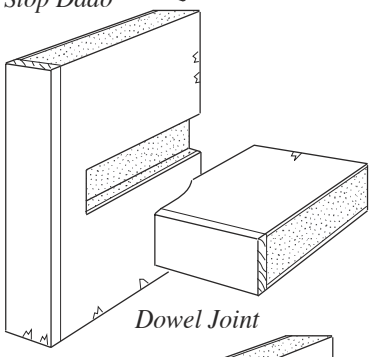


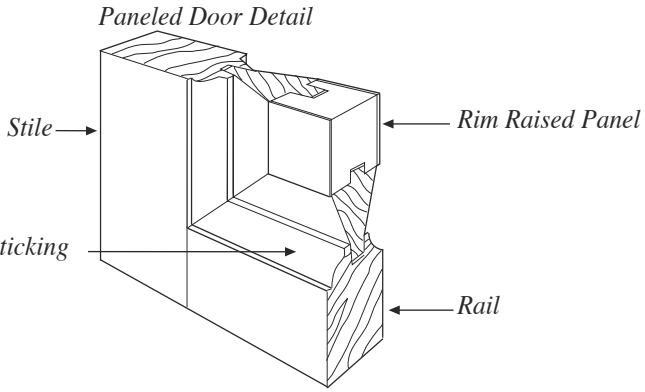


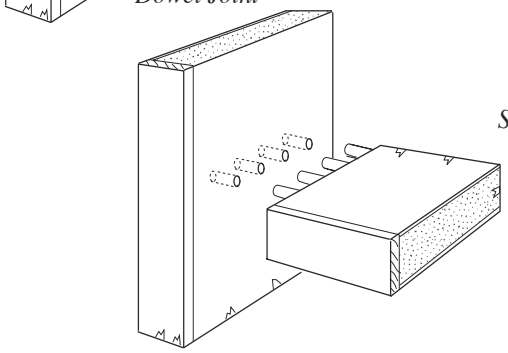


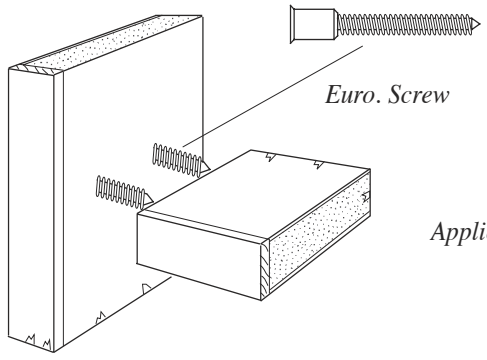


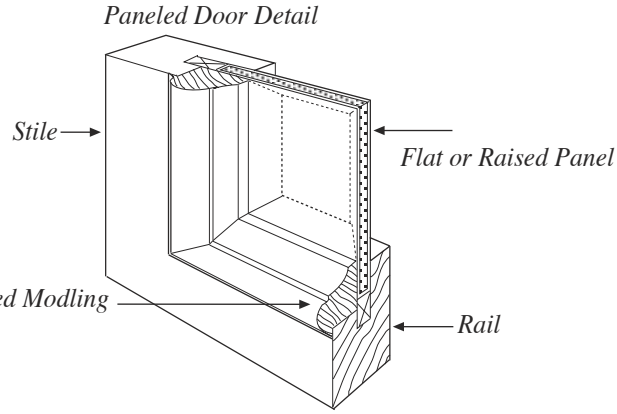












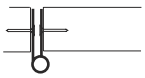
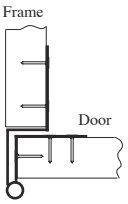
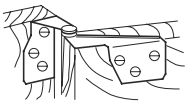
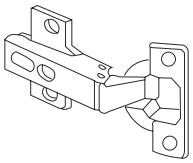
400-D-1 (continued)

Hinge Selection Guide

Architectural cabinet hinges will usually be furnished from the manufacturer's stock unless otherwise specified. The four most common hinge types are illustrated below, along with a brief table to assist in selection.

European hinges with the screws set in synthetic inserts are fast becoming industry standard. These hinges have been found to be cost-effective alternatives to the more traditional hinges shown below. Follow hinge manufacturers recommendations on number and spacing of hinges. There are conditions, however, in which the use of butt or wraparound hinges will continue to be the best solution. Pivot hinges often require a cut-in center hinge. Consult manufacturer's recommendations.

The owner and the design professional will be best served by involving an AWI member-manufacturer in the design and selection process early in the project.

Hinge Type	Butt	Wraparound	Pivot	European Style
				
Applications	Conventional Flush with Face Frame	Conventional Reveal Overlay	Reveal Overlay Flush Overlay	Conventional Flush without Face Frame Reveal Overlay Flush Overlay
Strength	High	Very High	Moderate	Moderate
Concealed when closed	No	No	Semi	Yes
Requires mortising	Yes	Occasionally	Usually	Yes
Cost of hinge	Low	Moderate	Low	Moderate
Ease of installation	Moderate	Easy	Moderate	Very Easy
Easily adjusted after installation	No	No	No	Yes
Remarks	Door requires hardwood edge	Exposed knuckle and hinge body	Door requires hardwood edge	1. Specify degree of opening 2. No catch required on self-closing styles

400-D-1 (continued)

Drawer Slide Selection Guide

The following table serves as both a checklist and a starting point for the discussion of a wide variety of drawer slide systems. While by no means exhaustive, the characteristics described below are often considered the most important by the client, the design professional, and the woodwork manufacturer. The selection of the slide characteristics will affect the usefulness of the cabinets. Careful consideration should be given to avoid "overspecifying" for the purpose intended.

The owner and the design professional will be wise to involve an AWI/AWMAC member manufacturer in the design and selection process early in the project. Dimensions use the inch-pound convention.

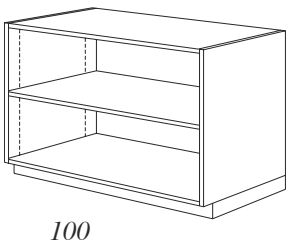
Degree of Extension	☐ STANDARD EXTENSION—All but 4-6" of drawer body extends out of cabinet ☐ FULL EXTENSION—Entire drawer body extends out to face of cabinet ☐ FULL EXTENSION WITH OVERTRAVEL—Entire drawer body extends beyond the face of cabinet
Static Load Capacity	☐ 50 Pounds—Residential/Light Commercial ☐ 75 Pounds—Commercial ☐ 100 Pounds—Heavy Duty ☐ Over 100 Pounds—Special Conditions, Extra Heavy Duty
Dynamic Load Capacity	☐ 30 Pounds; 35,000 cycles—Residential/Light Commercial ☐ 50 Pounds; 50,000 cycles—Commercial ☐ 75 Pounds; 100,000 cycles—Heavy Duty
Removal Stop	☐ INTEGRAL STOP—Requires ten times the normal opening force to remove drawer ☐ POSITIVE STOP—Latch(es) which must be operated/opened to remove drawer
Closing	☐ SELF CLOSING/STAY CLOSED—Drawer slides will self-close with their related dynamic load when the drawer is 2" from the fully closed position and not bounce open when properly adjusted
Metal Sided Systems	In recent years several hardware manufacturers have developed "drawer systems" of one type or another, nearly all proprietary. In addition to the above criteria, the following should be considered for these system prior to approval for use: ☐ POSITIVE STOP—Drawer must stop within itself and not rely on the drawer front to stop it ☐ PULLOUT STRENGTH—System must demonstrate sufficient strength of attachment of front to sides - design professional should evaluate and approve individually

400-D-2

Designs - Form and Function

The following series of basic cabinet styles are used with permission of the Woodwork Institute in California for all editions.

They are not intended to illustrate every possible cabinet configuration or fabrication solution. They are presented here for reference and design purposes. Consult with your woodwork manufacturer for details and features. These drawings are available as Autodesk® Revit® Families and AutoCAD® .DWG and .DXF files at http://www.woodworkinstitute.com/manual.asp.



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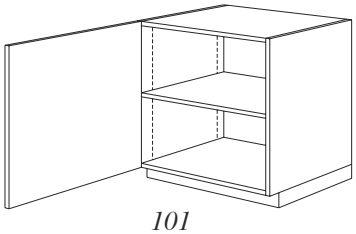

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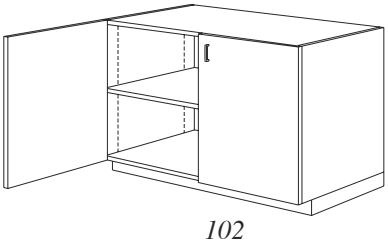

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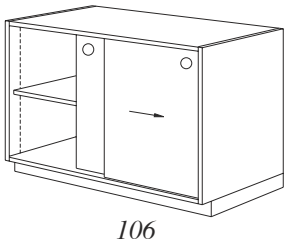

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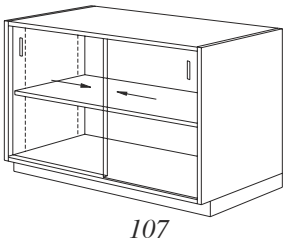

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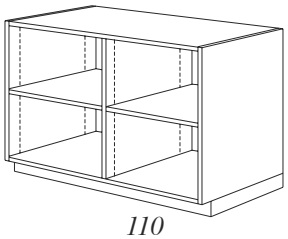

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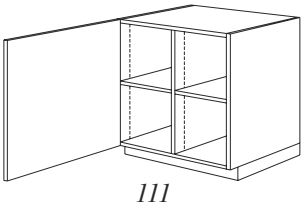

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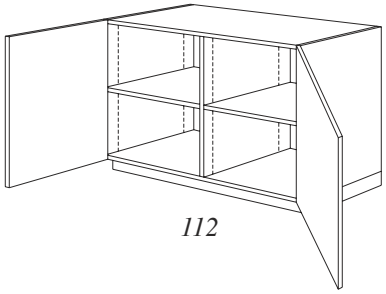

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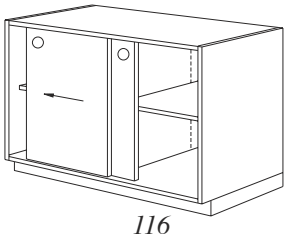

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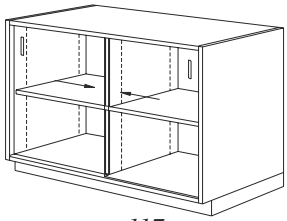

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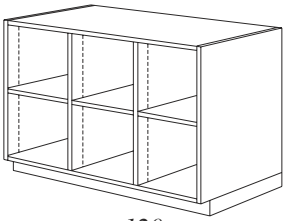

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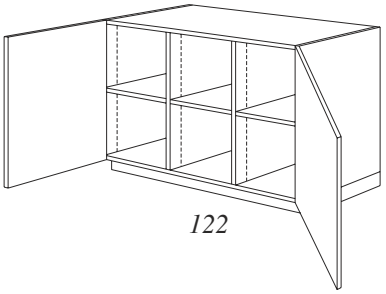

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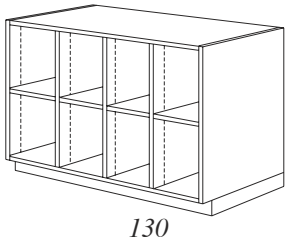

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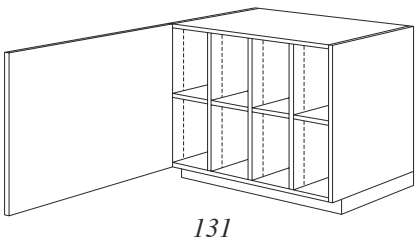

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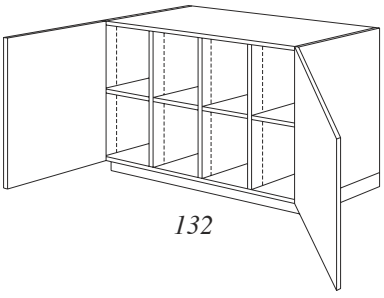

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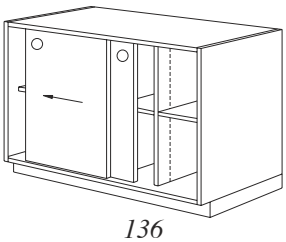

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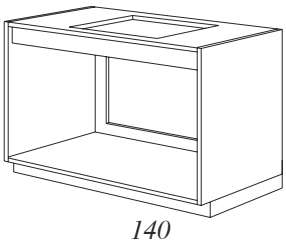

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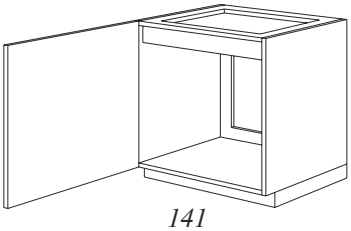

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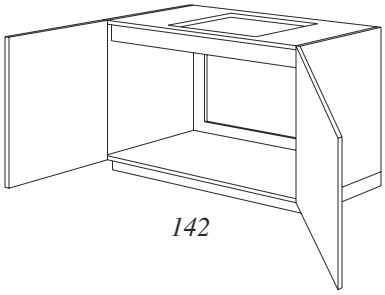

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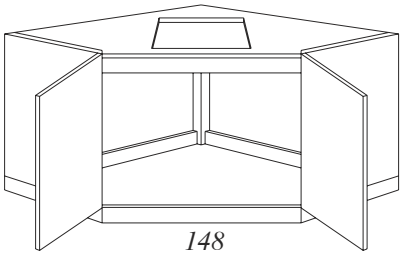

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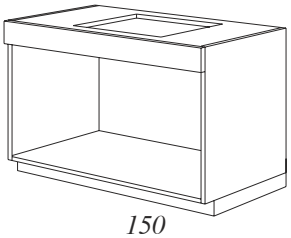

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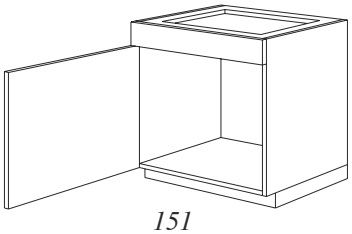

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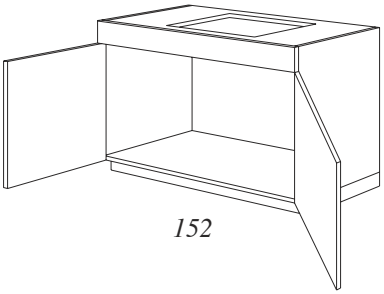

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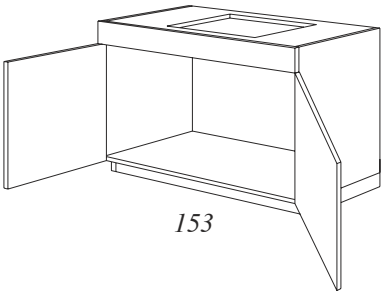

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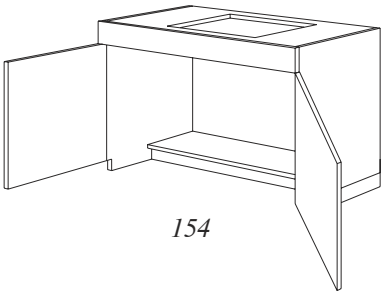

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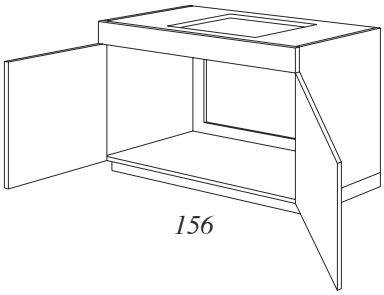

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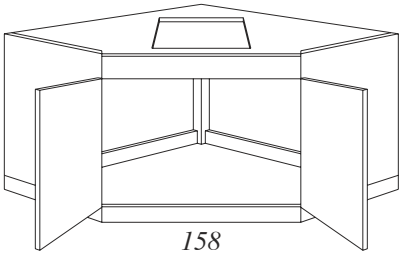

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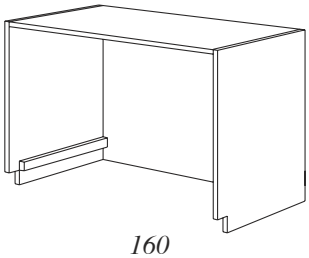

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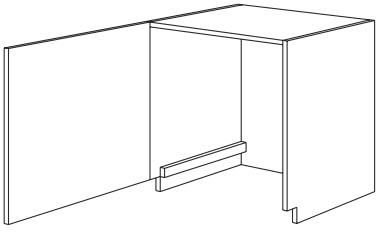

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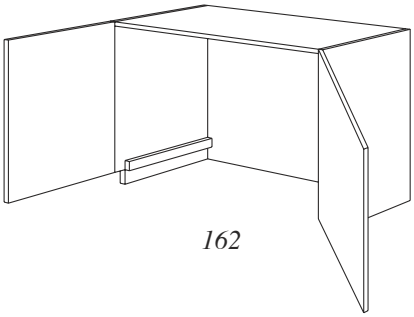

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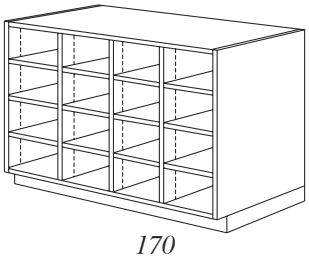

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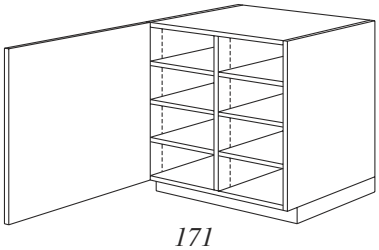

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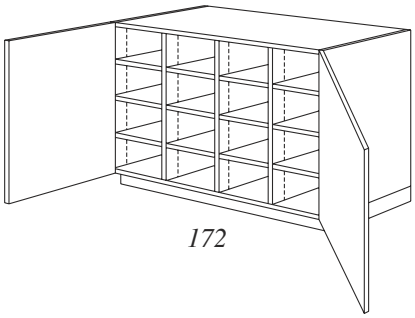

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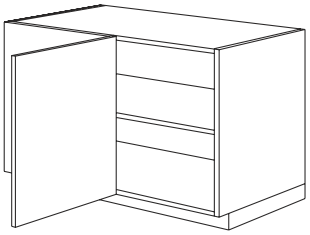

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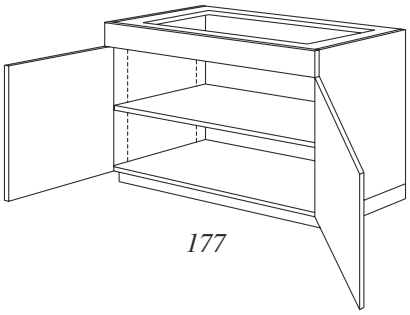

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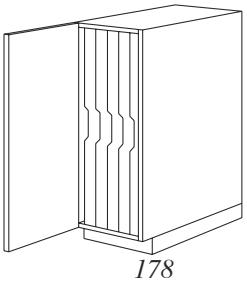

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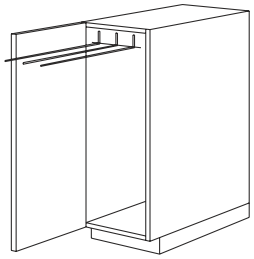

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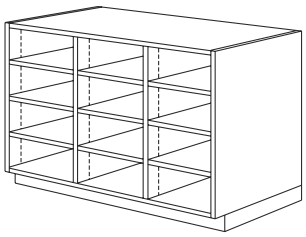

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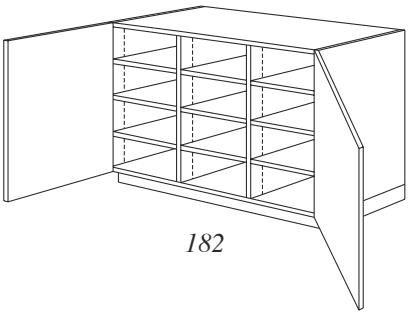

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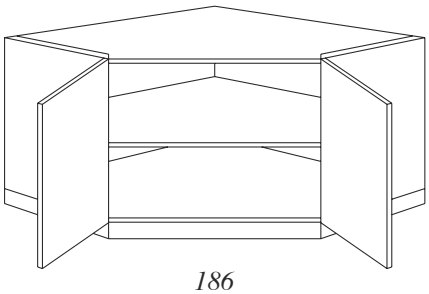

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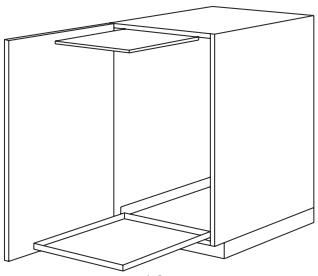

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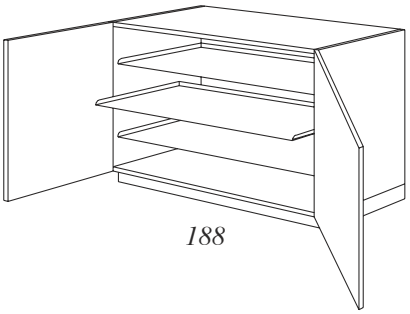

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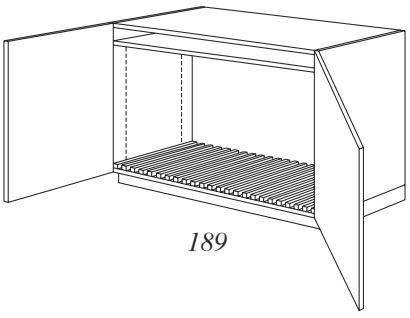

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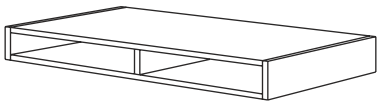

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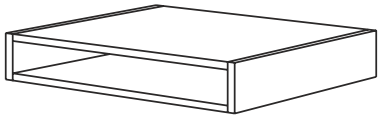

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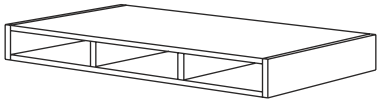

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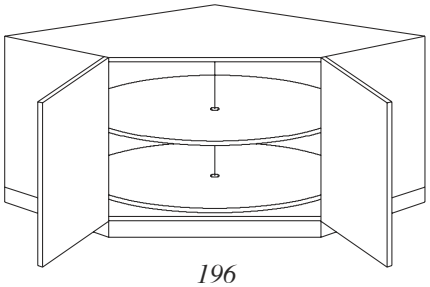

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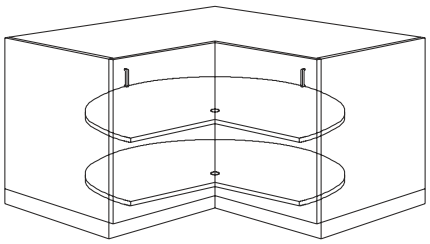

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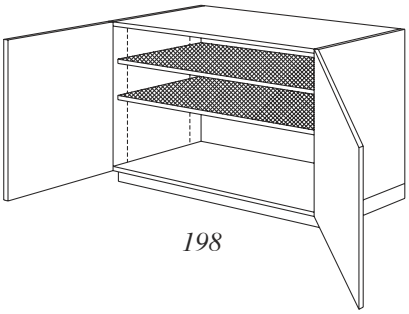

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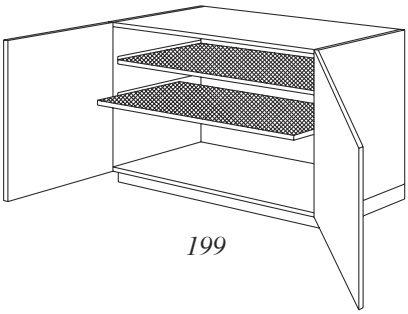

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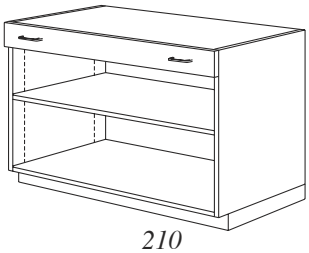

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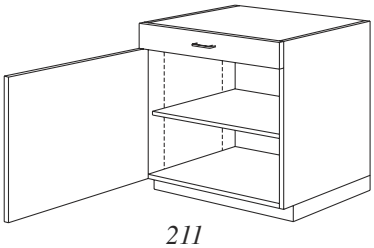

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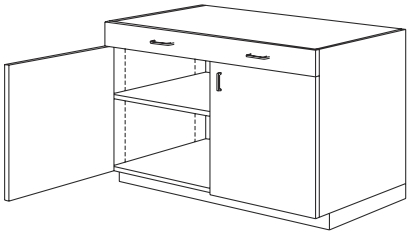

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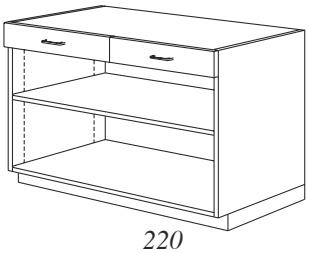

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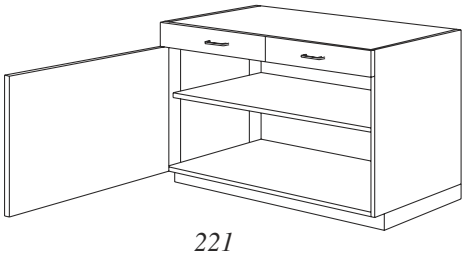

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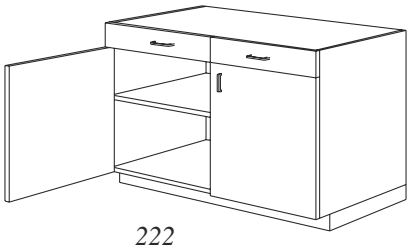

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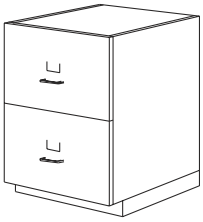

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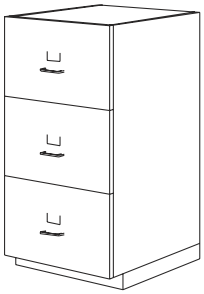

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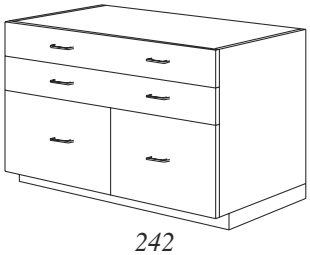

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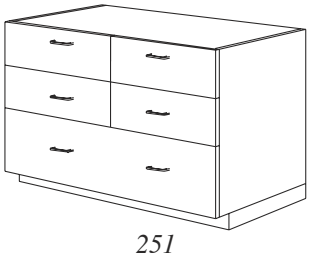

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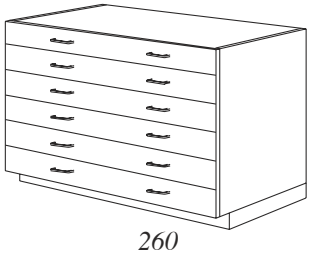

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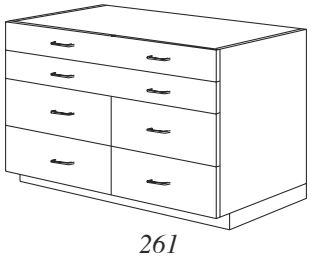

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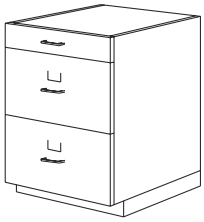

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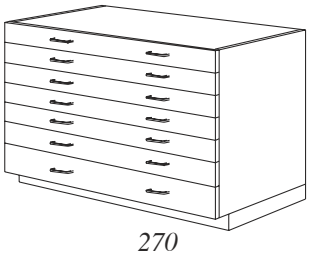

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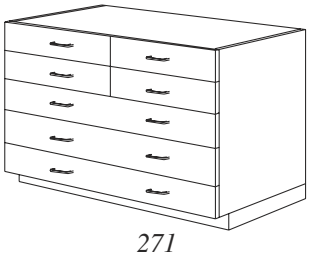

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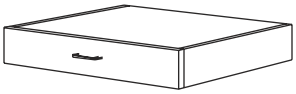

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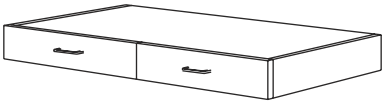

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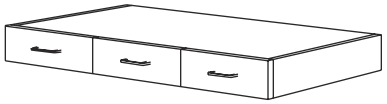

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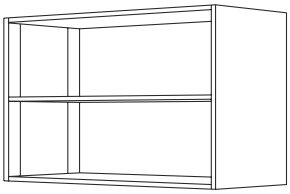

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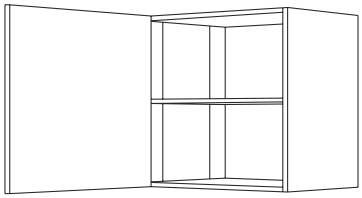

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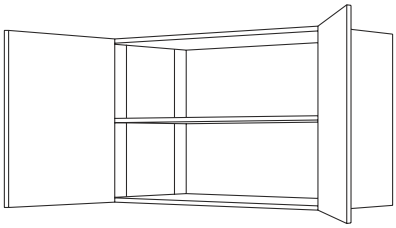

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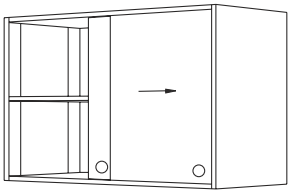

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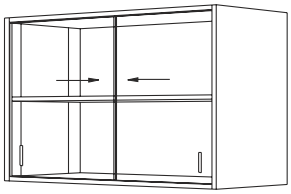

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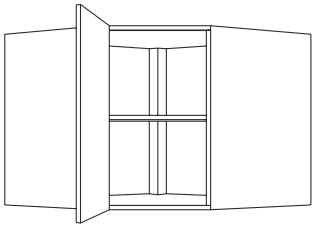

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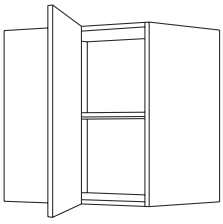

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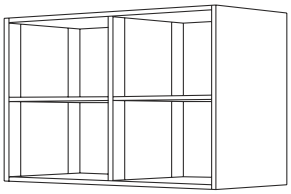

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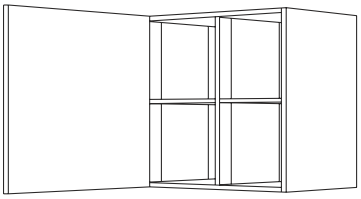

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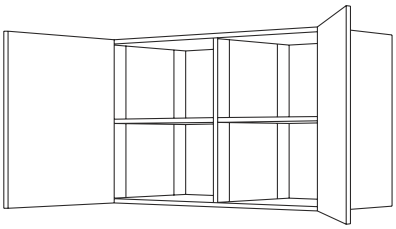

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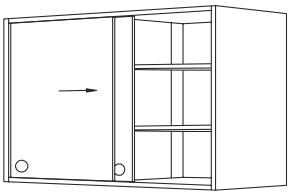

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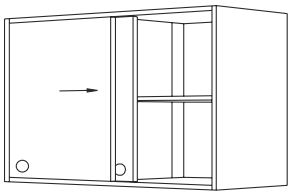

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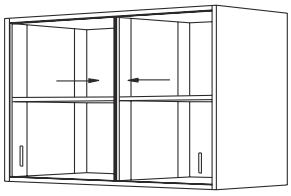

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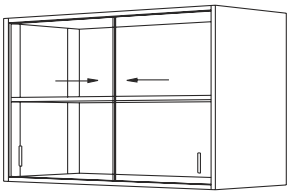

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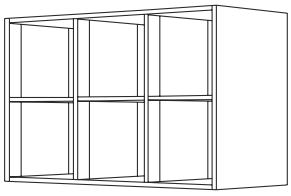

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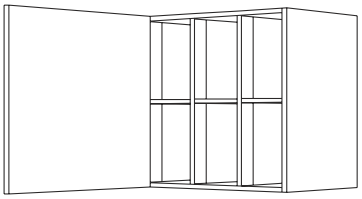

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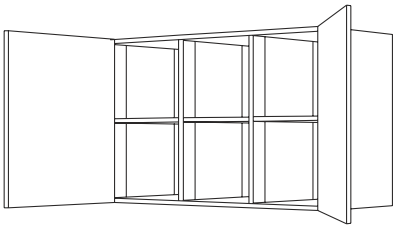

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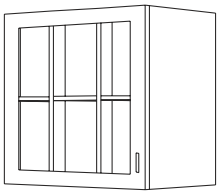

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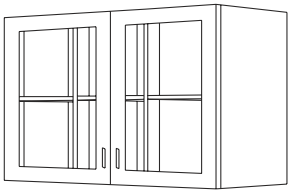

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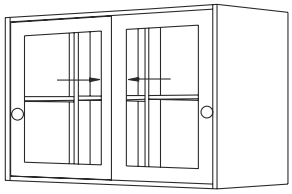

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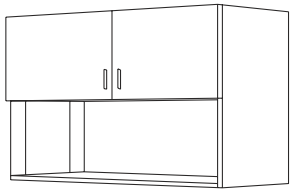

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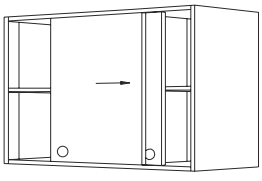

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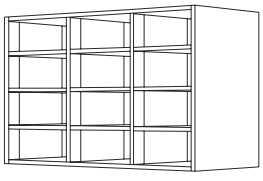

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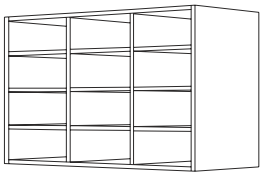

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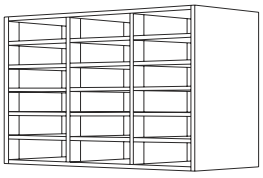

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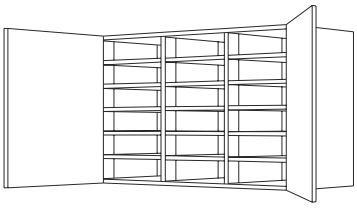

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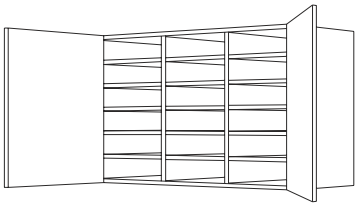

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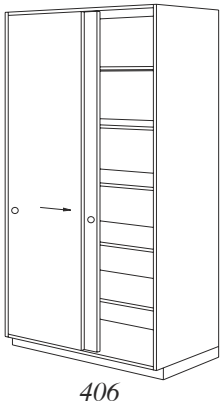

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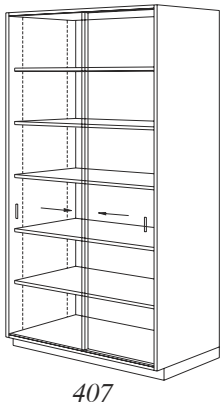

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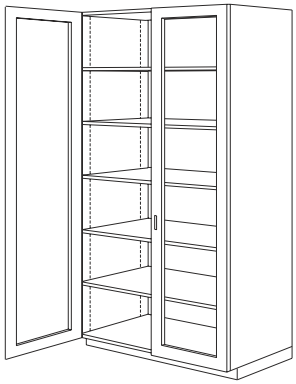

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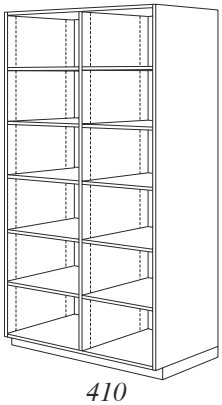

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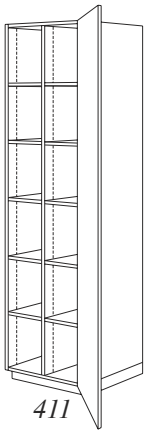

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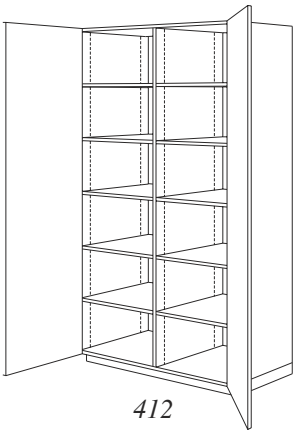

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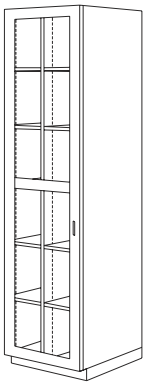

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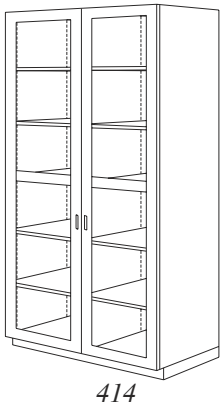

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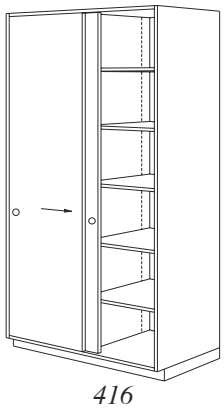

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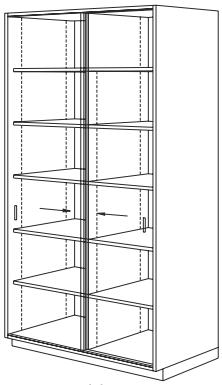

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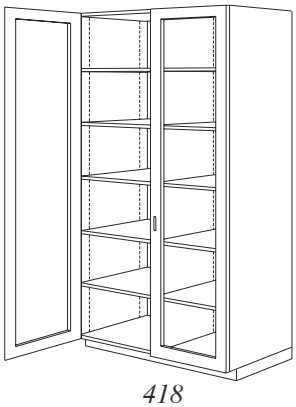

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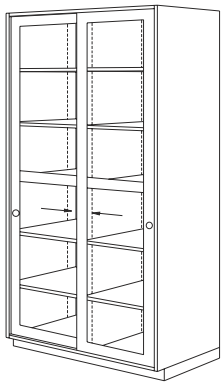

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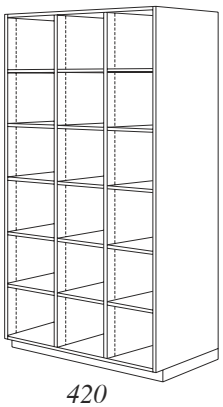

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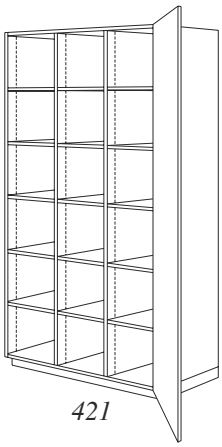

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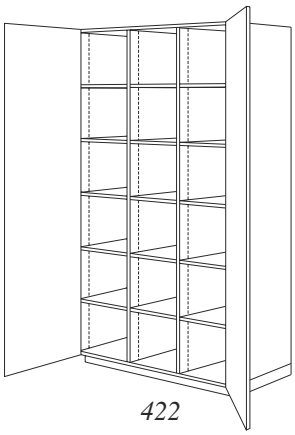

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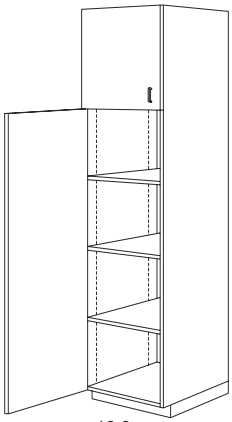

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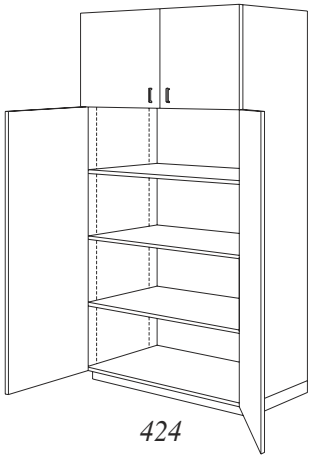

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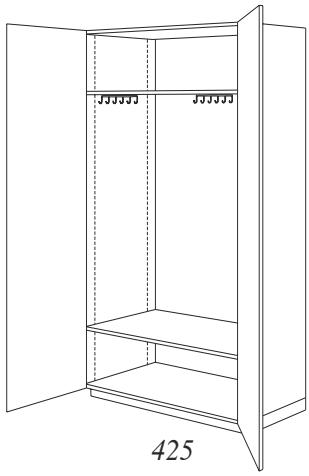

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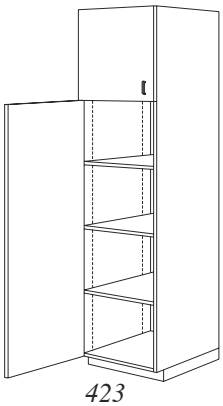

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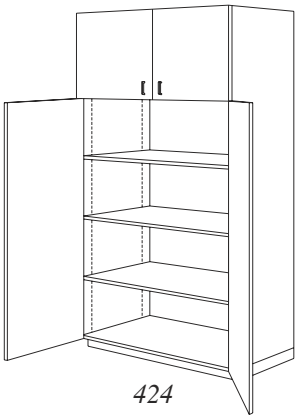

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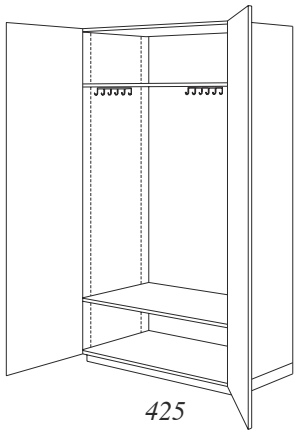

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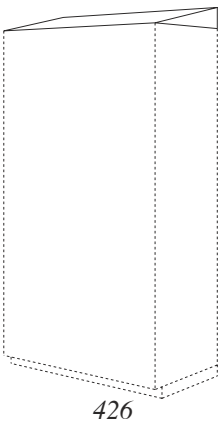

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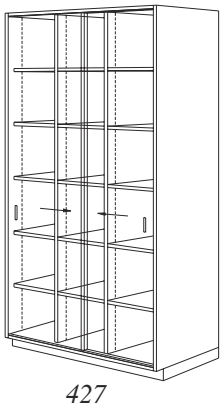

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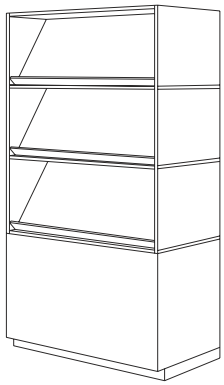

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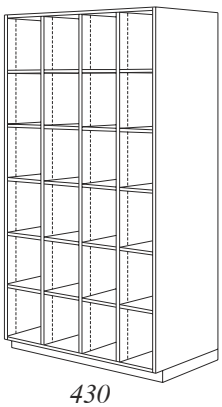

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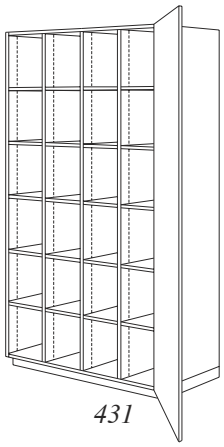

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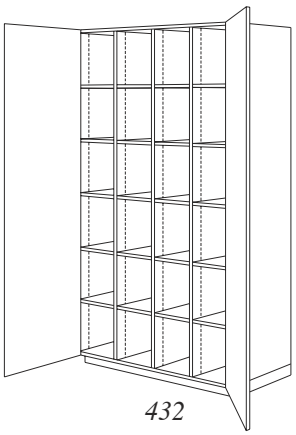

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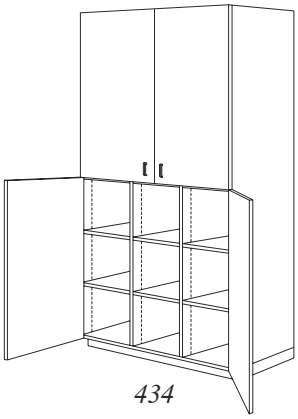

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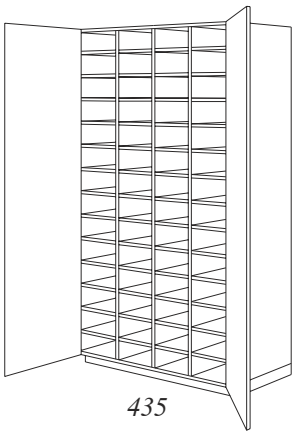

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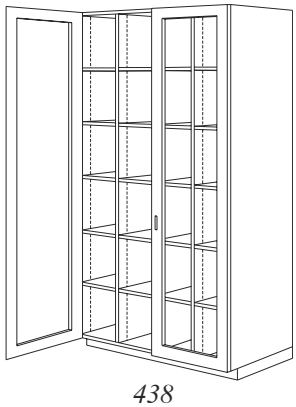

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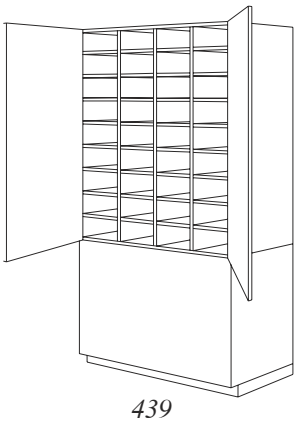

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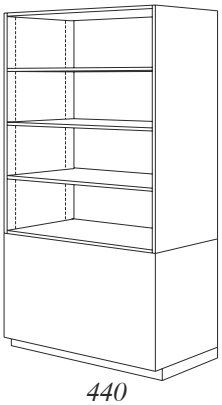

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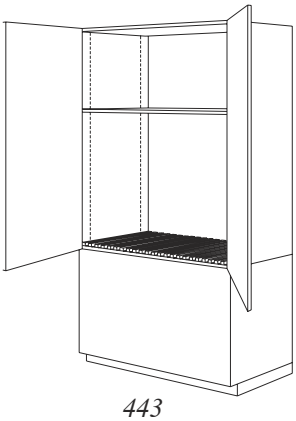

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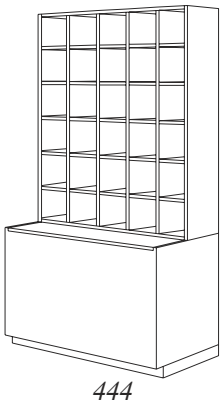

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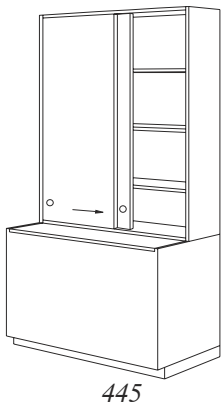

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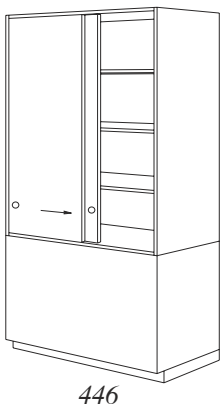

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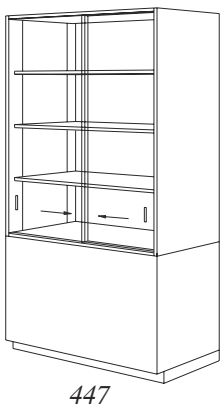

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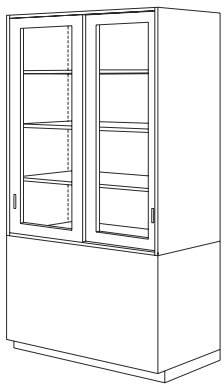

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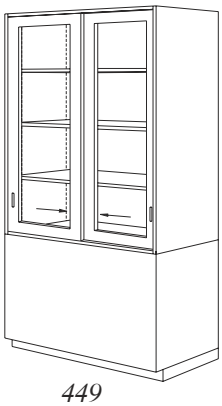

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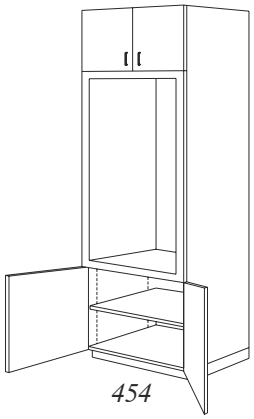

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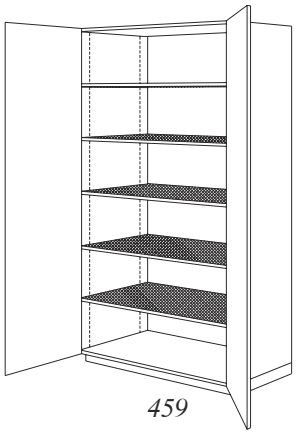

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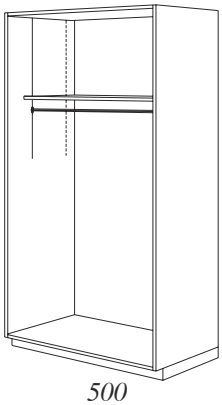

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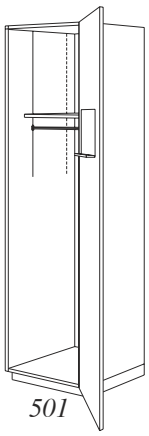

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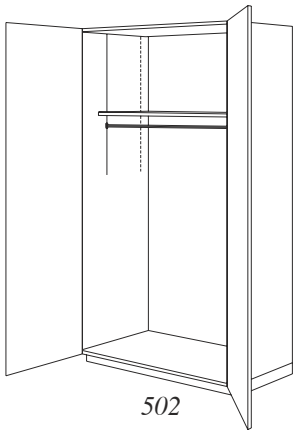

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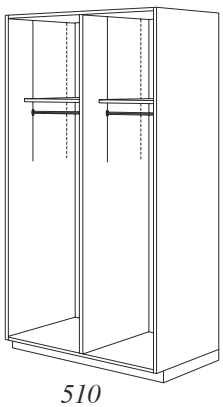

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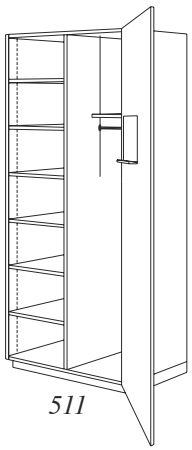

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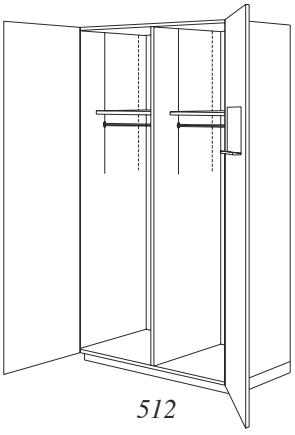

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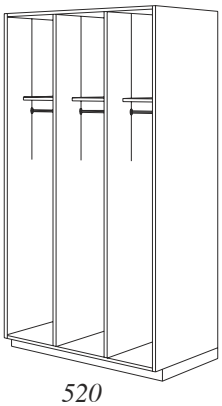

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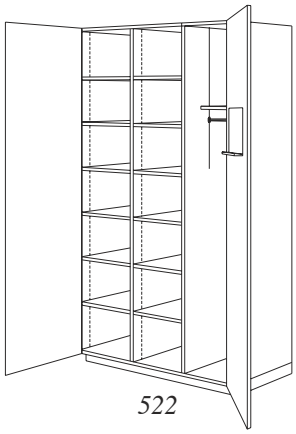

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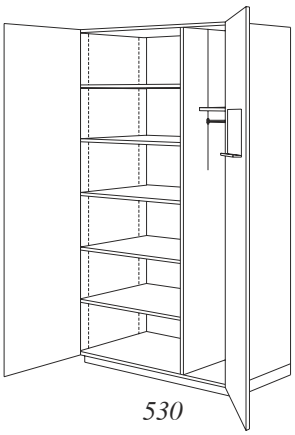

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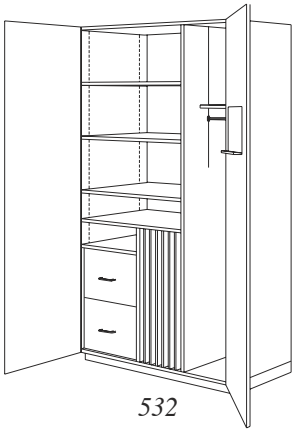

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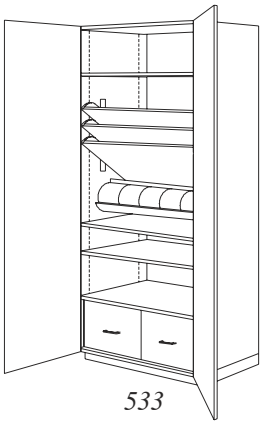

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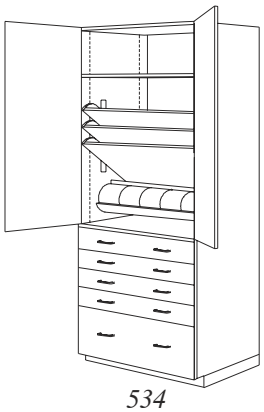

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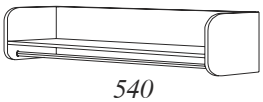

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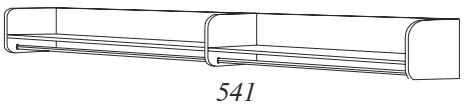

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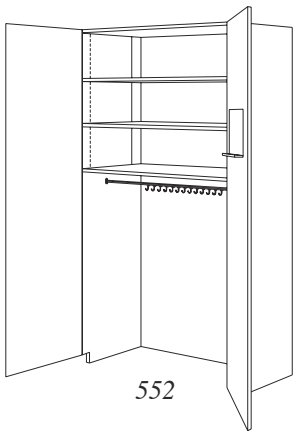

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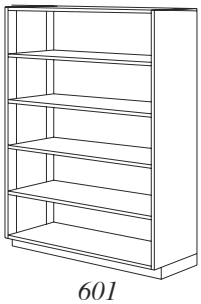

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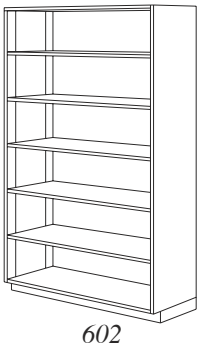

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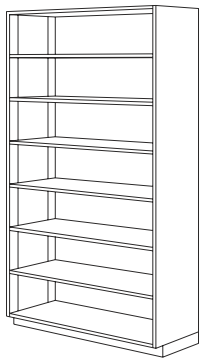

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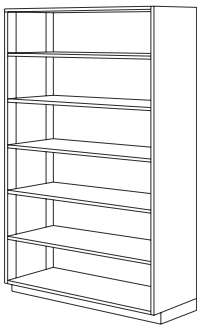

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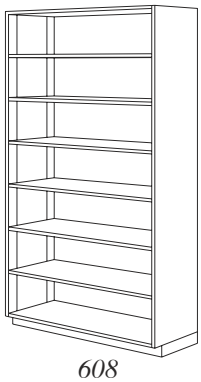

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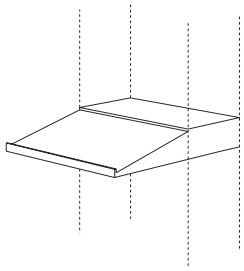

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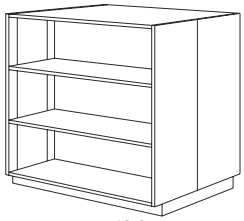

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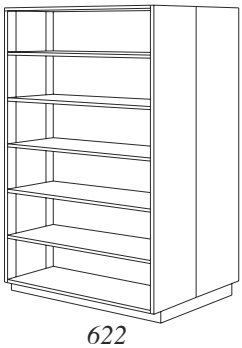

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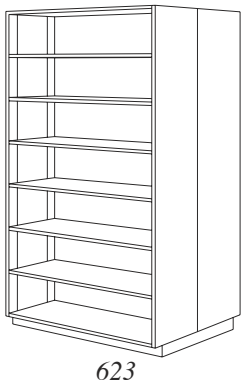

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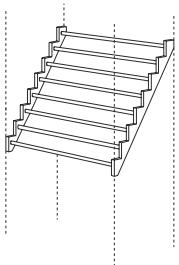

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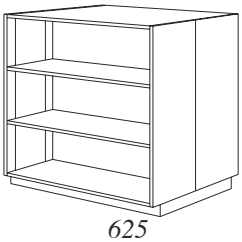

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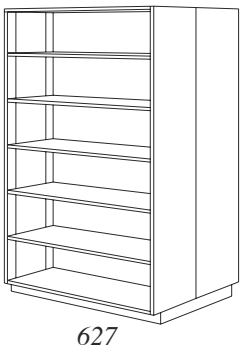

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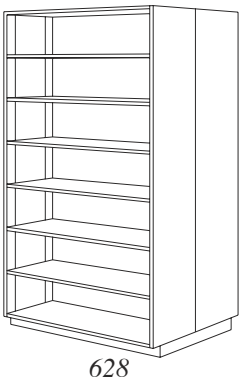

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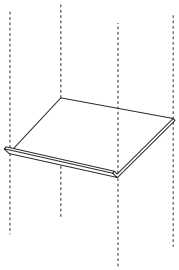

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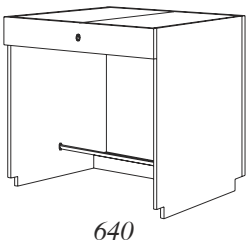

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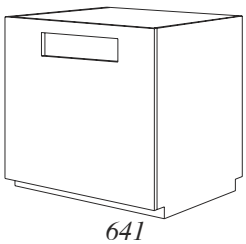

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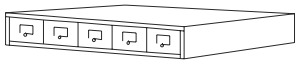

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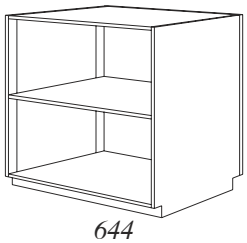

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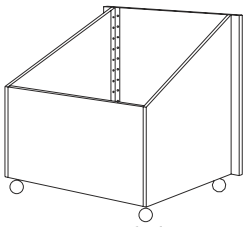

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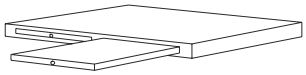

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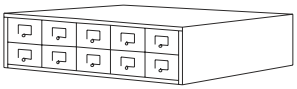

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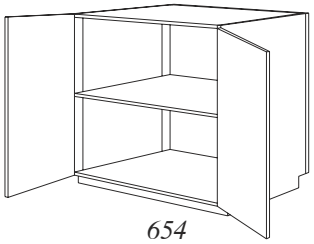

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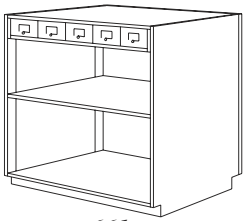

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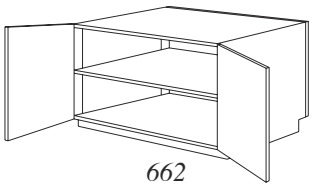

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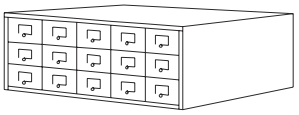

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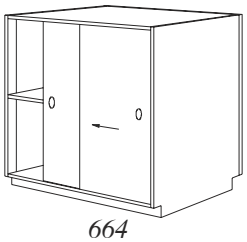

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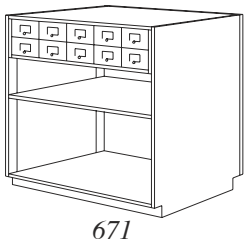

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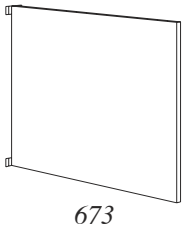

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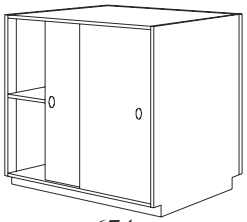

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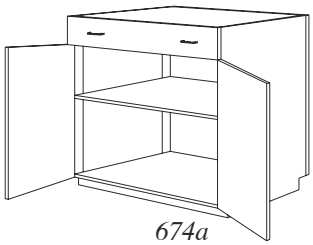

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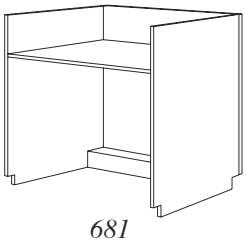

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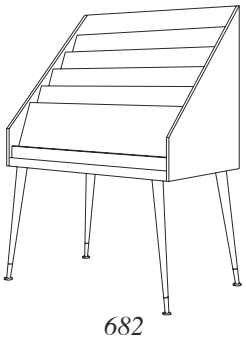

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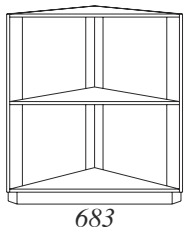

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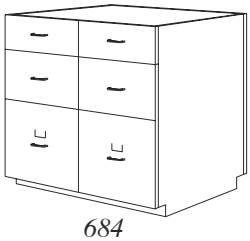

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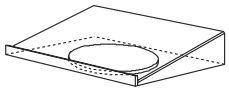
Dictionary Stand with
Swivel Base



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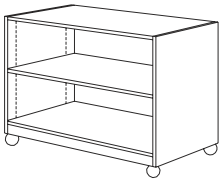

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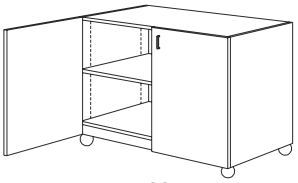

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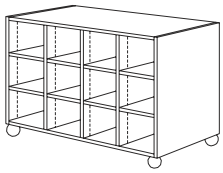

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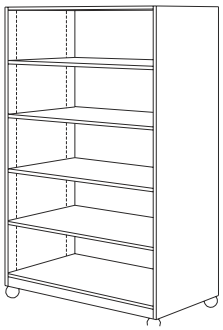

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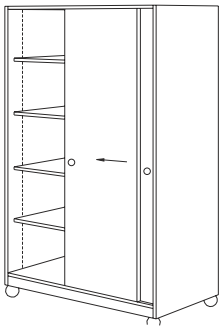

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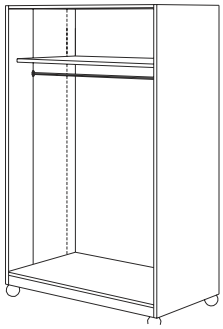

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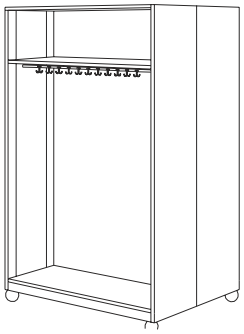

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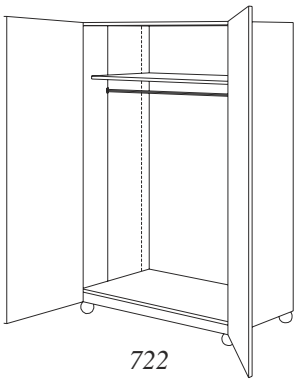

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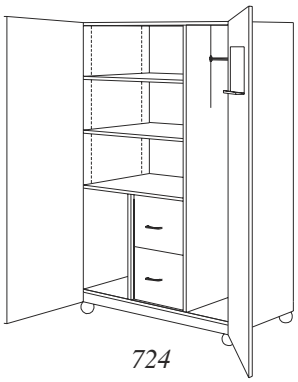

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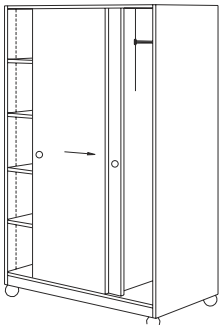

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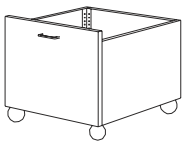

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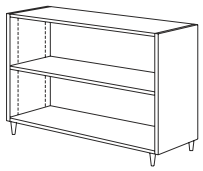

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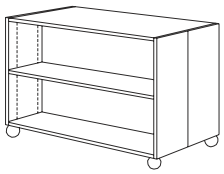

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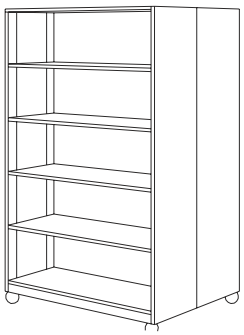

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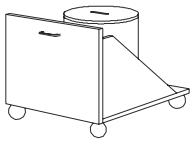

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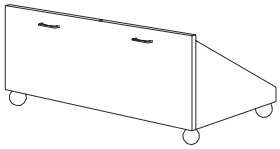

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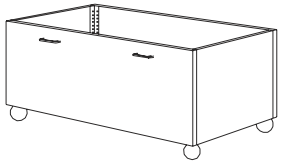

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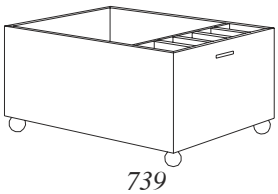

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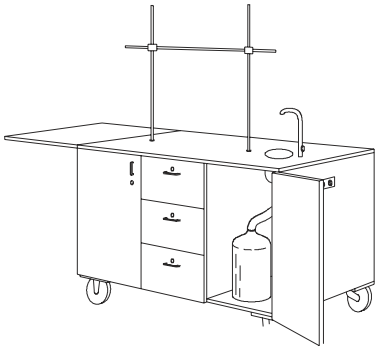

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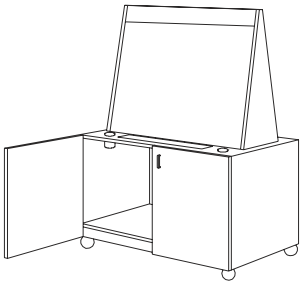

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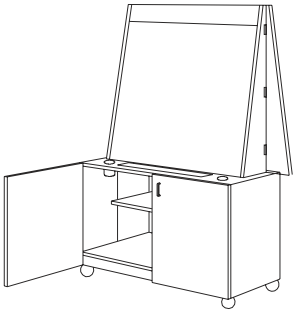

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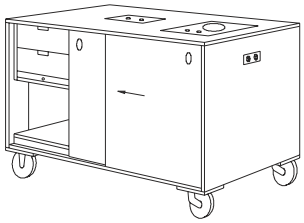

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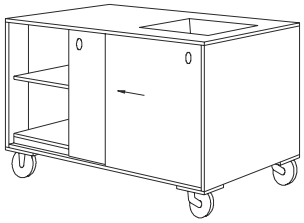

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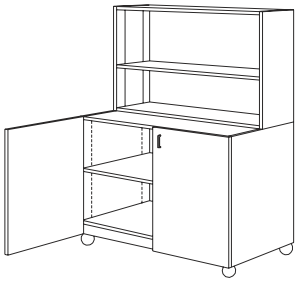

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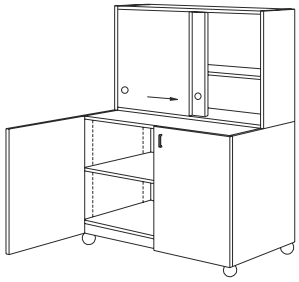

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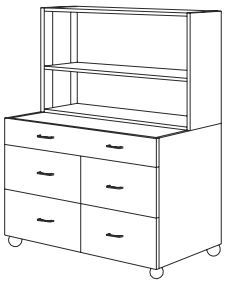

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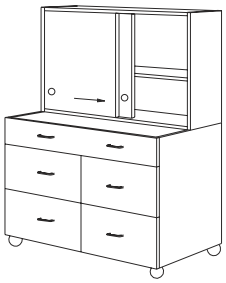

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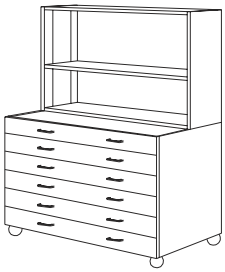

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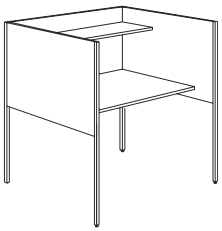
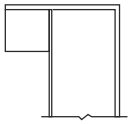


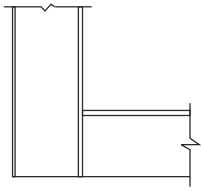
760

These illlustrations are not intended to be all inclusive. Other engineering solutions may be acceptable. In the absence of specifications, fabrication methods are at the option of the woodwork manufacturer.

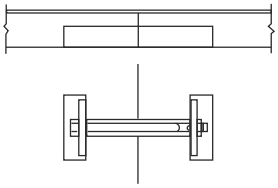
Radiused Top



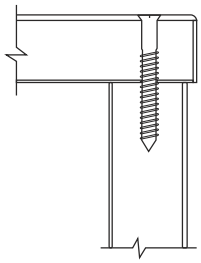
Square Top



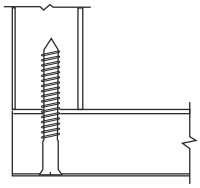
End Splash Joint



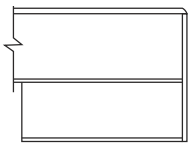
Tight Joint Fastener



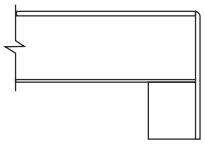
Removable Ledge



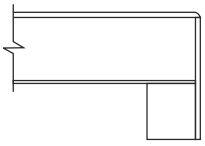
Square Splash Joint



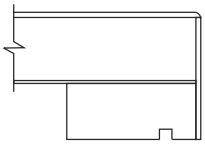
Self Edge w/ Wide Build Up



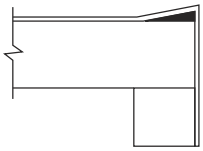
Self Edge Economy



Self Edge Premium/Custom

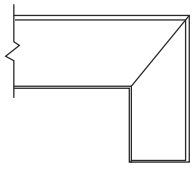


Self Edge w/ Drip Groove Laboratory

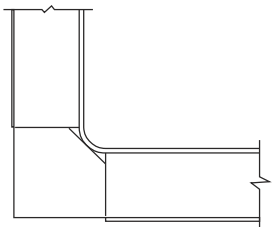


No Drip Self Edge

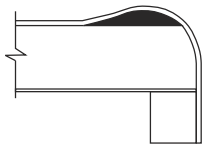
The details below can not be made on radiused counter tops



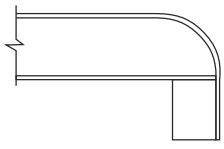
Miter Fold



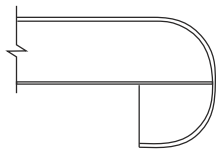
Coved Splash Joint



No-Drip Edge



Waterfall Edge



Full Round Edge

Details courtesy of The Woodwork Institute of California
Used with permission.

400-D-4
Ideas in Groups

The final subdivisions of this section are an ever-growing collection of design ideas with an additional level of detail. While these ideas are grouped by (admittedly somewhat arbitrary) classifications, the design professional should never hesitate to adopt and adapt from one group to another.

Most importantly, the Quality Standards Board of Review presents these ideas as a *starting point* for creative design and fabrication. They are not intended as an illustration of the only way to accomplish a design solution, nor are they intended to establish firm recommendations on dimensions or fabrication techniques.

Note: There are projects, such as credenzas, which benefit from having the grain or pattern carried on to the toe space. Toe kicks with exposure to moisture are often specified to be solid hardwood, with the grain running horizontally. Such special considerations shall be clearly noted on the design drawings and in the specifications. Base/toe on cabinets shall be integral (constructed as an integral part of the cabinet body) or separate (constructed as a separate member) at the option of the manufacturer.

Stile and rail doors and drawer fronts, and face frames on some cabinets, require careful attention to details regarding material selection for compatibility of grain and color as well as grain direction.

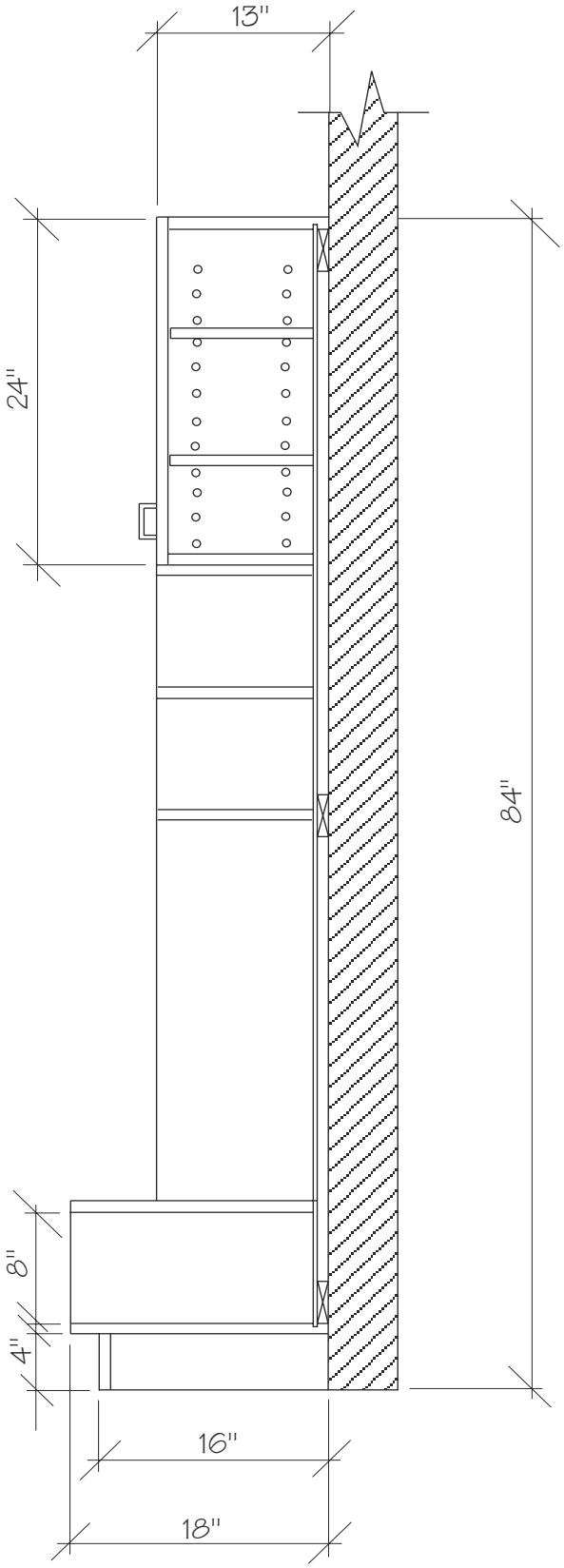
When transparent finish is specified for exposed surfaces, semi-exposed surfaces are not required to be transparent finish.

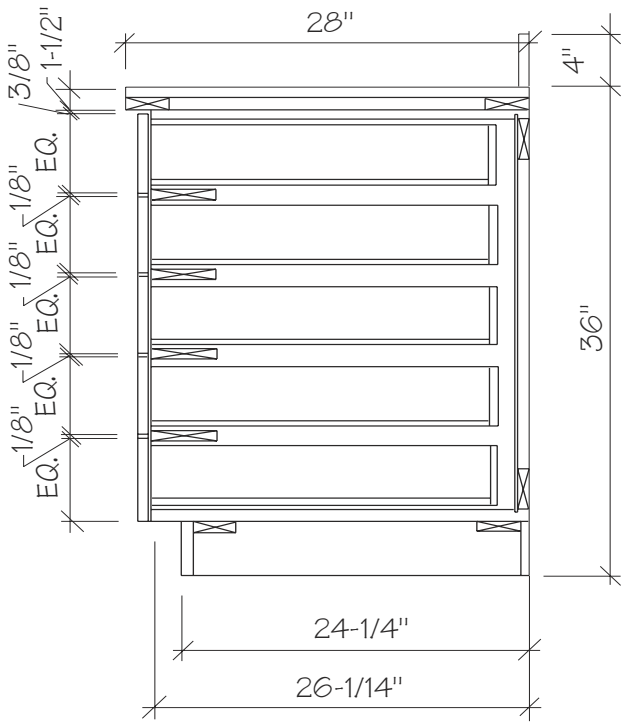
The advice and suggestions of all the members of the construction team, from the customers through the designers through the contractors and subcontractors, can and should be evaluated.

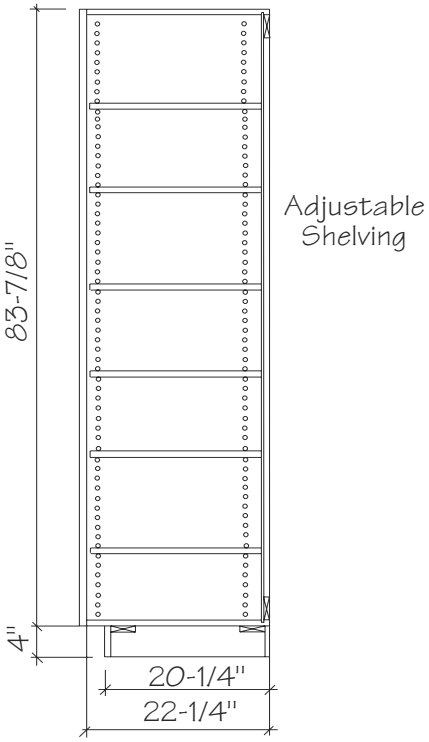
The classifications to follow are:

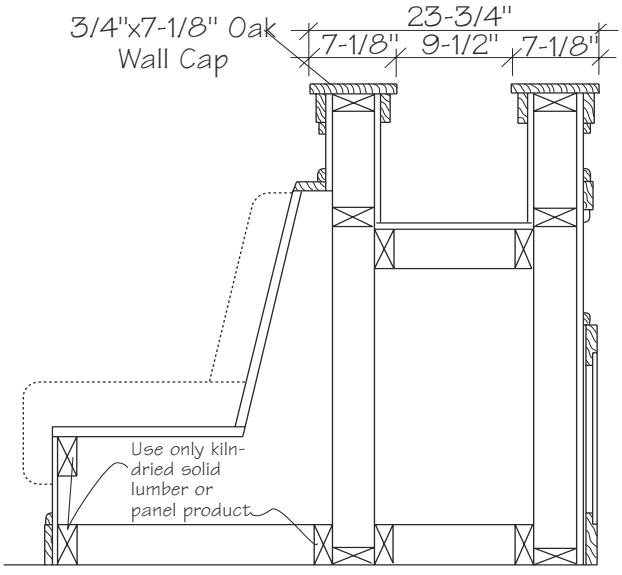
400-D-5 – Schools and Libraries
400-D-6 – Banks and Courts
400-D-7 – Corporate Woodwork
400-D-8 – Furniture and Fixtures
400-D-9 – Reception
400-D-10 – Church Fittings
400-D-11 – Basic Cabinetry

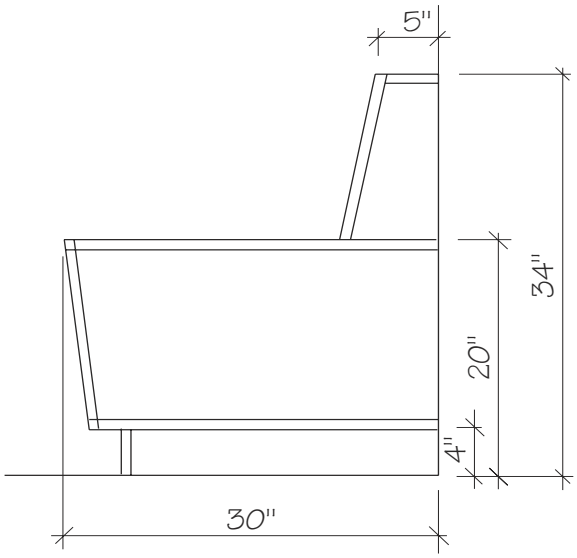
400-D-5
Schools and Libraries











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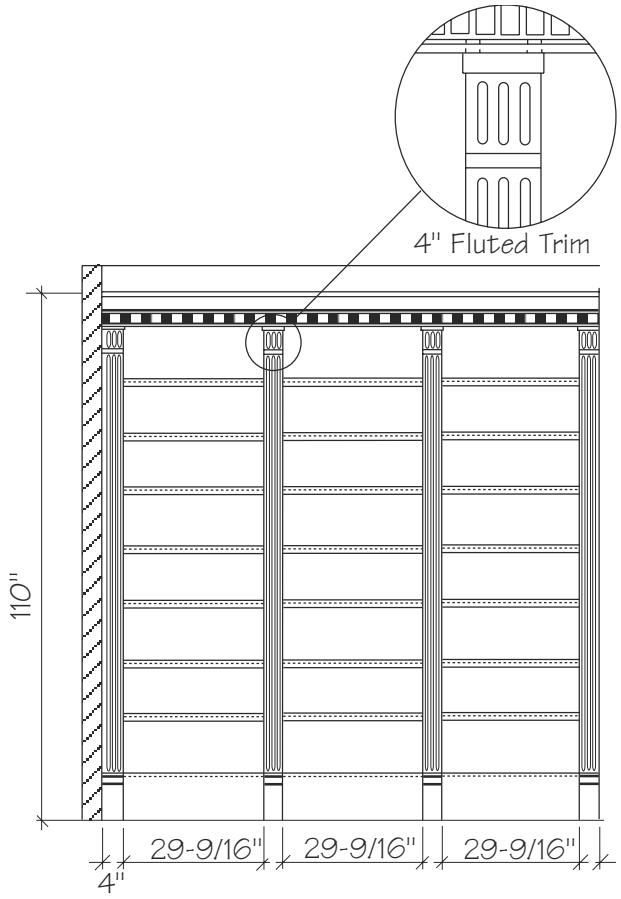
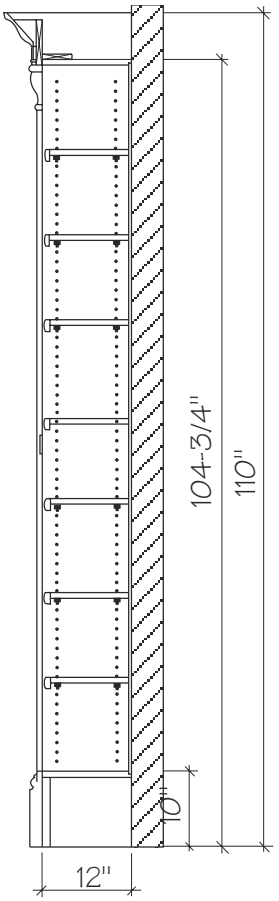
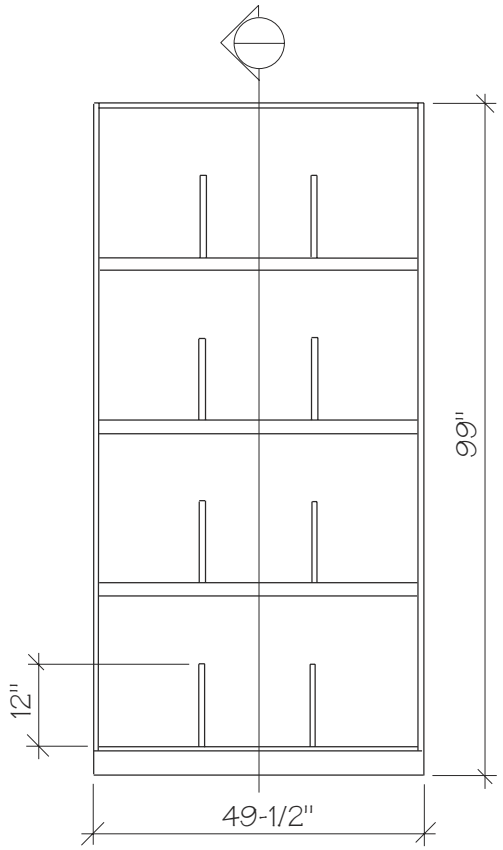
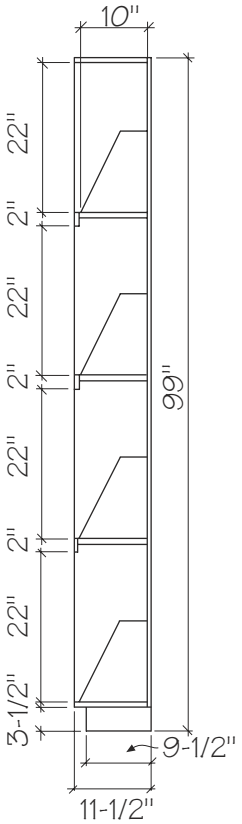
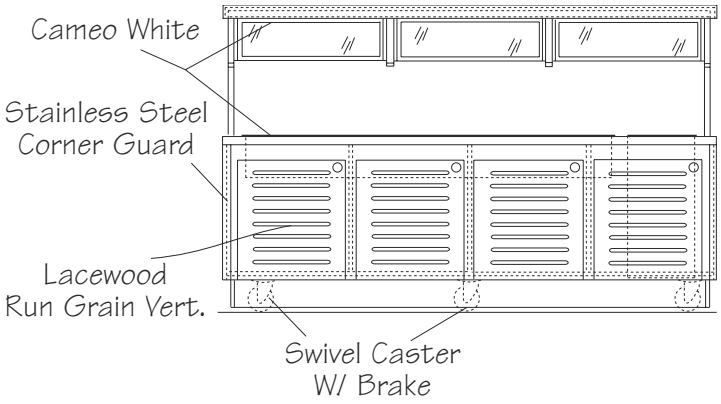
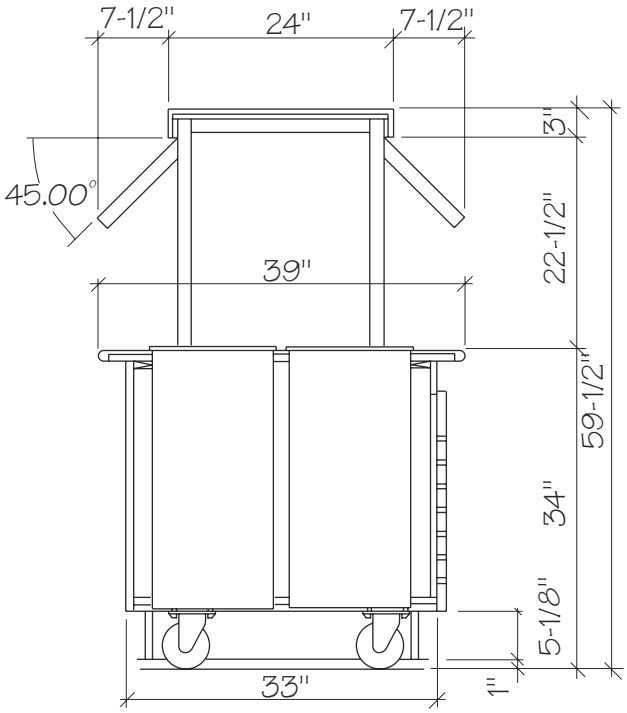


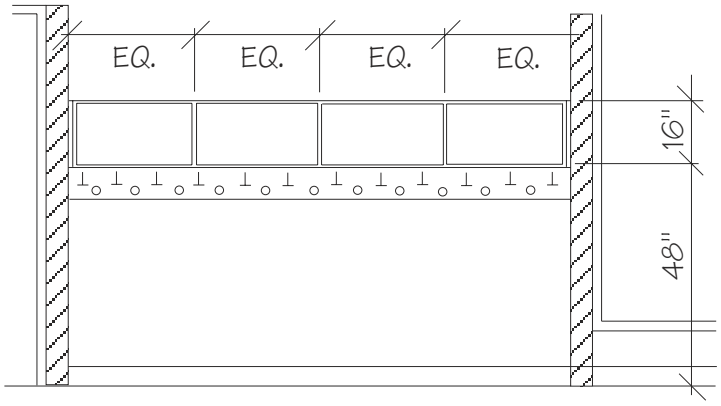


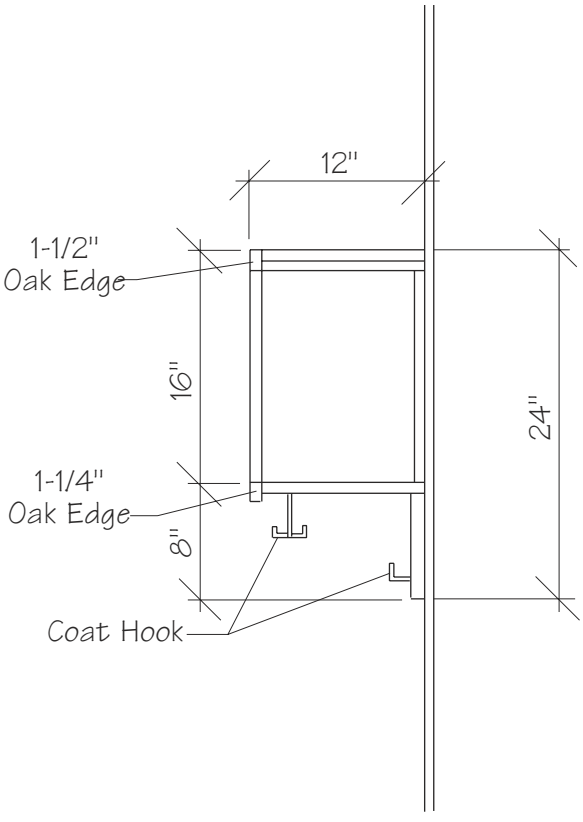






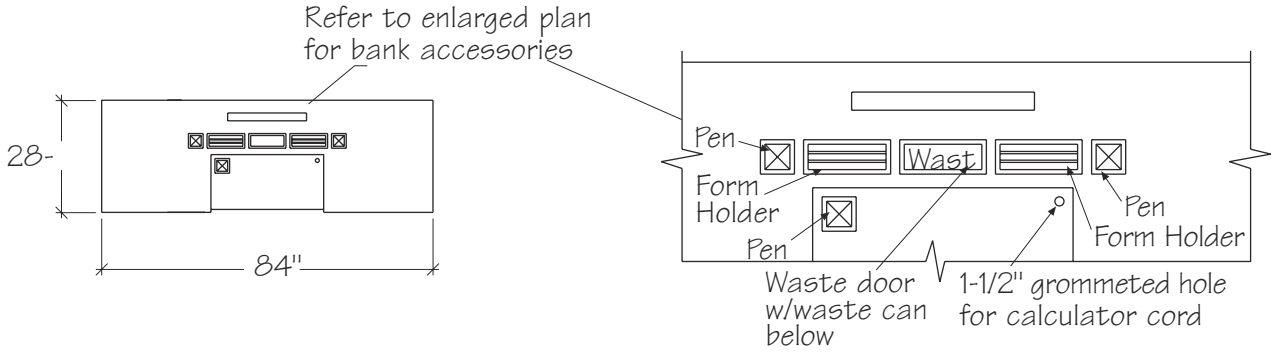


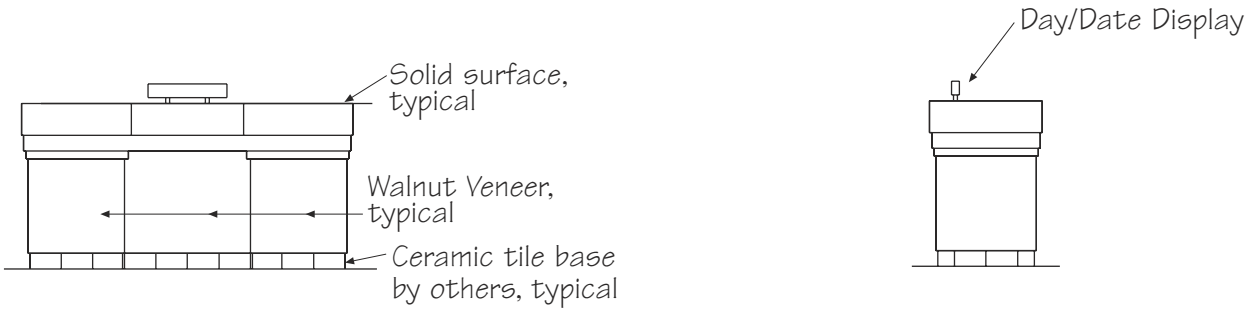


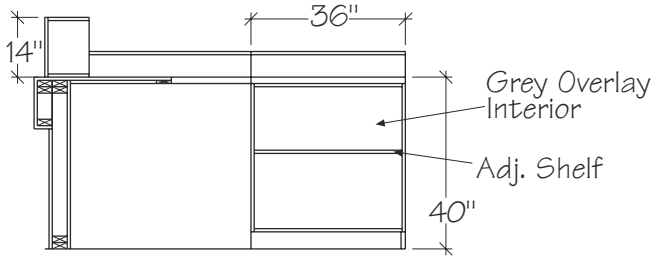


400

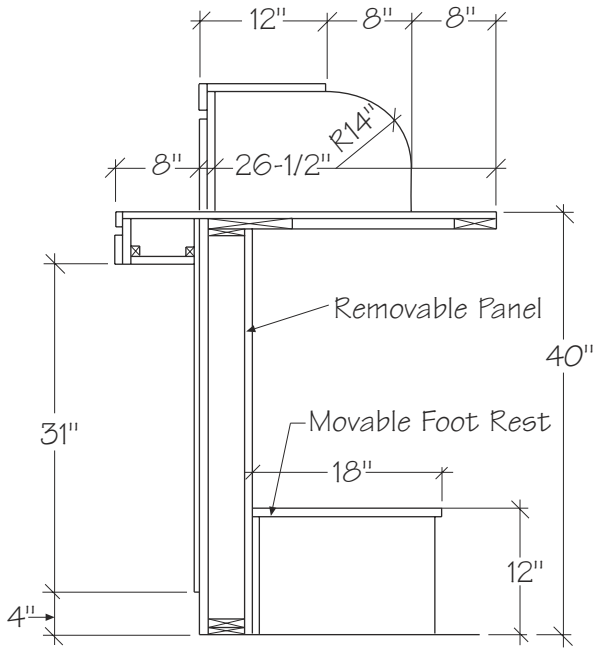
400-D-6
Banks and Courts

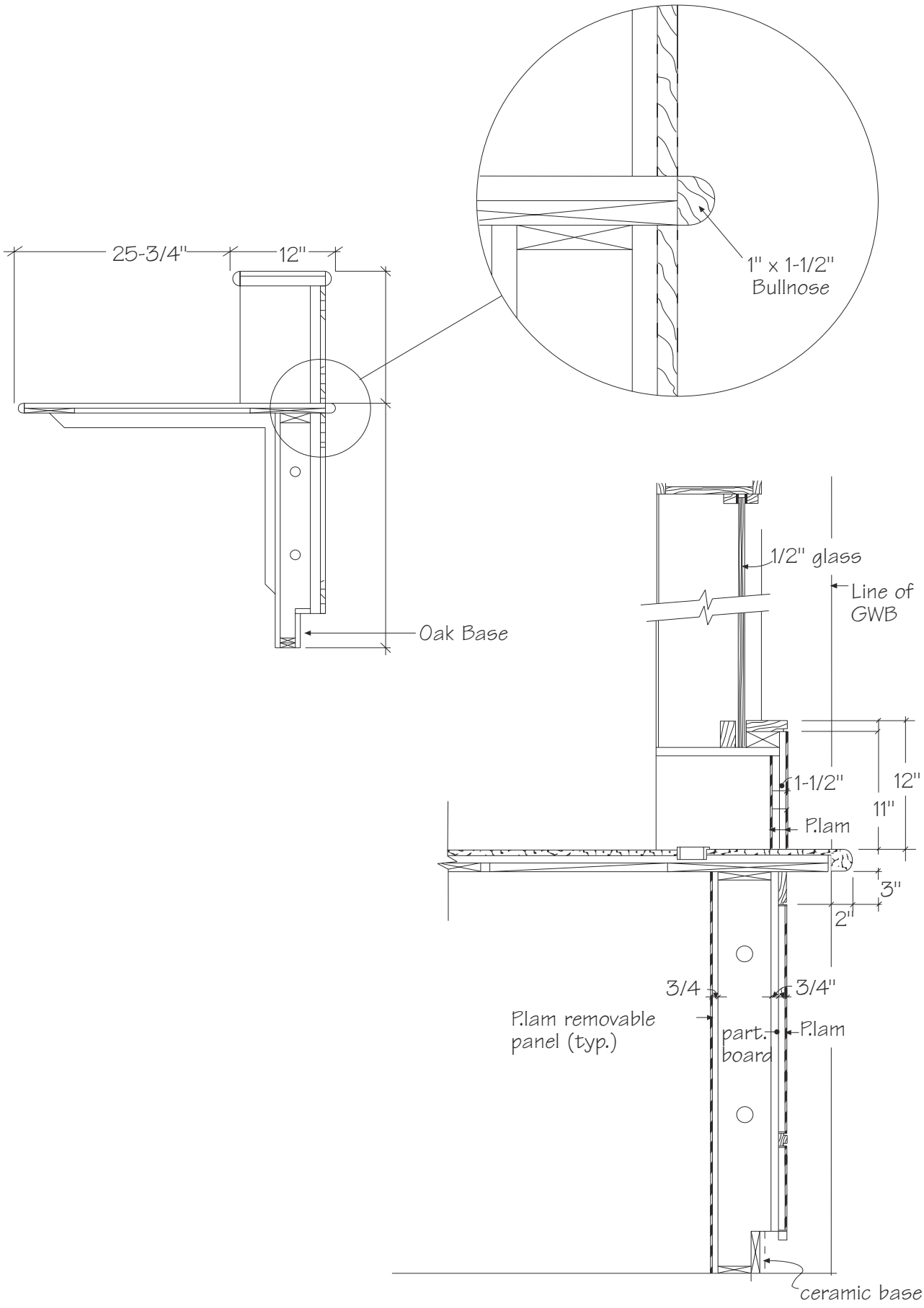


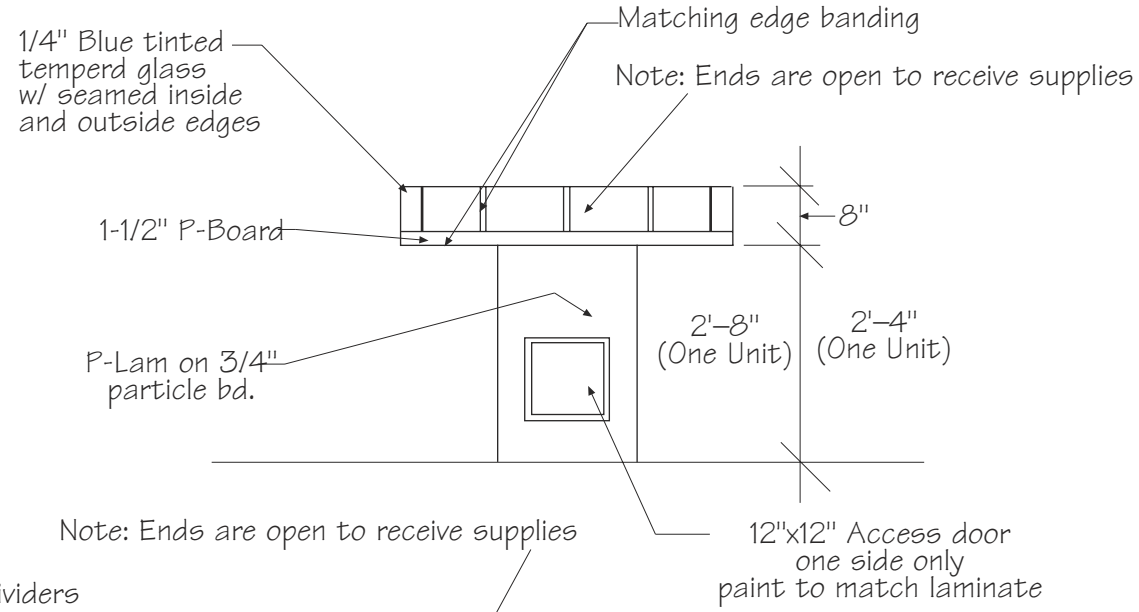


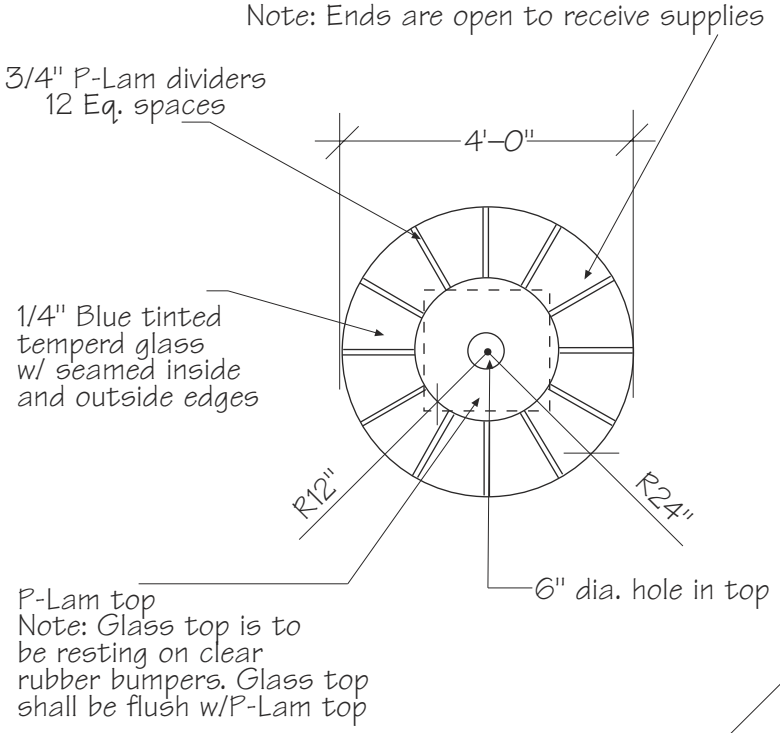


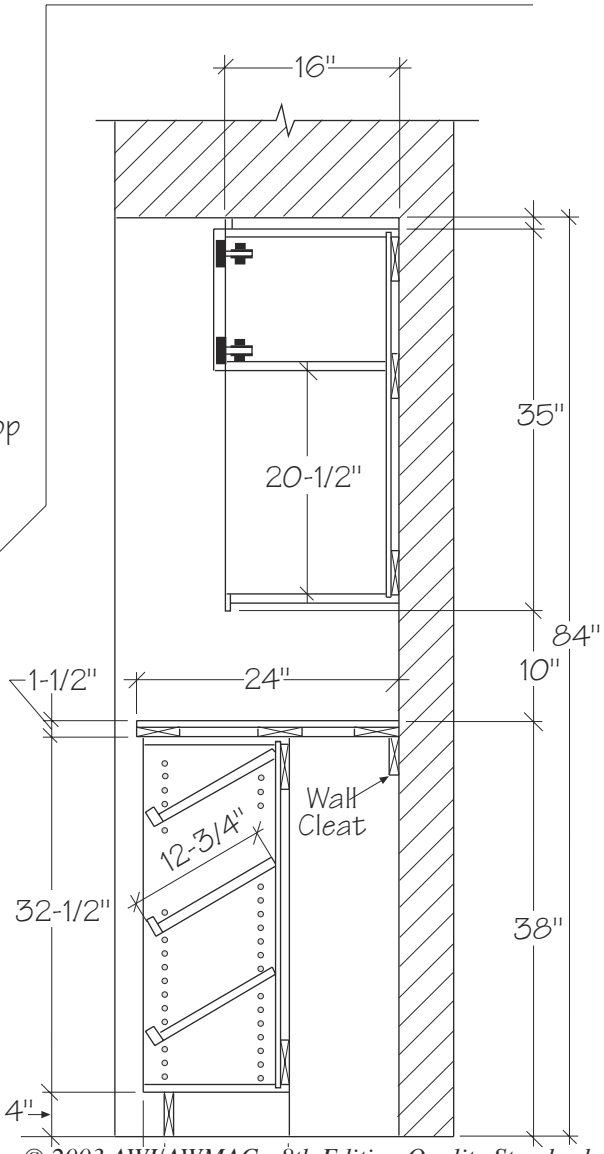
Typical Teller Counter Section





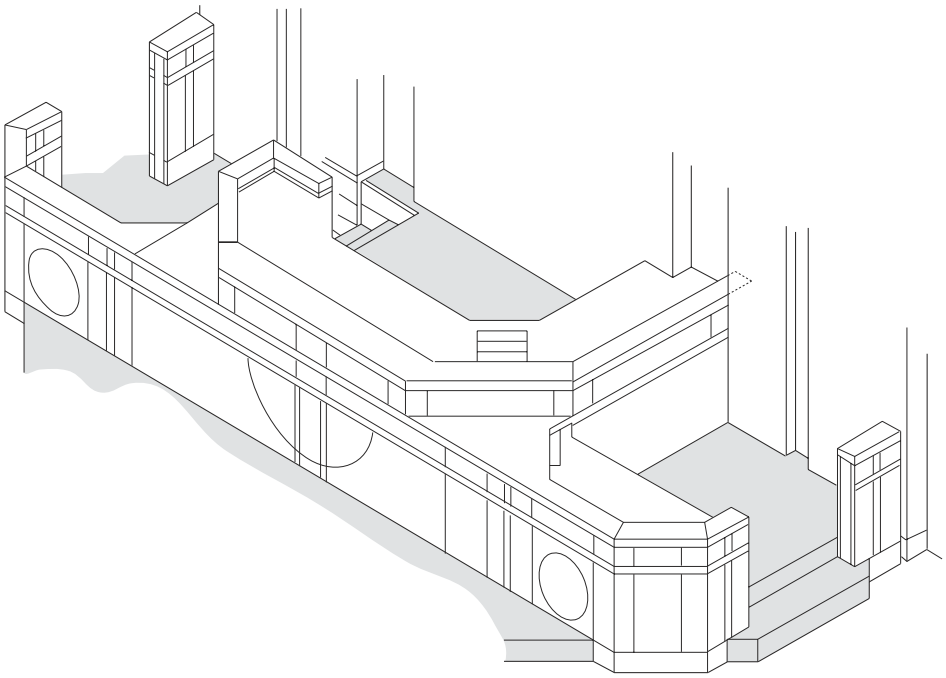


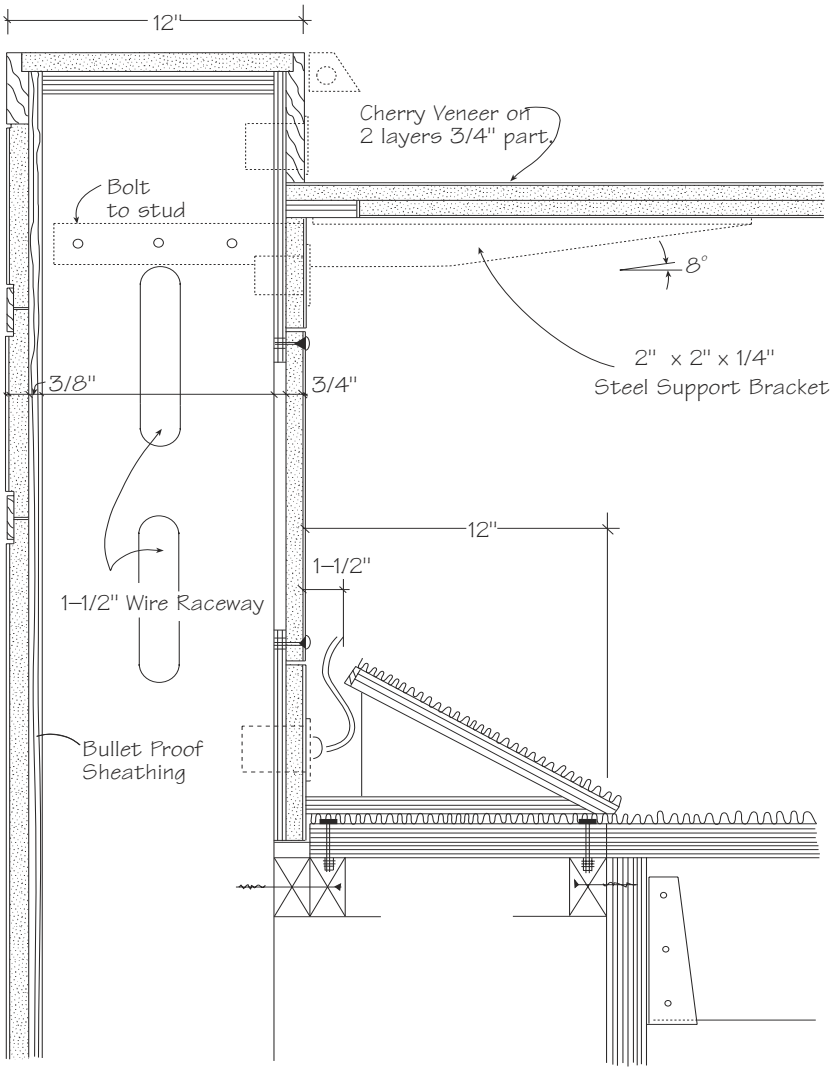




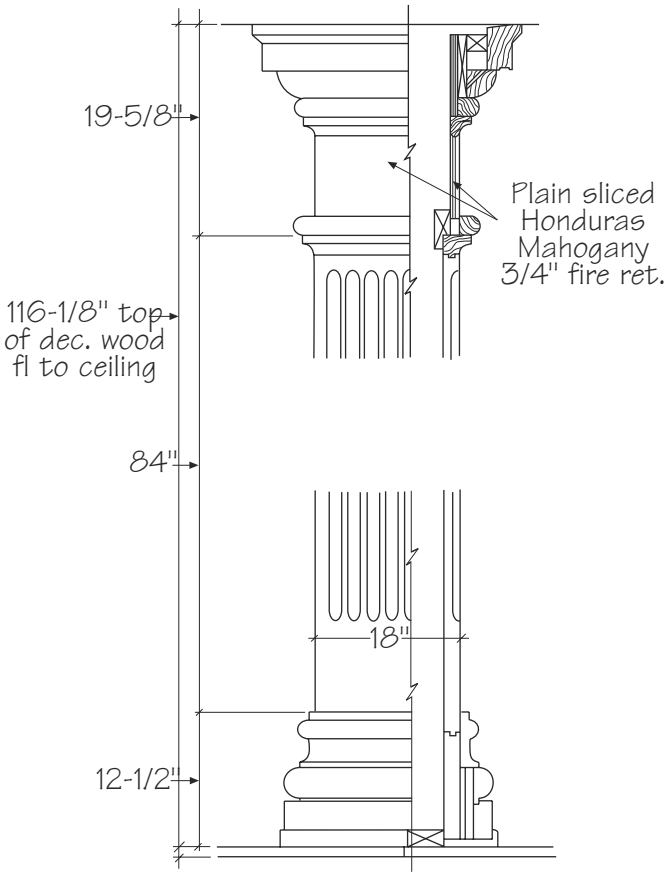
Typical Work Counter with
Literature Display below

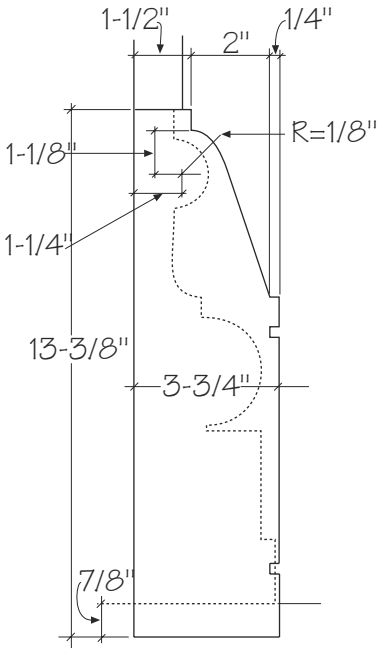
Judge's Bench

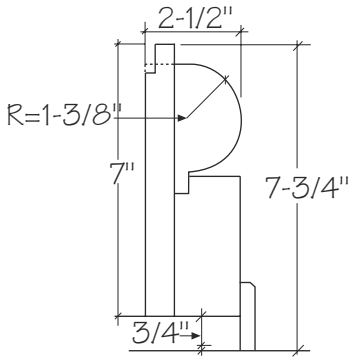


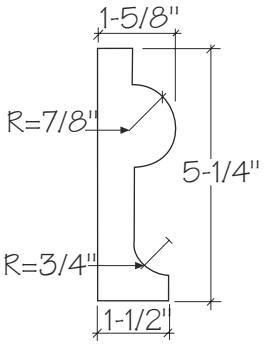


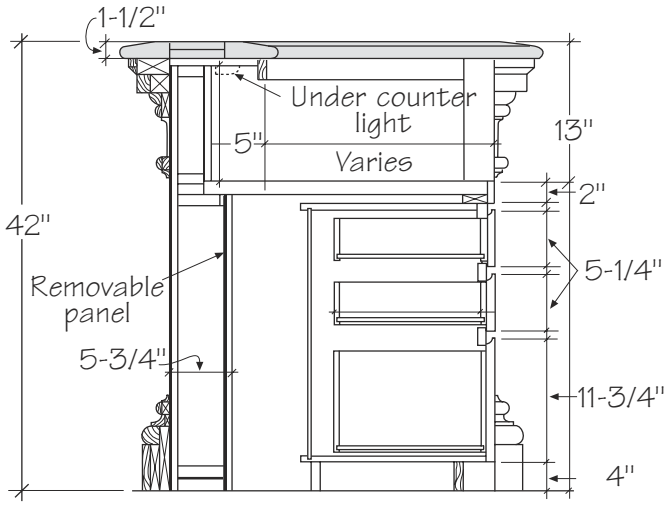
400-D-7
Corporate Woodwork

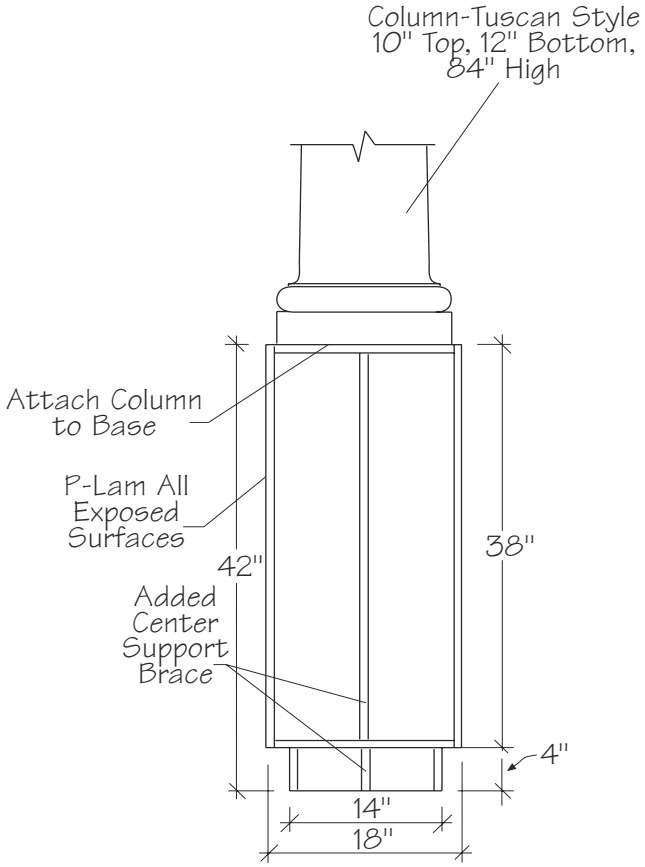


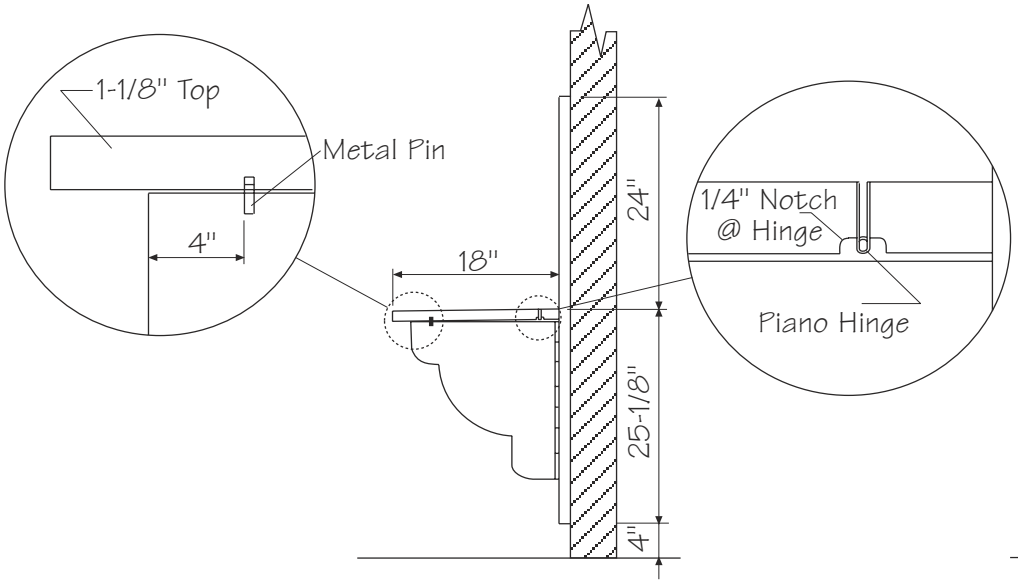




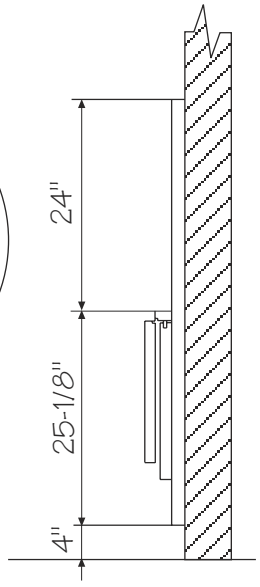




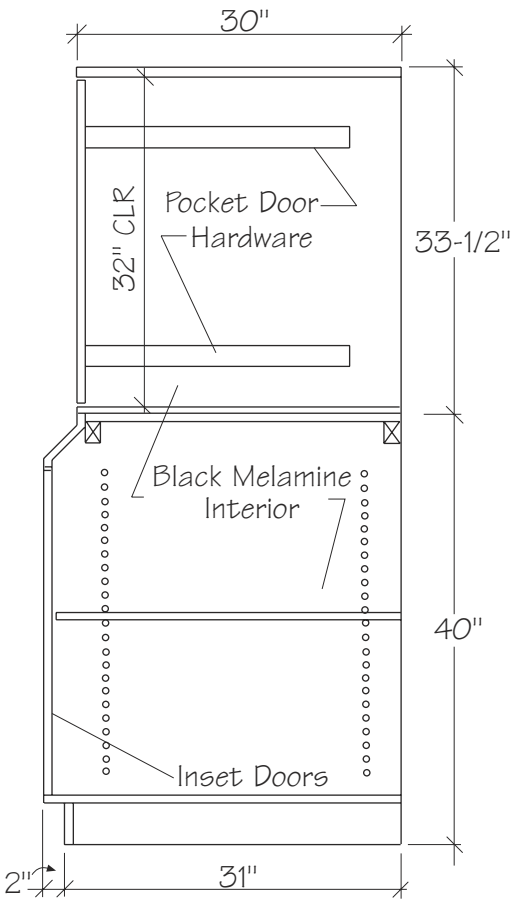


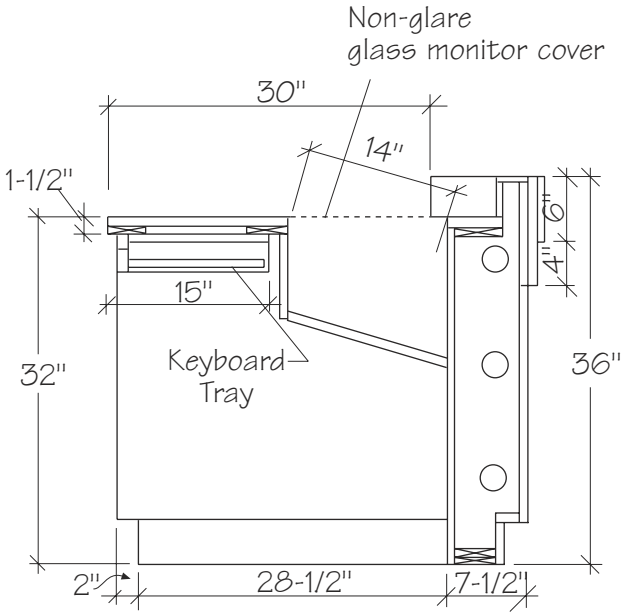


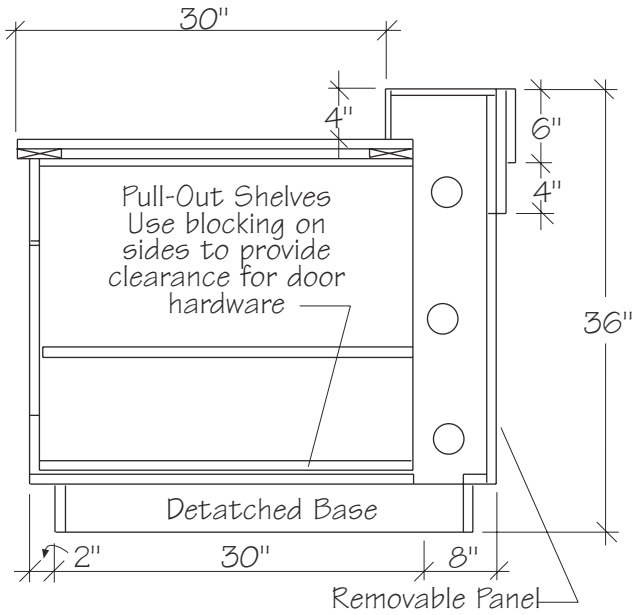
SECTION
Chart Table

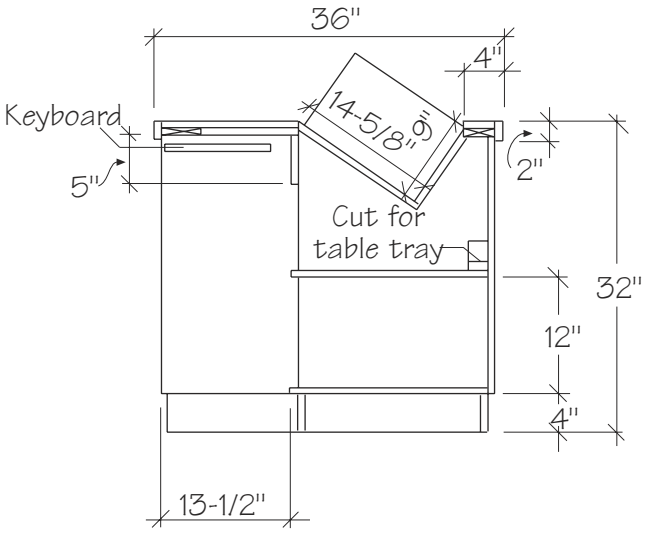


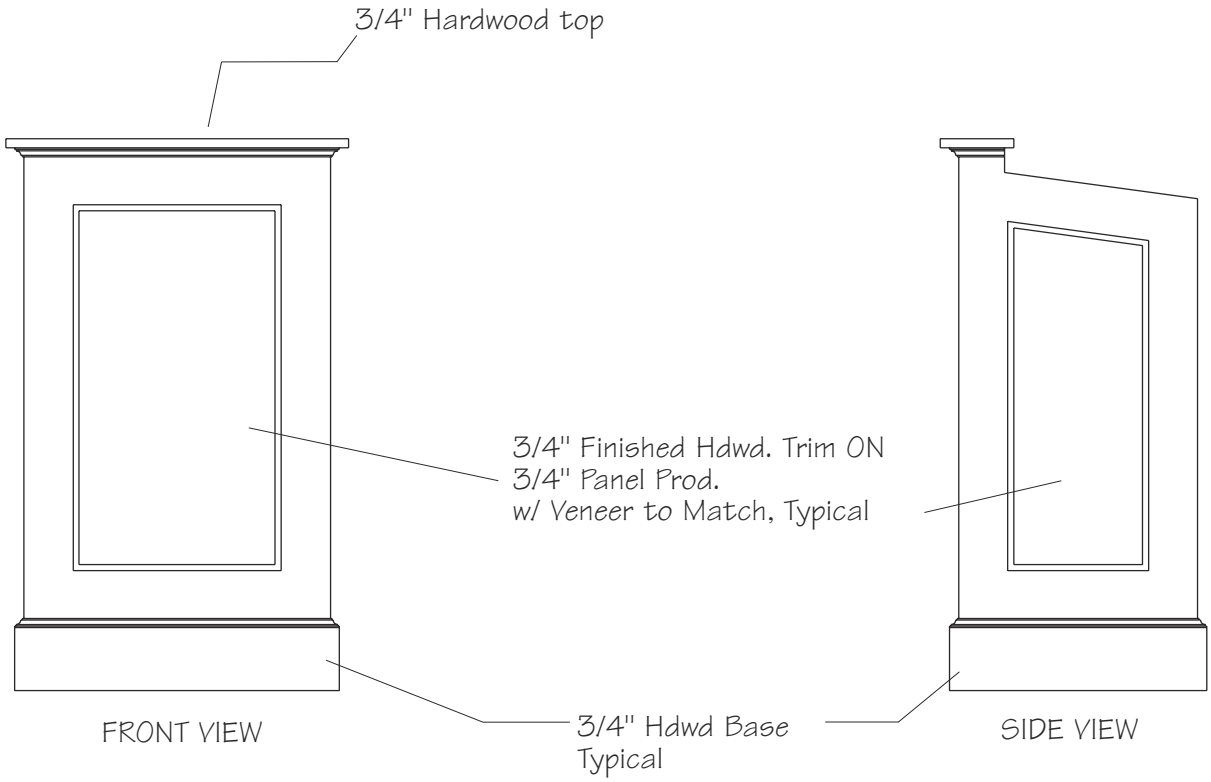
SECTION
Chart Table
W/Top Down

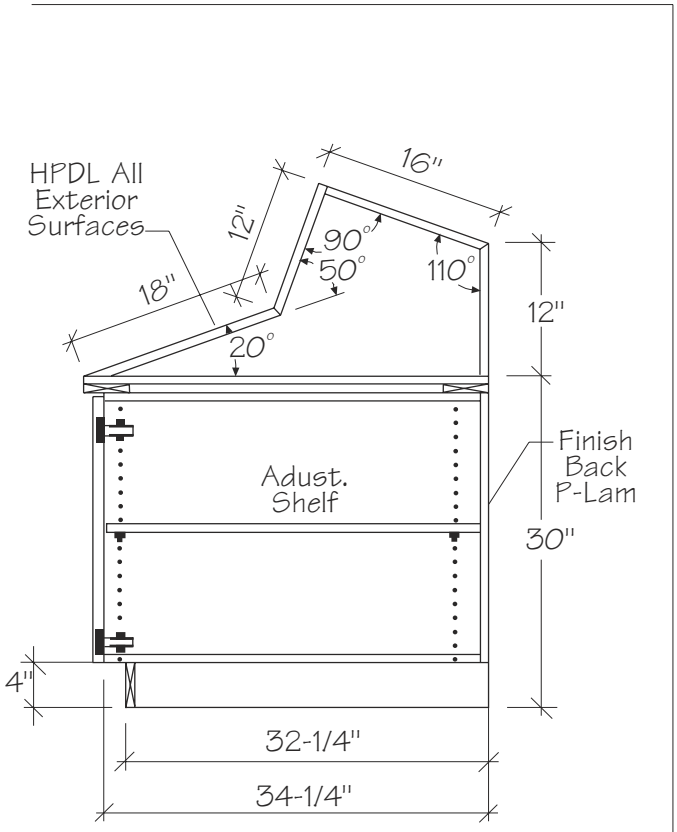


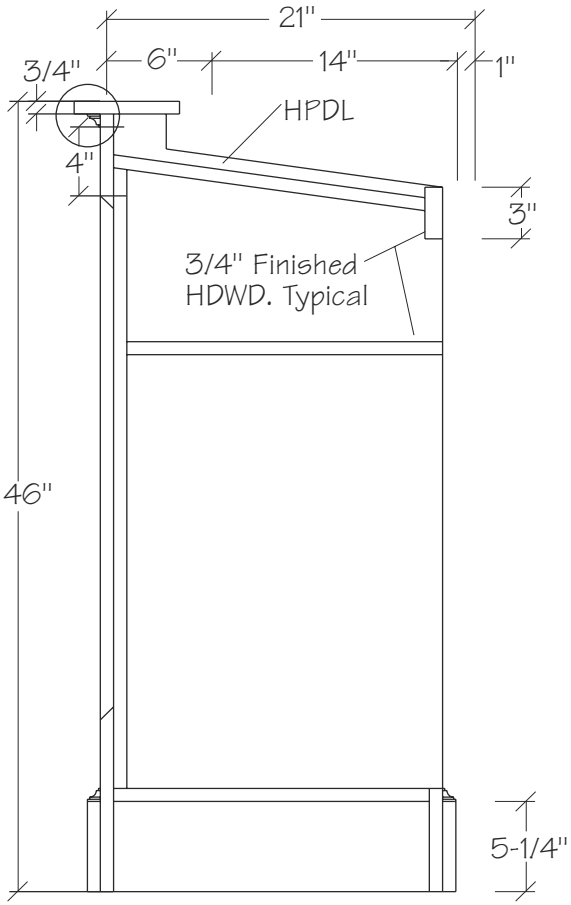




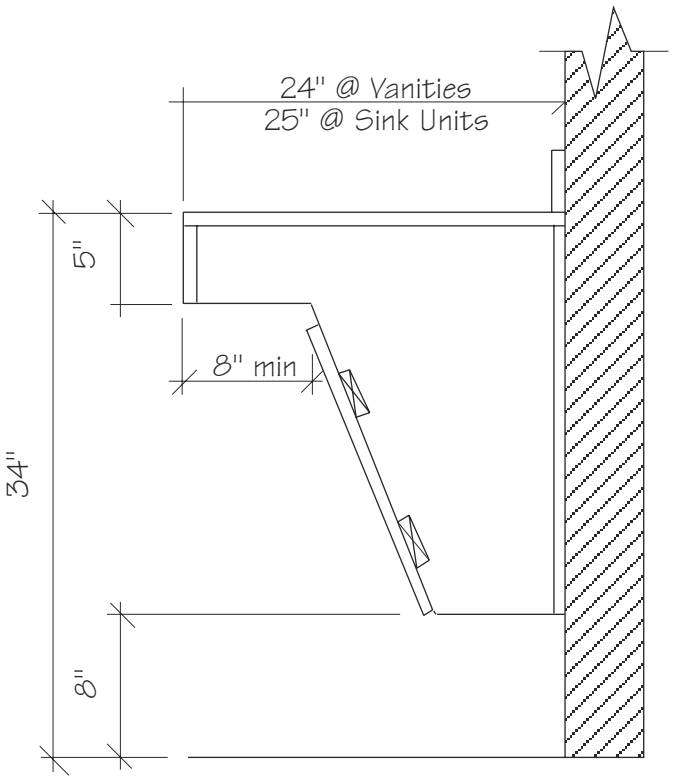


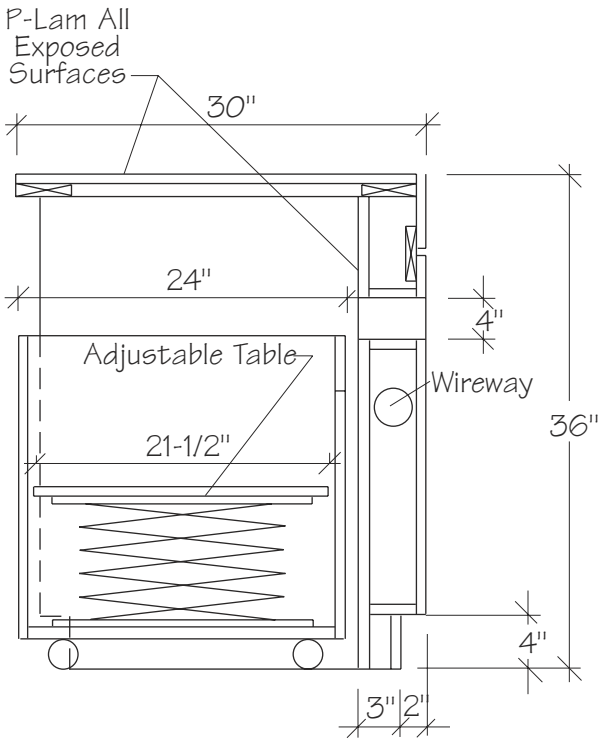


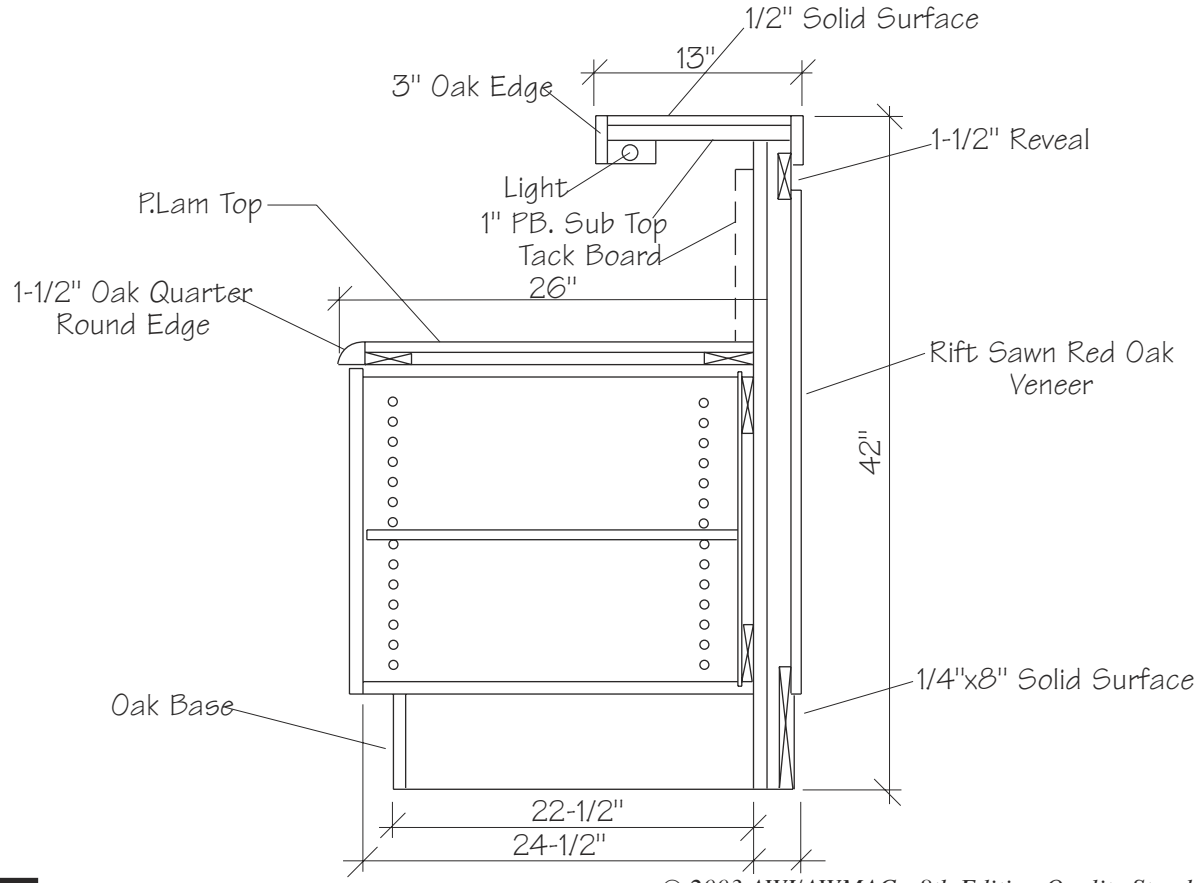




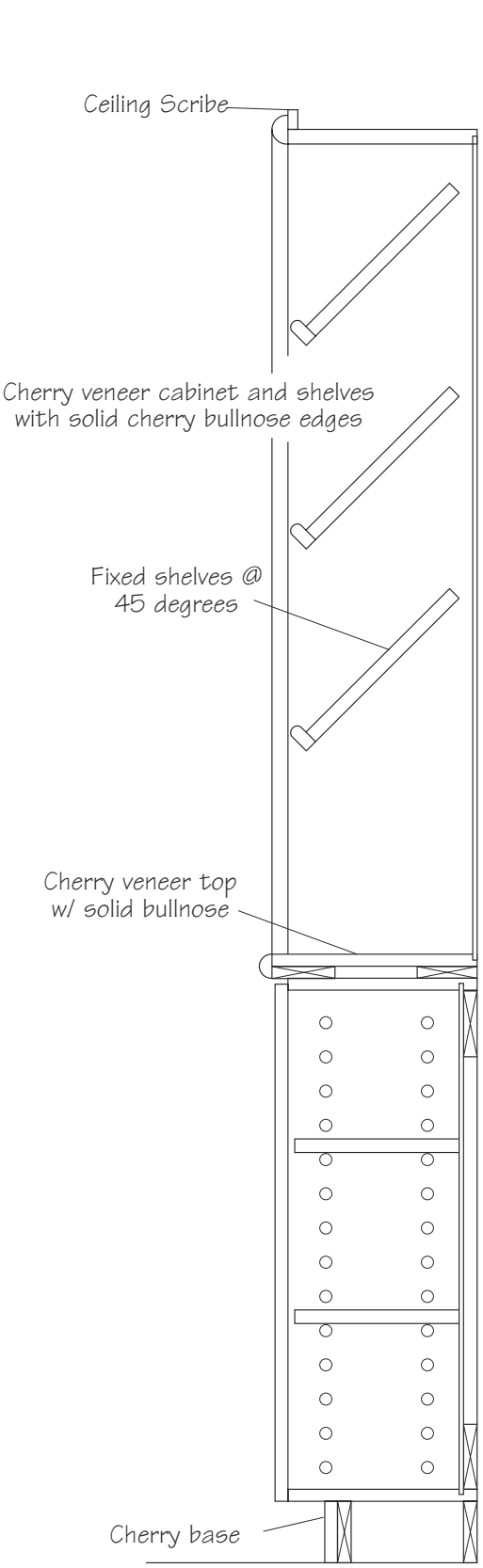
400

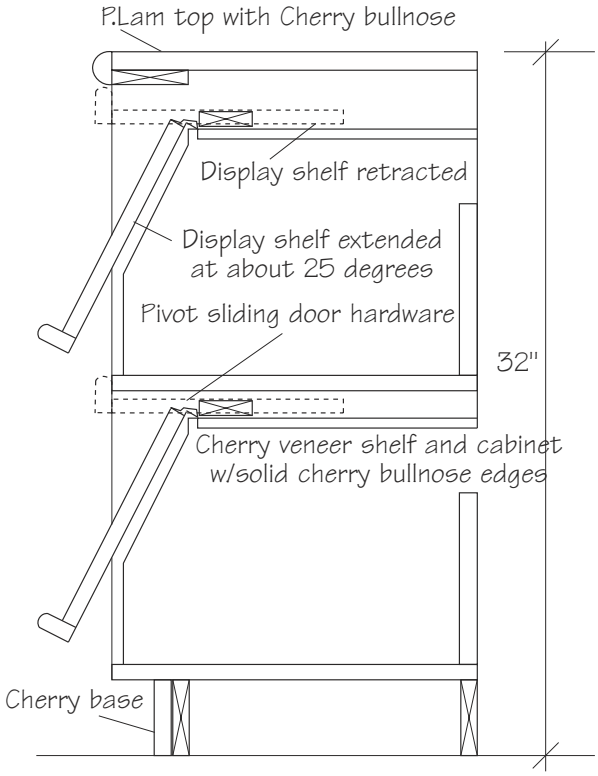


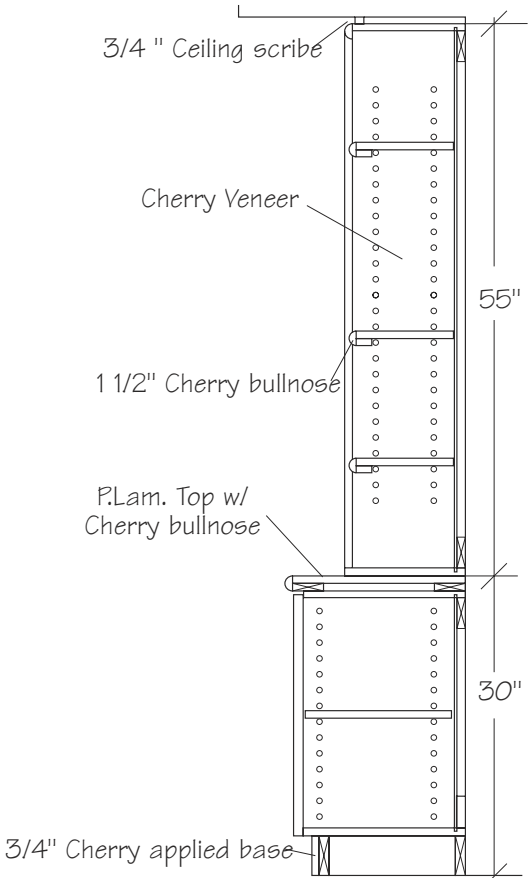


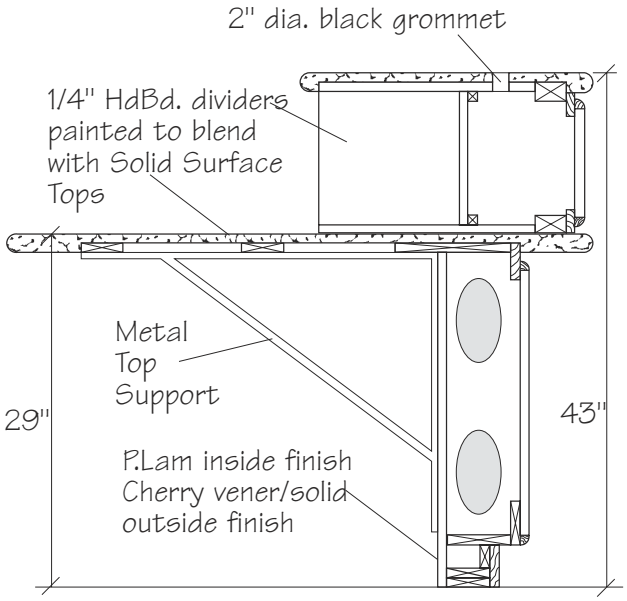


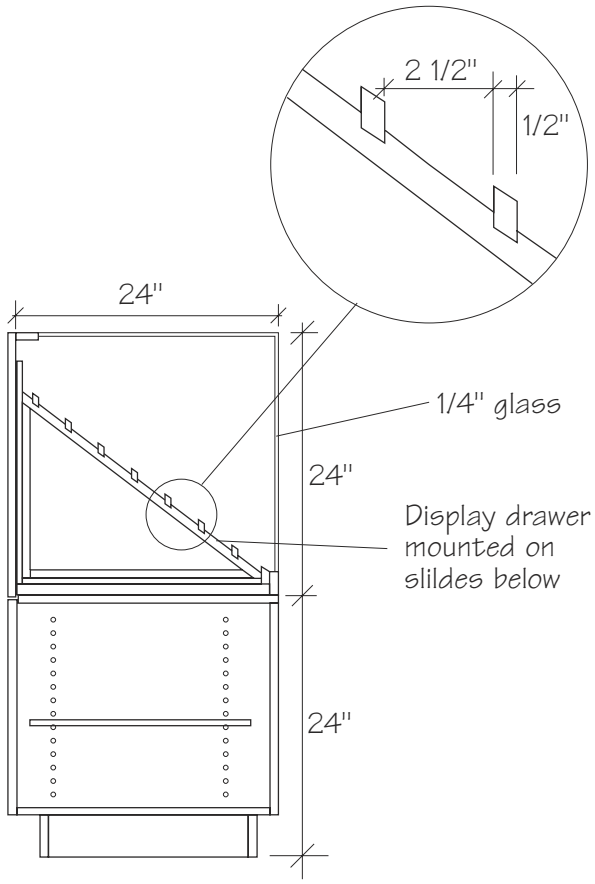
400-D-8
Furniture and Fixtures

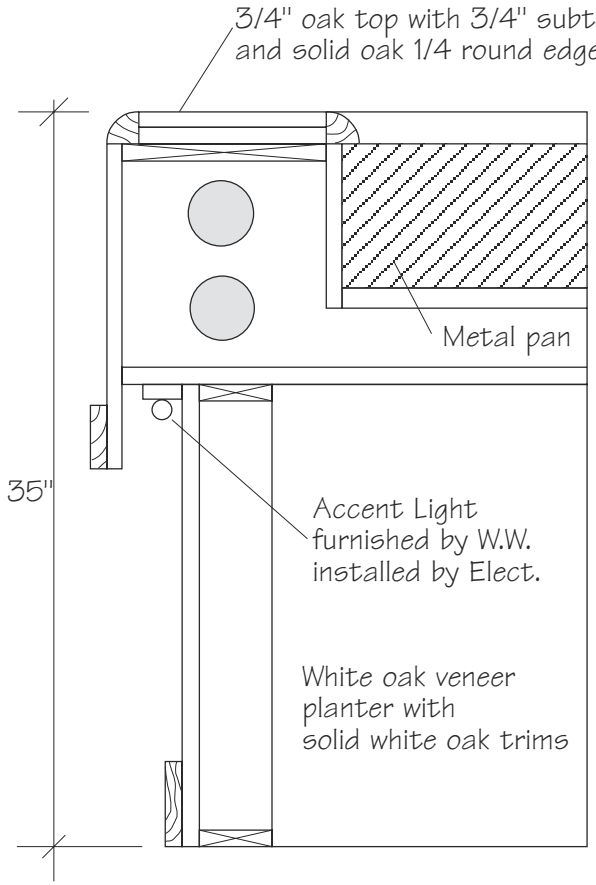


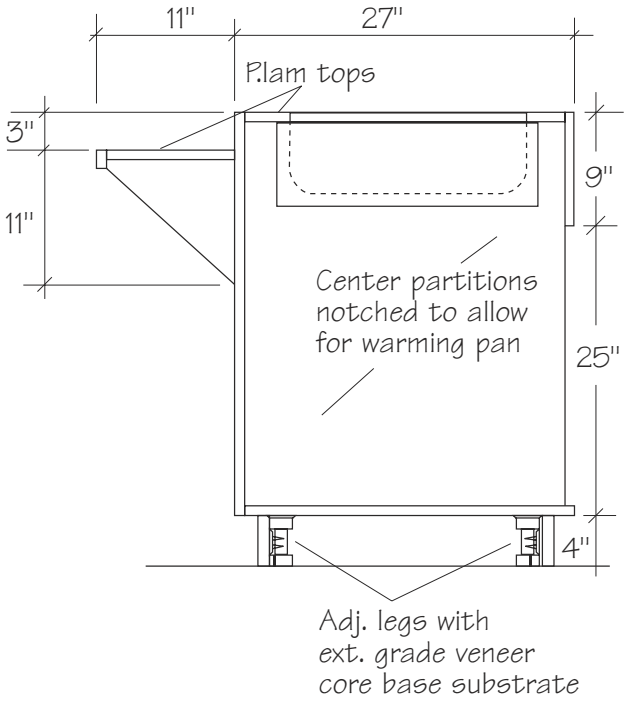


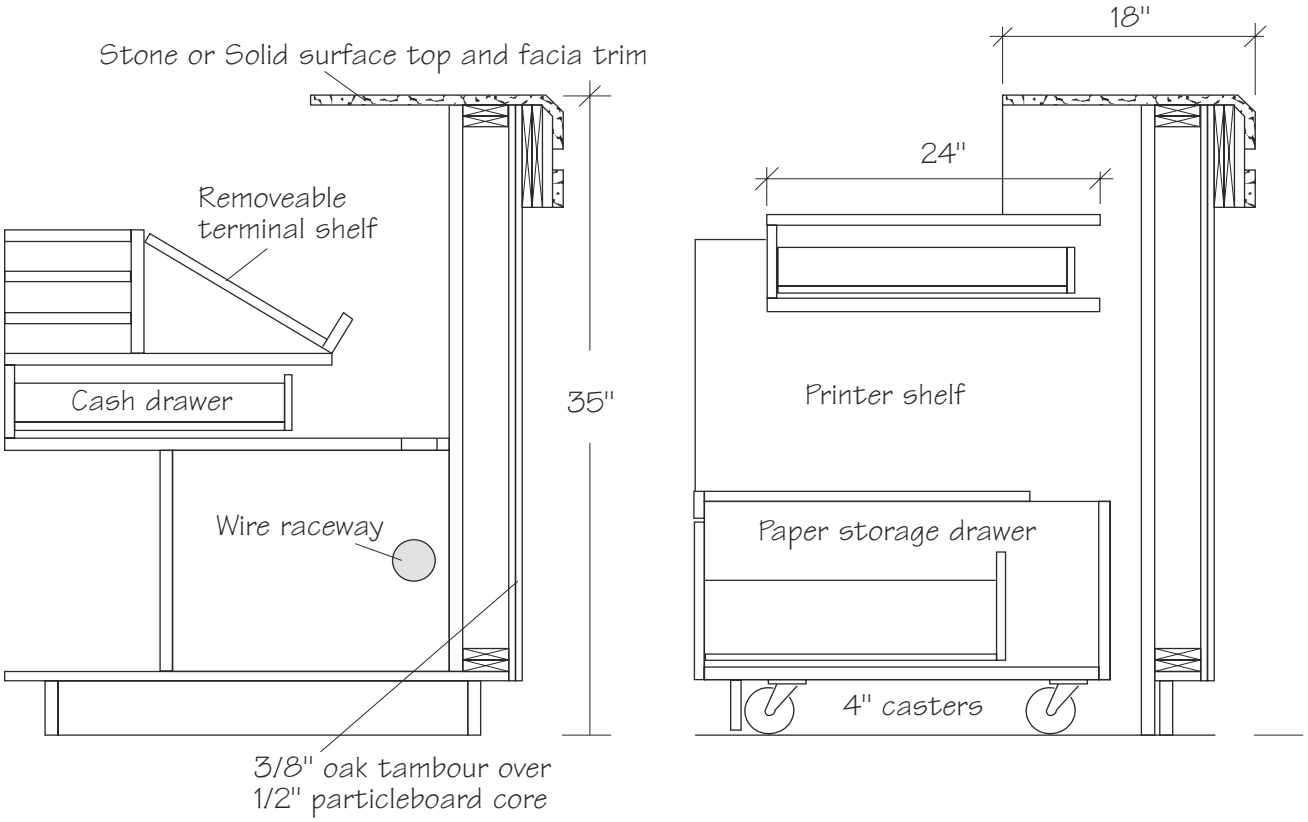


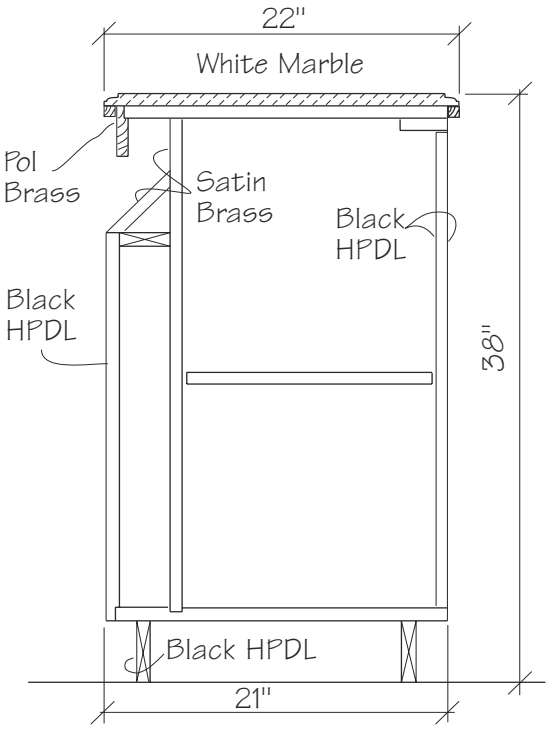


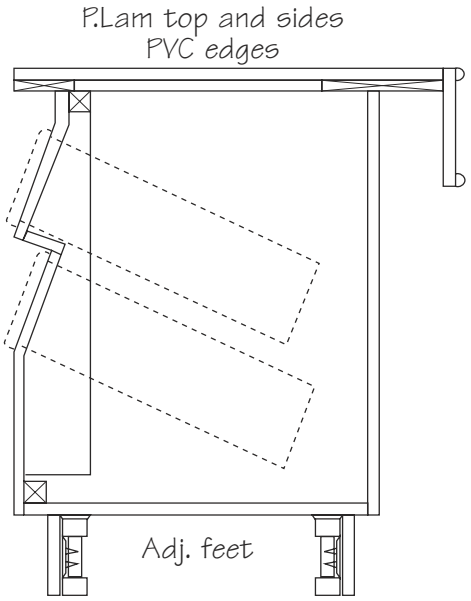




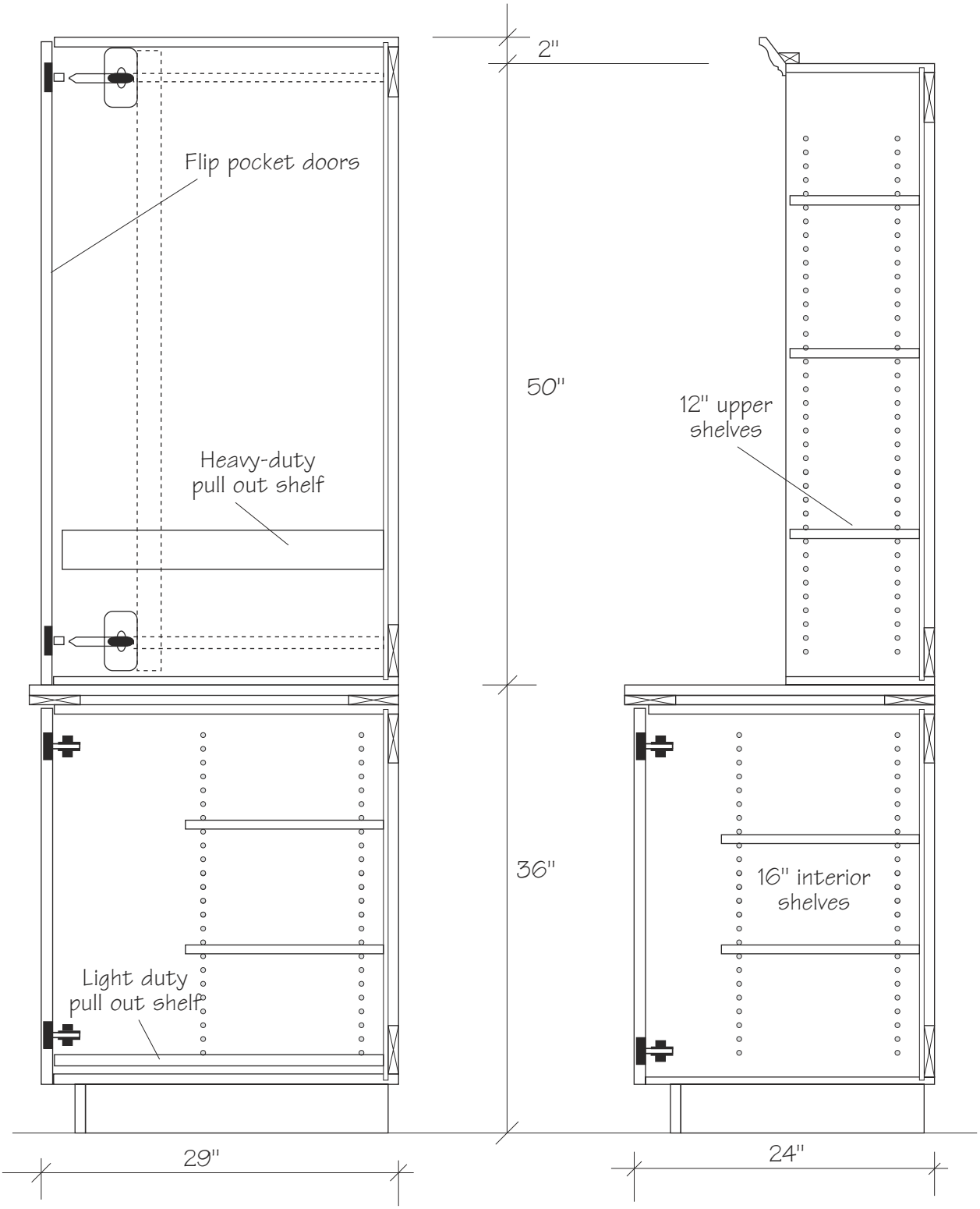


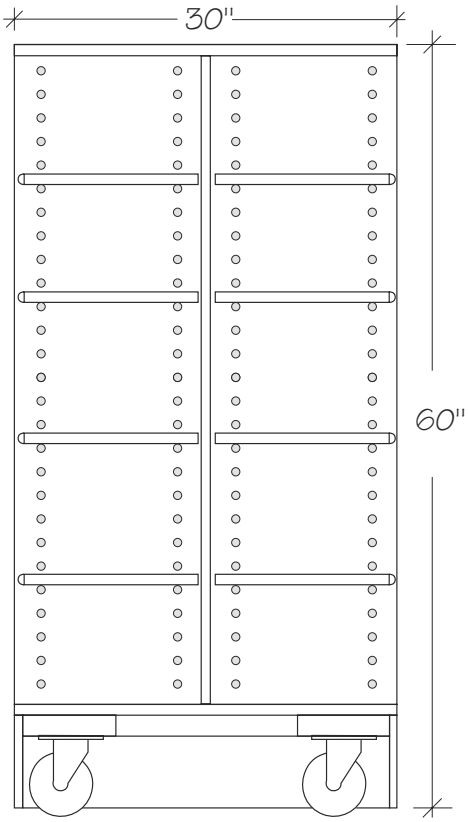


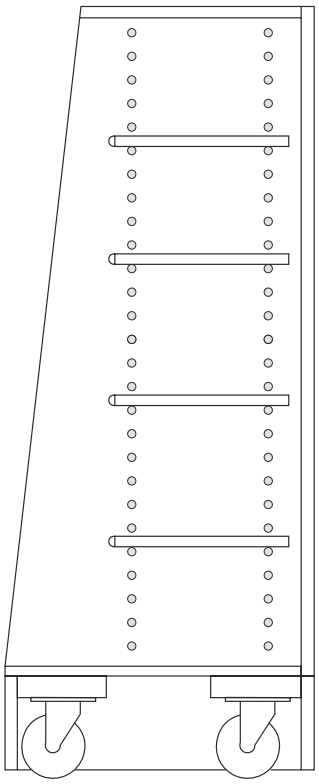




Cup dispenser inserts by owner



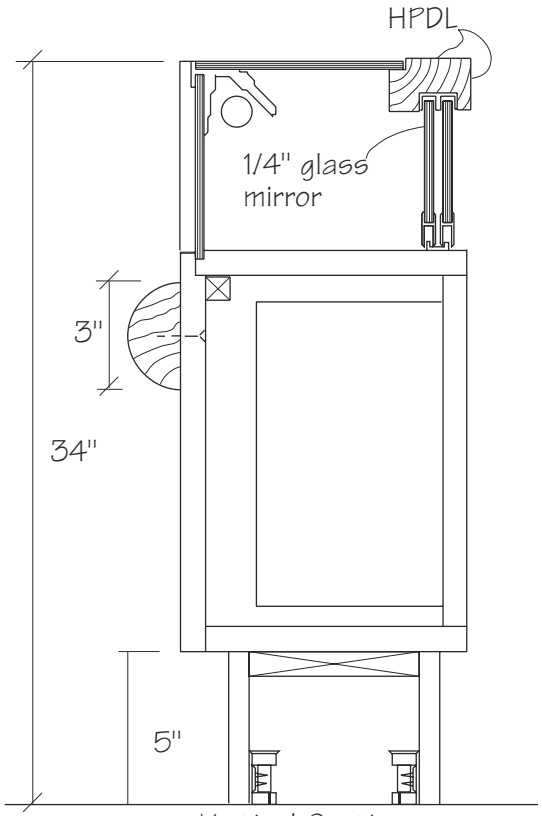




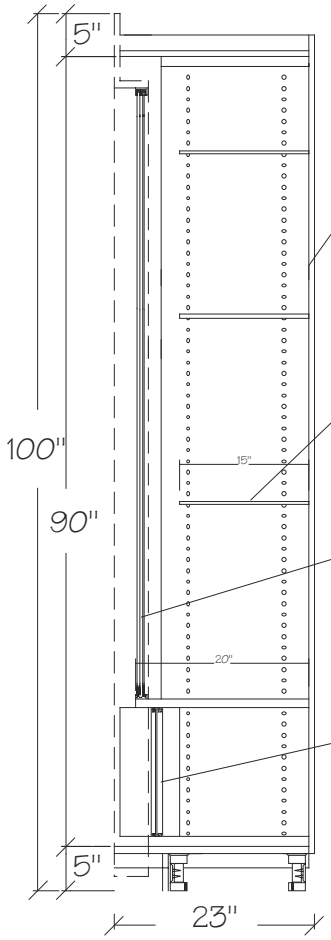
Single and Double-sided Units with bullnosed shelves

Finished back on single sided units

All exposed surfaces White Oak and White Oak veneer



Vertical Section
Jewelry Showcase

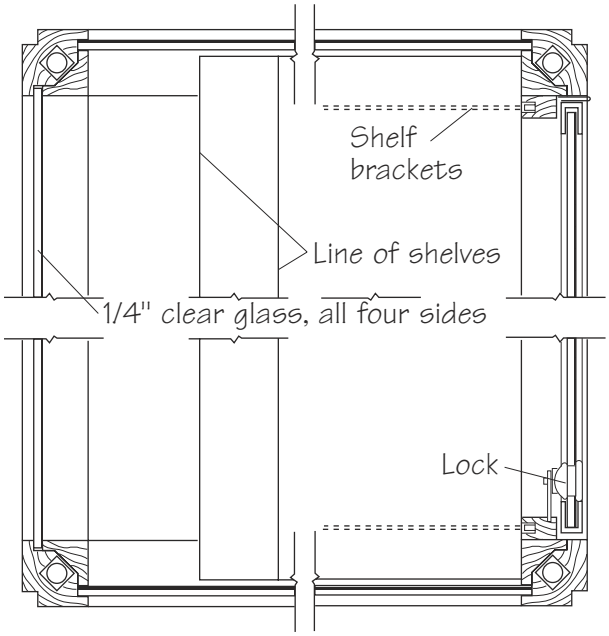


1/2" PtBd. wrapped w/ fabric

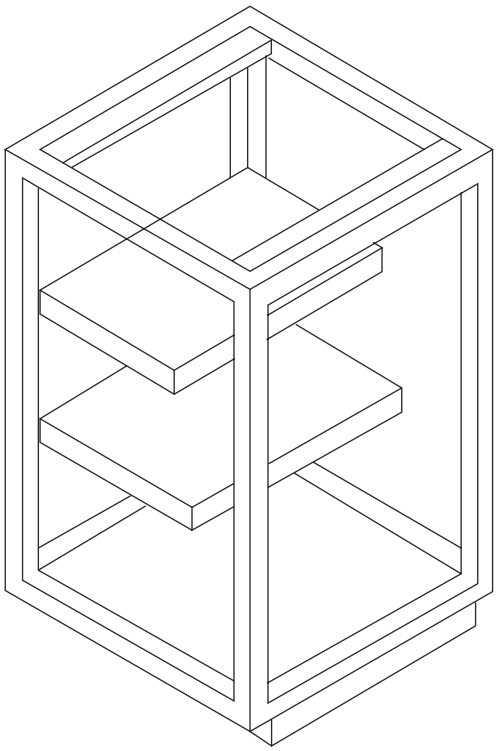
Glass shelves

1/4" clear glass sliding doors

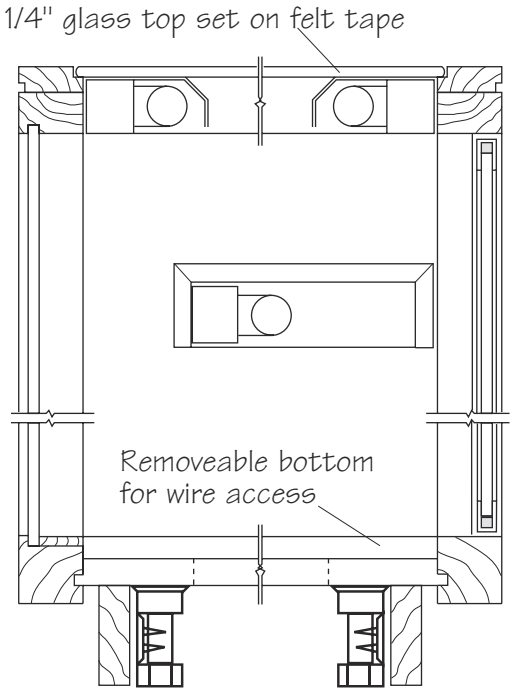
3/4" white oak veneer sliding doors



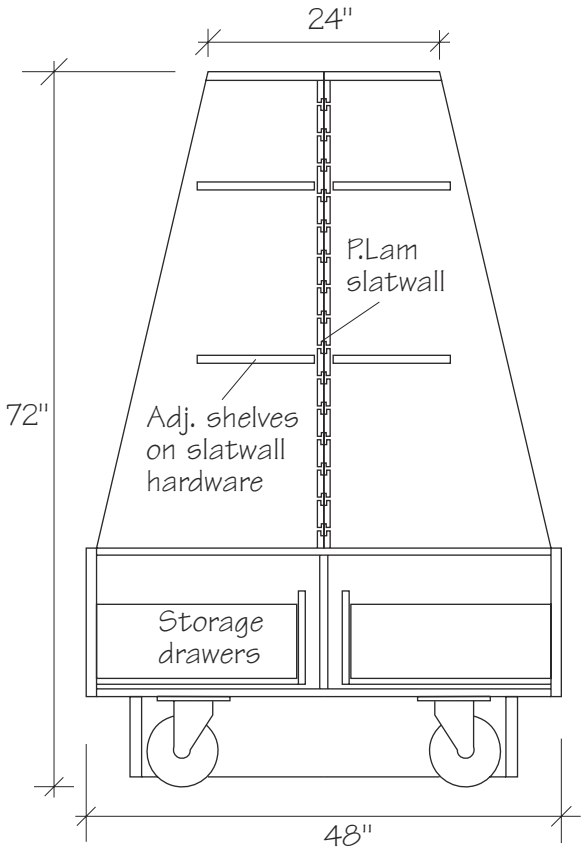
Plan Section

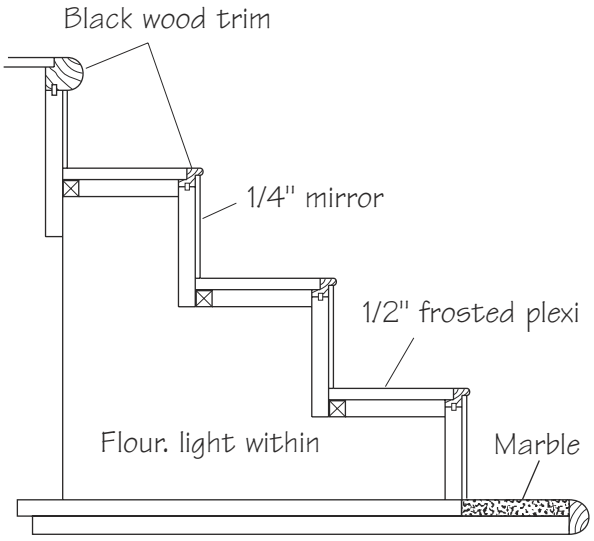


Isometric

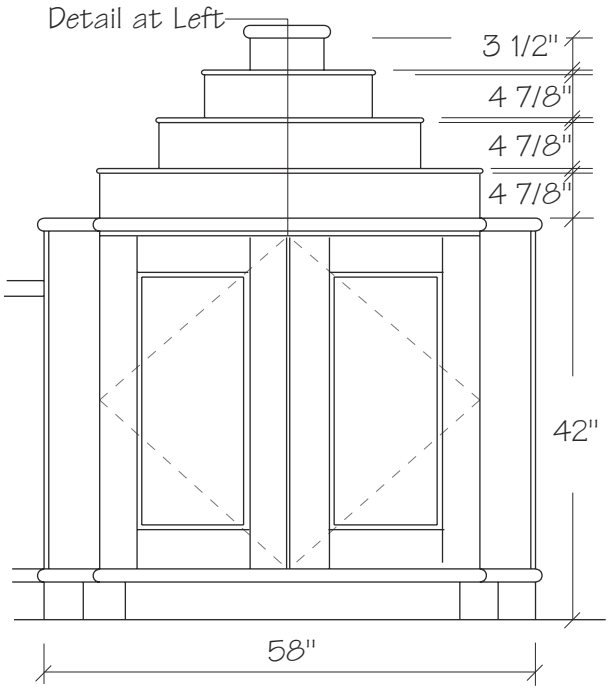


Vertical Section

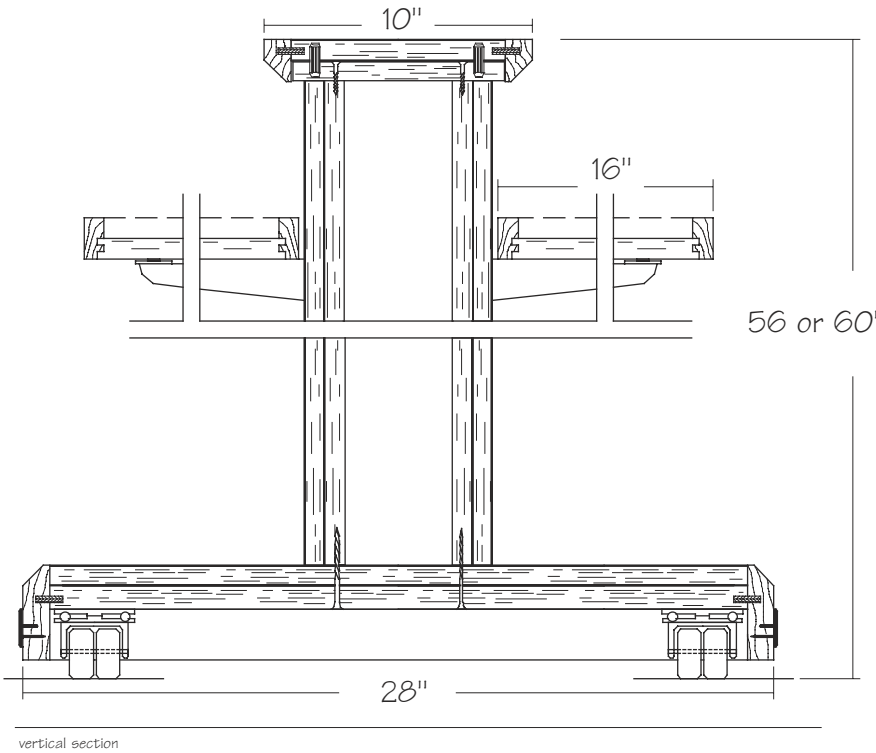




Detail at Top of Back Bar

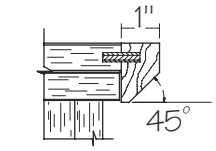


Elevation at Back Bar

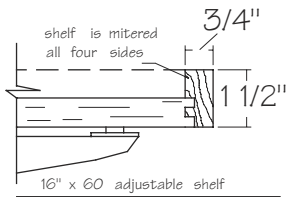


vertical section

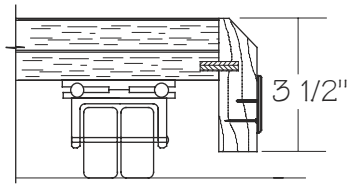
Rolling Display Store Fixture



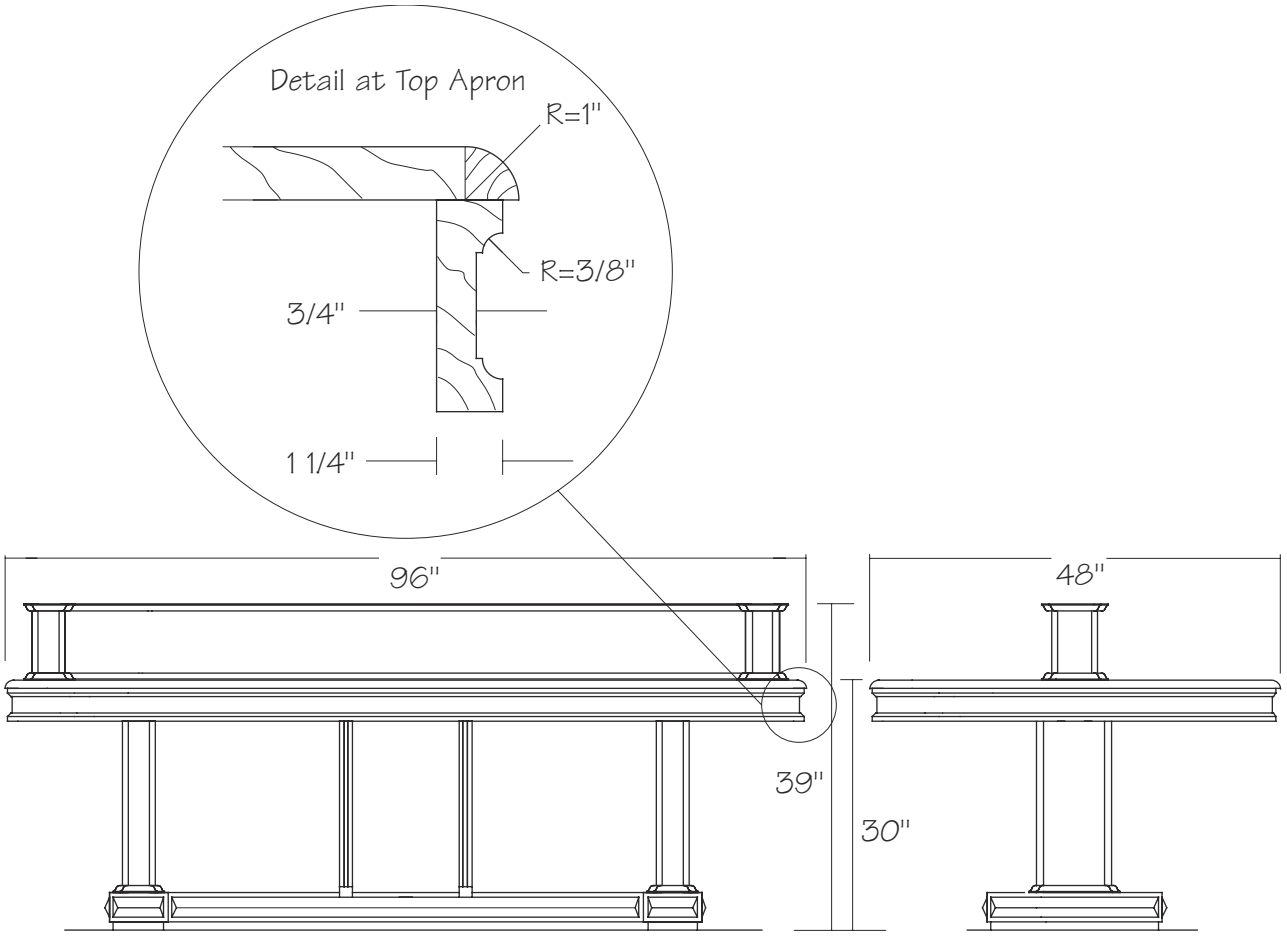
top shelf edge detail
vertical section



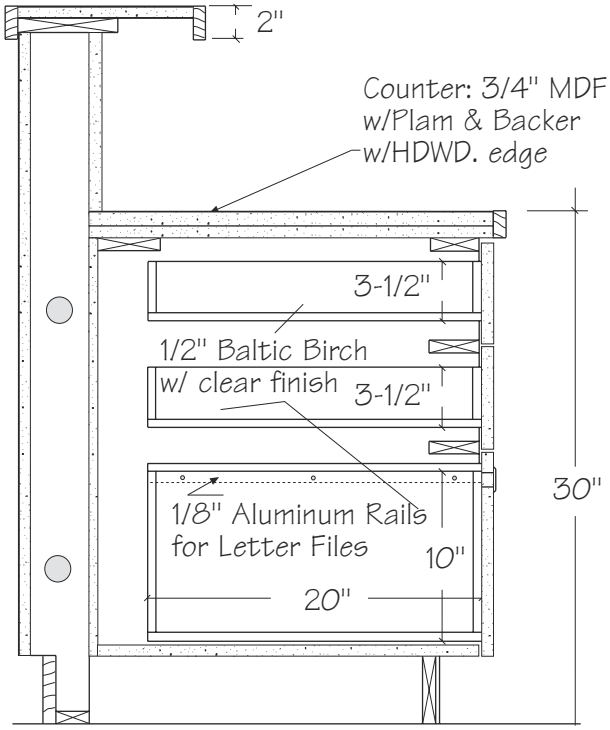
16" x 60 adjustable shelf
shelf section/edge detail

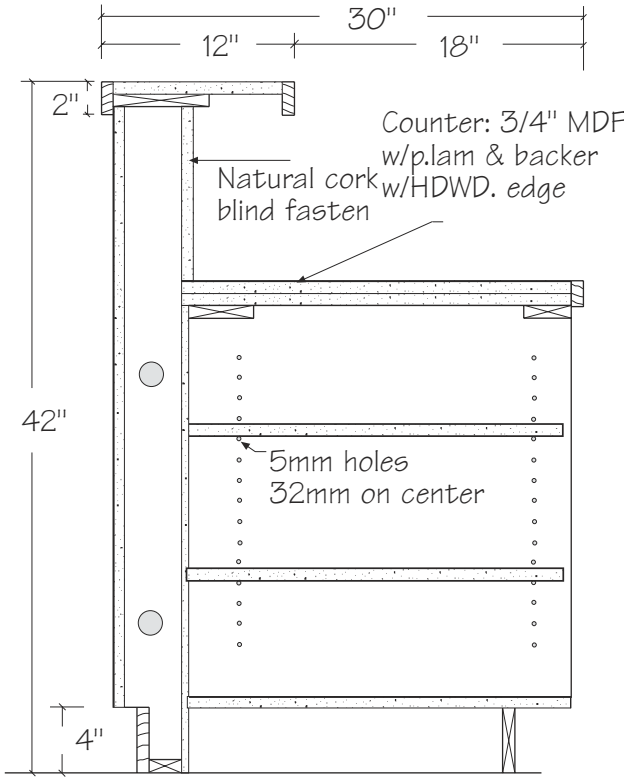


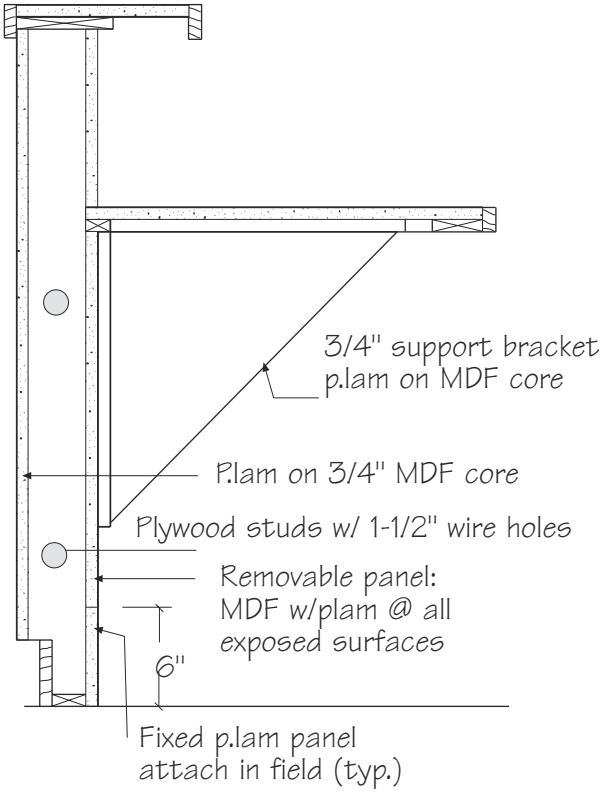
base edge detail
vertical section

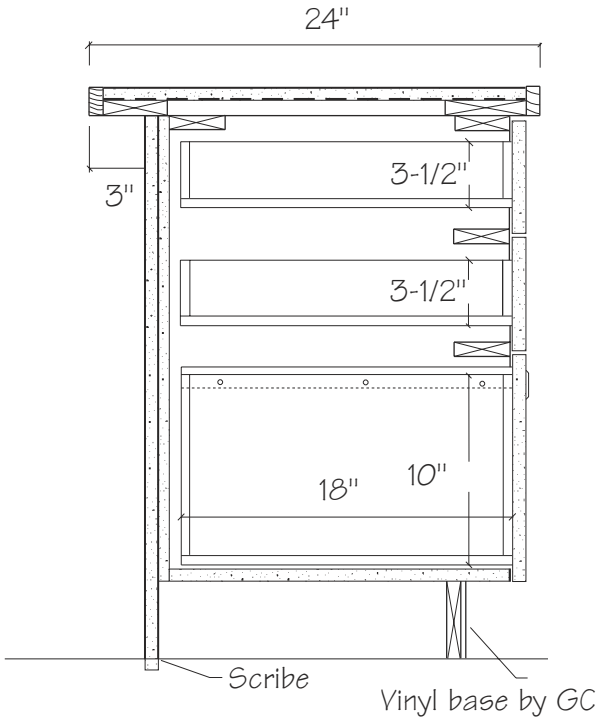


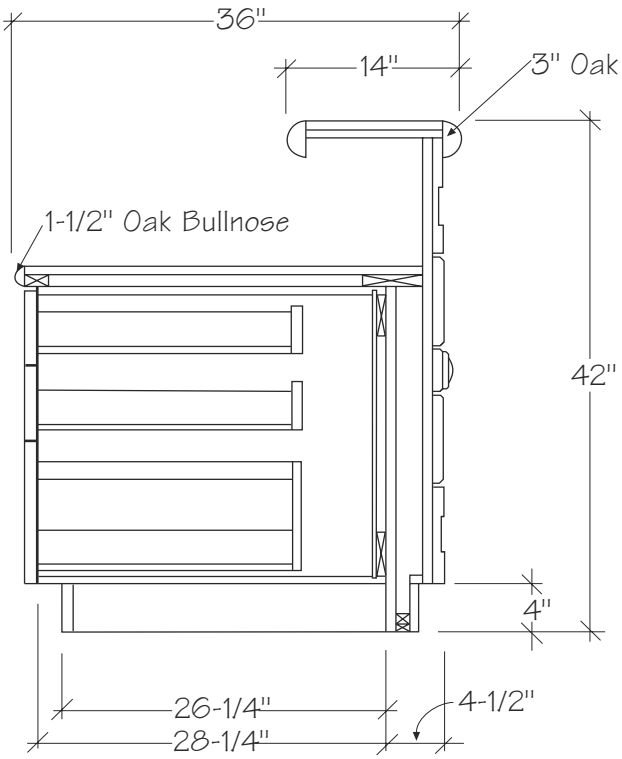
400-D-9
Reception

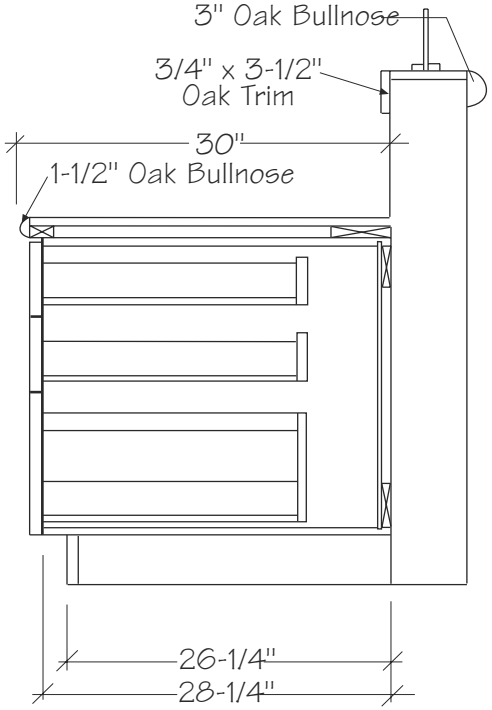


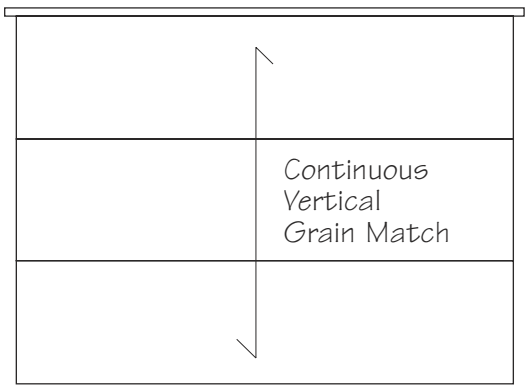




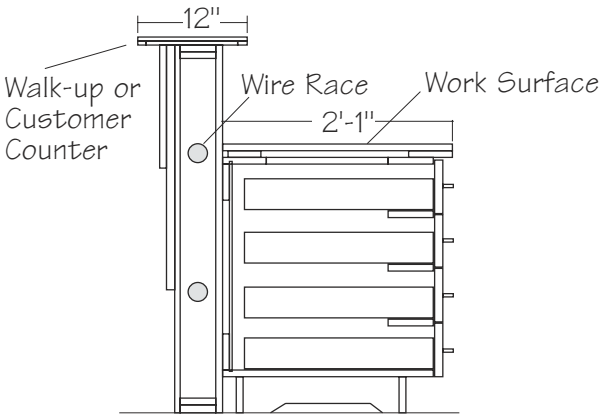




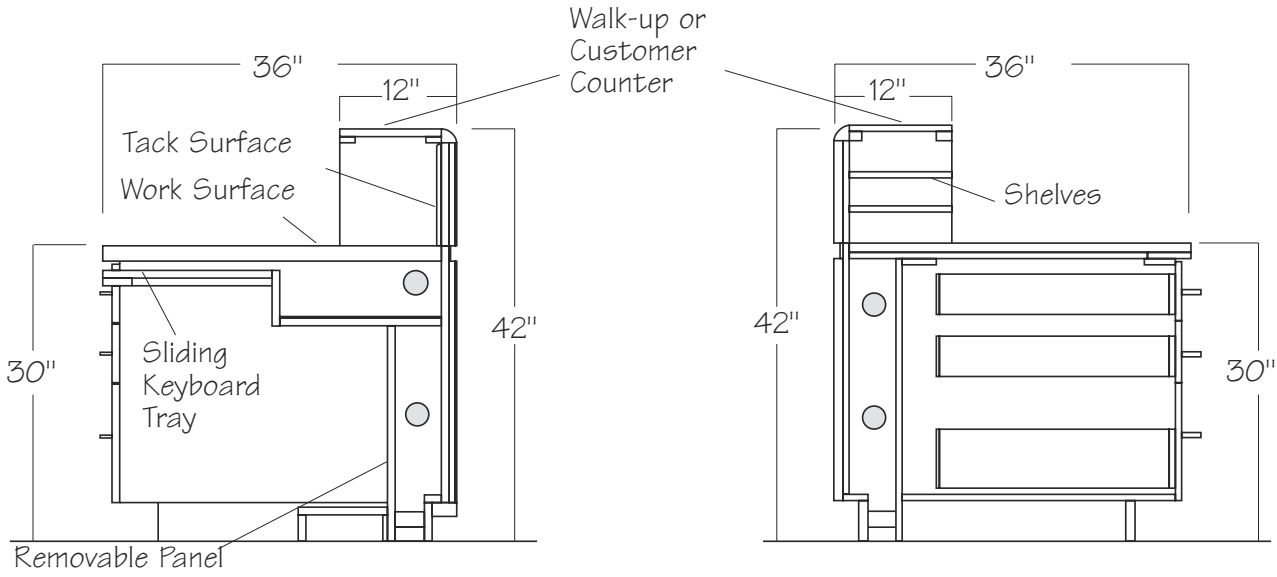


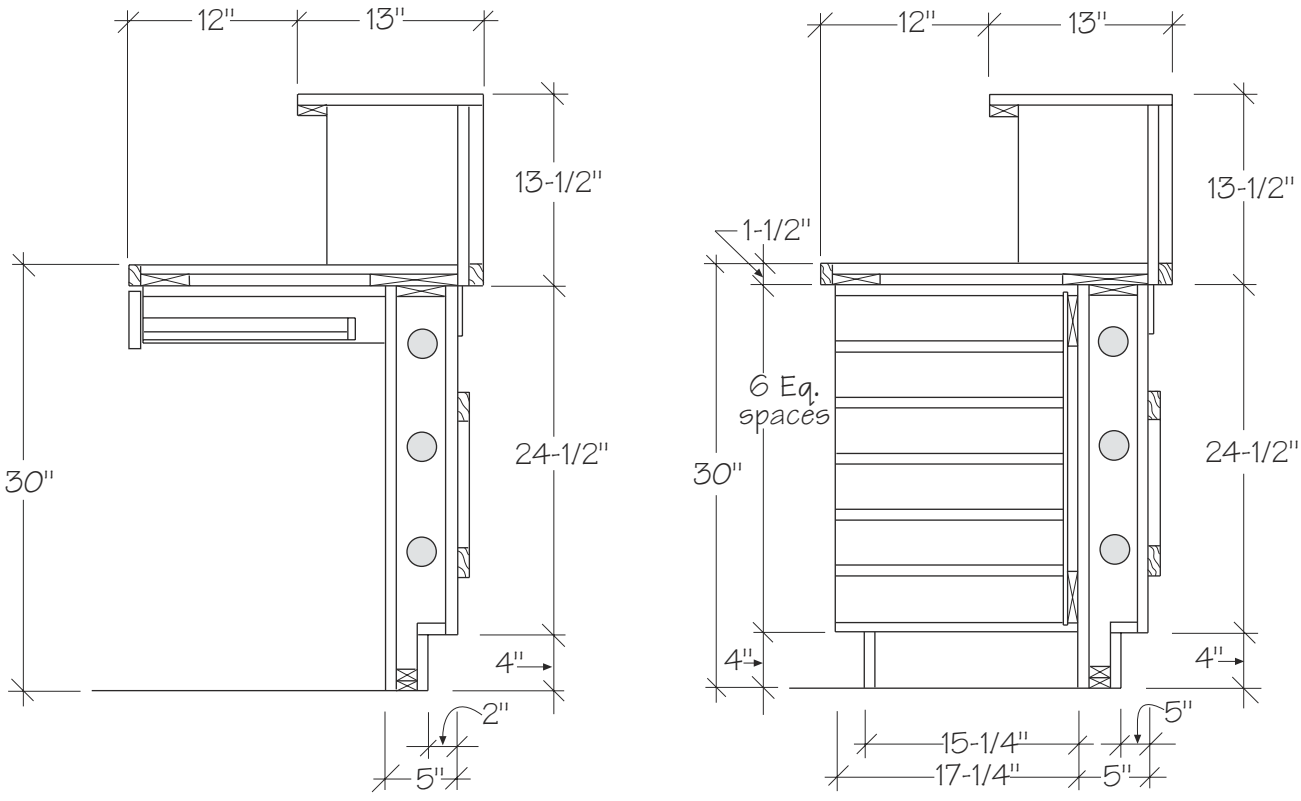


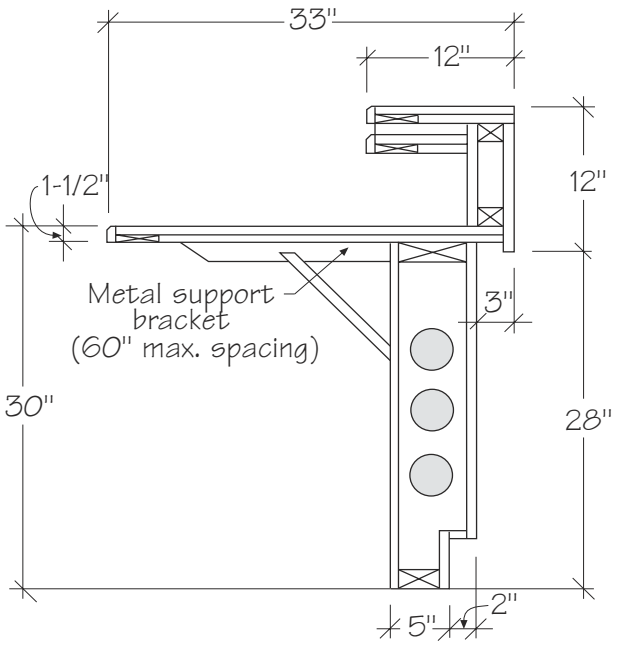
Front Elev. - Small Reception Desk w/ Drawers

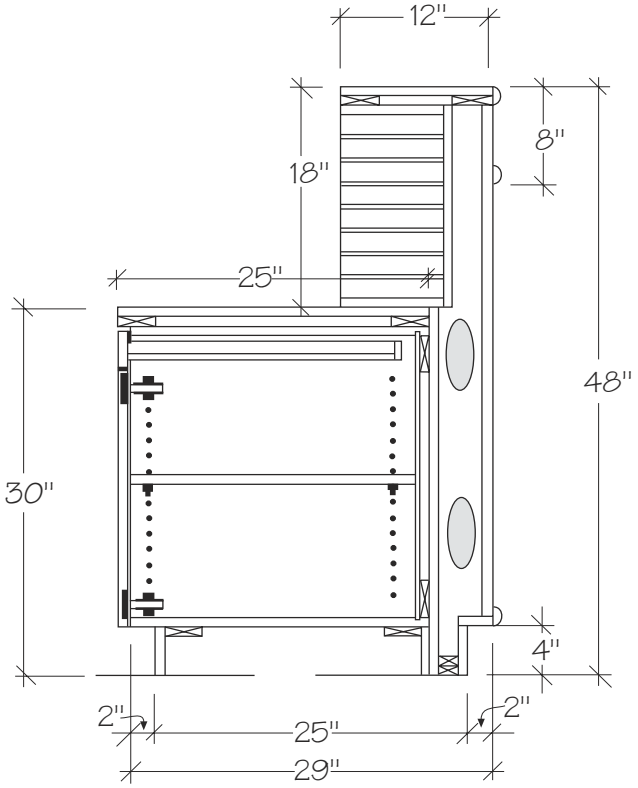


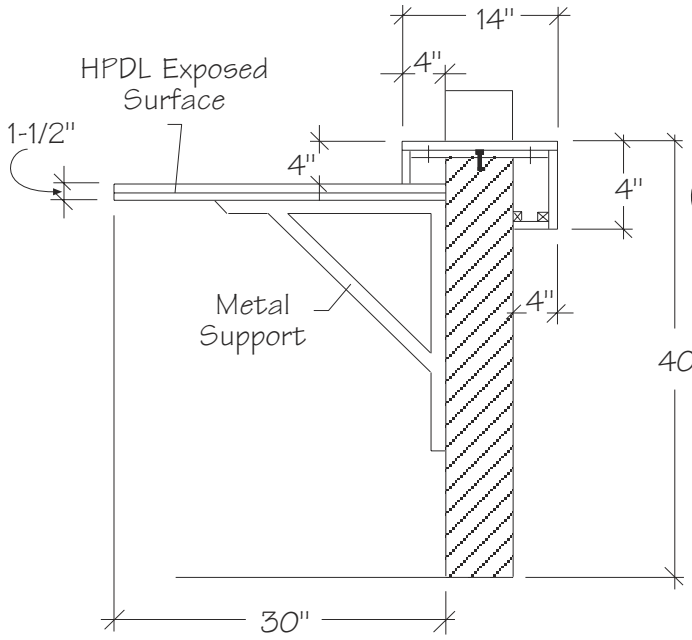
Sect. thru Typ. Drawer
Stack/Reception

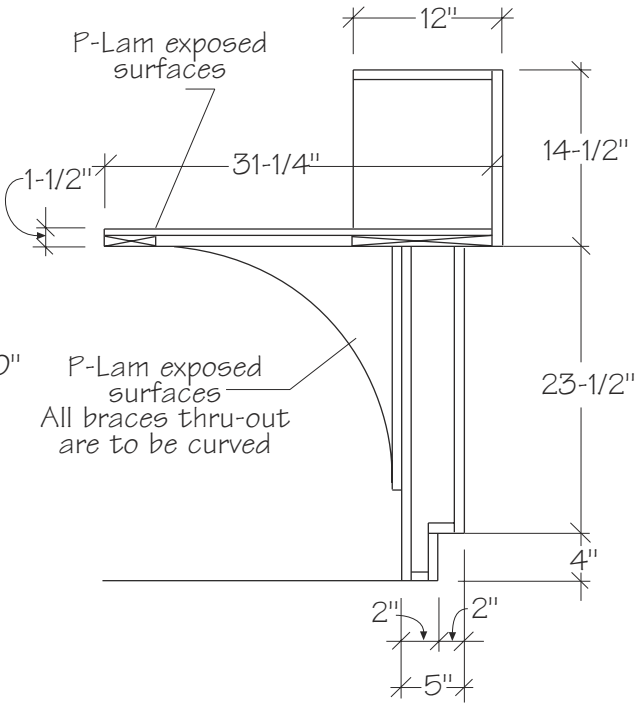


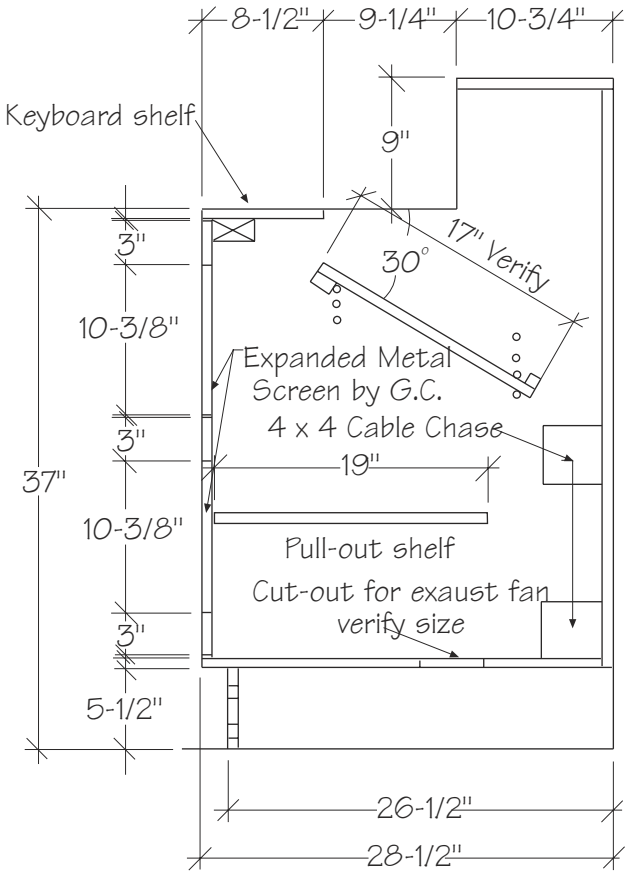


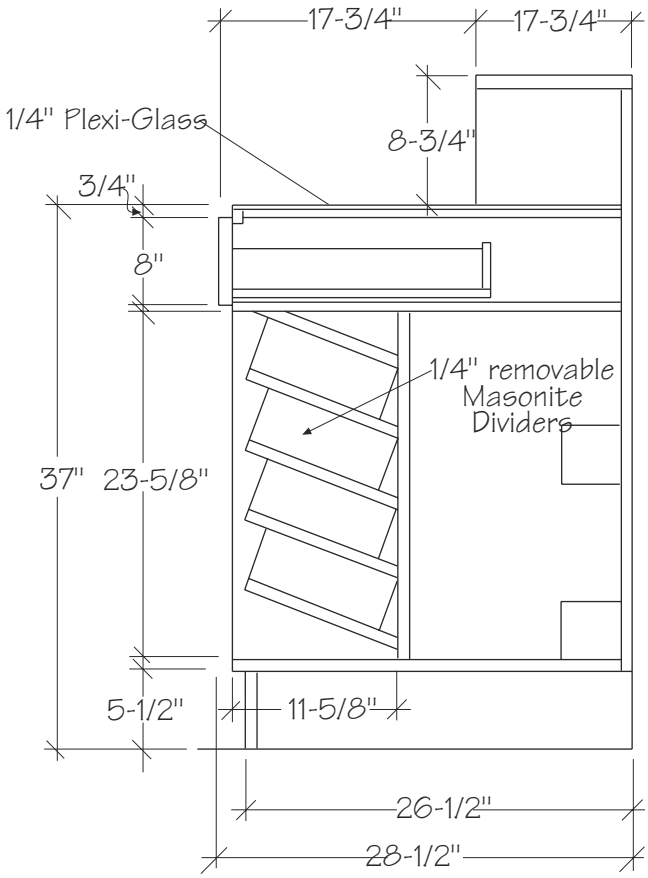


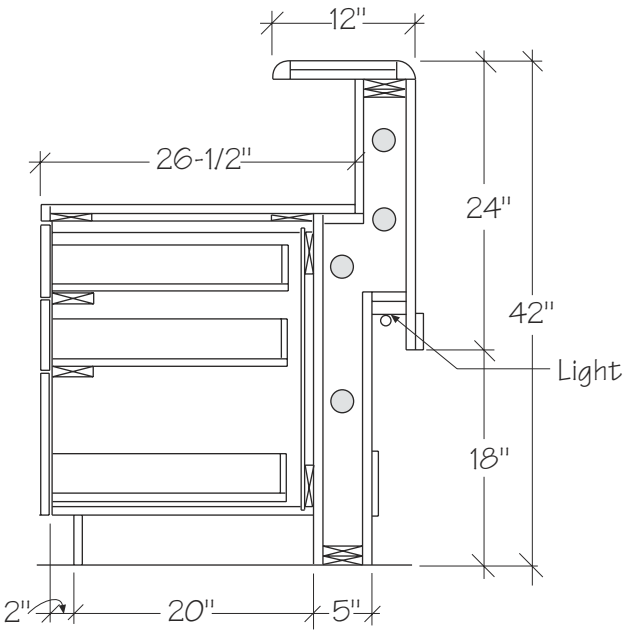


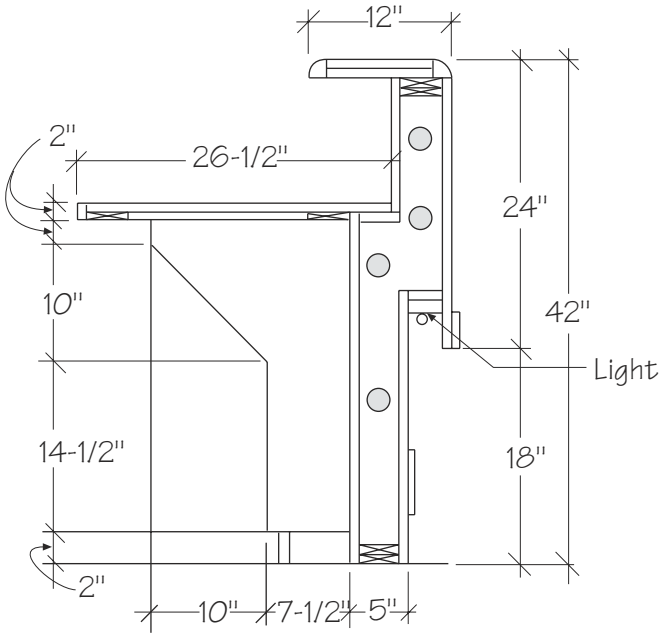




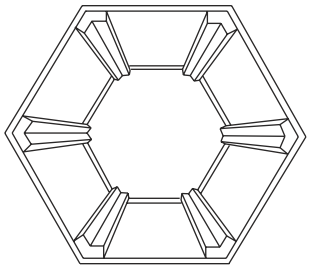




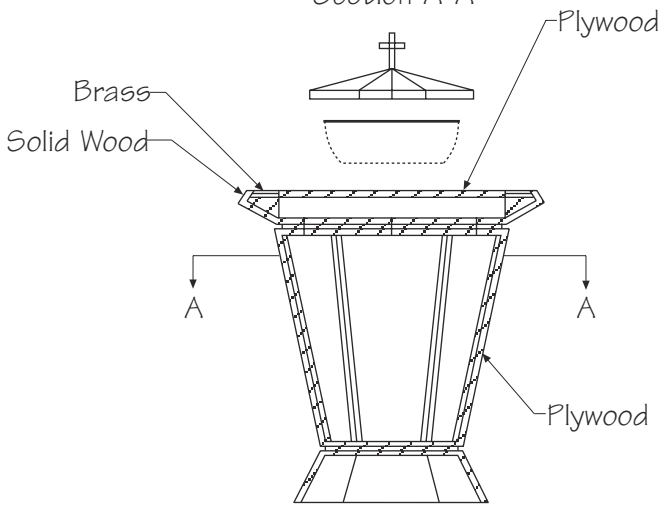




400-D-10
Church Fittings

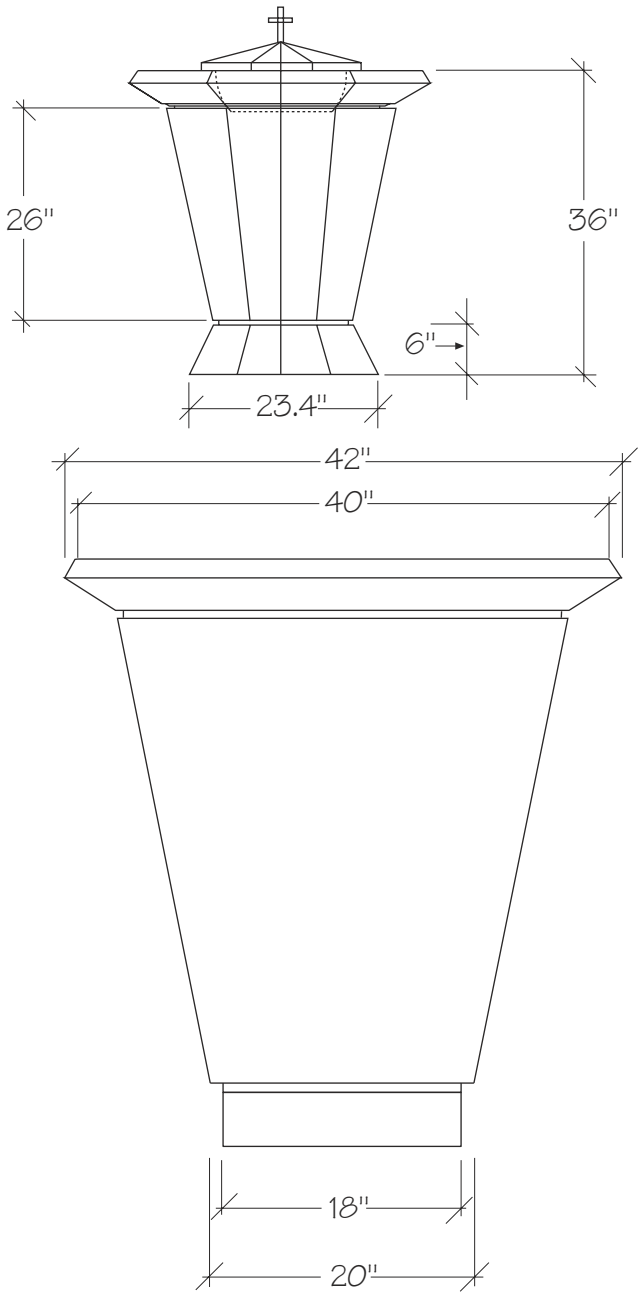


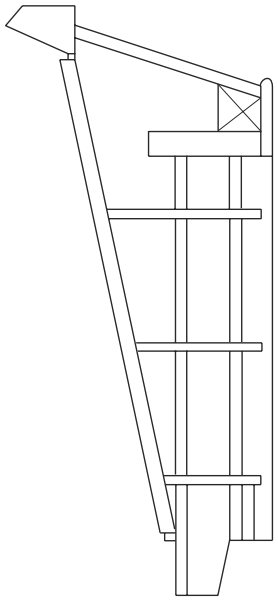
Section A-A



Vertical Section

Baptismal Font





Lectern

400-D-11
Basic Cabinetry