

MODULAR CABINETS

SECTION
1600



General Criteria

1600-G-1

Scope

IMPORTANT NOTE TO DESIGN PROFESSIONALS

Whether cabinets are specified in Section 06000 or in Section 12000 of your office master, they are often built in “modules.”

Modular cabinets are often specified from a *catalog* rather than the more traditional *dialog* associated with individual custom cabinetry.

AWI/AWMAC member firms can and do make modular cabinets. Some have the capability to make both a line of standard modular cabinets as well as the custom work often associated with schools, libraries, health care facilities, etc.

In many cases the performance of these cabinets exceeds that of traditional kitchen and bath cabinets sold in the retail and residential contract markets.

This section of the Standard will assist in establishing a non proprietary specification and quality standard for mass-produced modular cabinets acceptable primarily for institutional or commercial use.

Includes:

This section will discuss cabinets, cases, and fixtures, produced from a manufacturer’s standard details adapted to use for a particular project.

Excludes:

Architectural cabinets (see Sections 400A & B)

Counter tops (see Section 400C)

1600-G-2

Design and Specification

Modular cabinets allow the design professional to use manufacturer-designed and engineered quality when the economics of mass production outweigh the needs for design flexibility offered by Section 400, Architectural Cabinets Standards. Look in the design ideas area of Section 400 for sample cabinet design numbers loaned to us by our sister association, the Woodwork Institute of California (WIC).

Certain casework applications may require alternate construction techniques for high abuse laboratory environments. It is suggested the design professional consult the AWI/AWMAC manufacturers for the performance criteria of laboratory furniture, casework, shelving, and tables, and specify accordingly. Design aesthetics, materials, and workmanship will continue to be referenced to the Quality Standards Illustrated.

Most AWI/AWMAC members have the capability to produce modular cabinets. Indeed, when quantities of similar cabinets are specified under Section 400 of this Standard, they are often produced using *modular* fabrication methods. Modular cabinets offer the following advantages:

- **Consistent Appearance** - The use of modular cabinets on a project will give a consistency in appearance due to the standardization of materials and construction methods.
- **Functional Flexibility** - The use of modular components facilitates changes in function within a building area.
- **Designs for Institutional Needs** - Modular cabinet manufacturers incorporate designs that address specific cabinet functions and specific internal dimensions to meet identified institutional needs.
- **Economies of Mass Production** - High quality and increased productivity are achieved through standardization of materials and dimensions using modern production techniques.
- **Pre-Engineered Hardware** - By using specially researched and tested heavy-duty hardware, modular cabinets meet the high-use needs of institutional and commercial projects.
- **Serviceability** - Use of high-quality, factory-finished materials reduces maintenance during the life of the installation. Matching of replacement parts or complete cabinets is possible should the need arise due to damage or additions.
- **Ease of Installation** - The modular cabinet concept lends itself to standardized and economical installation techniques.

Most importantly, AWI/AWMAC cabinetmakers are eager to work with the design team during the developmental phase of the project to review form, function, and features. The design professional often has a greater variety of choices than is customary with retail or contract cabinets.

1600-G-3

Work Included

Manufacturer will furnish and install cabinet hardware.

Hardware furnished will be selected by the manufacturer to meet or exceed the minimum hardware standards set by this section.

1600-G-4

Work Not Included

Unless otherwise specified, the manufacturer shall not provide:

- surface finishes other than manufacturer’s standard;
- for any electrical, telephone, mechanical or plumbing equipment;
- common blocking (within a wall or ceiling) for the support of cabinets;
- exposed bases other than plastic laminate or wood; or
- dust panels (obsolete with modern drawer guides, but could be specified between drawers/doors with locks keyed differently.)

1600-G-5**Cabinet Construction**

Modular cabinet catalogs often contain useful data for evaluating the vendor's product. The following items should be evaluated when considering a modular cabinet fabricator:

- Minimum thickness and material for cabinet components (usually 19 mm [$3/4$ "])
- Surface materials: Cabinet body components
- Edge treatment of components
- Surface materials: Cabinet doors and drawer fronts
- Drawer construction techniques and hardware
- Drawer sides, subfronts, and backs
- Drawer bottoms 6 mm [$1/4$ "] minimum thickness
- Cabinet hardware
- Adjustable shelf techniques and hardware
- Joinery of cabinet body members

1600-G-6**Reference Points**

The design professional (and the cabinetmaker) can start with Section 1600 for each of the above criteria. Selections can be made between methods and materials shown here, as well as among other materials and fabrication techniques.

When maximum control in the selection of these items must rest with the owner and owner's representatives, the use of Section 400 to specify the project is recommended.

On the other hand, when the cabinetmaker suggests the use of the factory's standard methods and materials, and those suggestions meet the needs of the ultimate client, the use of a manufacturer's standard modular cabinet would be appropriate.

1600-G-7

Minimum Nominal Thickness And Material For Cabinet Components (Other Than Doors)

These general minimums apply to all 1600 cabinet standards. 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.

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. Dimensions have not been converted to metric.

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. unfixd, 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.

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	lumber	3/4"	322	483	189	284	117	175	78	117		
Red Gum		1-1/16"	912	1368	528	790	332	498	221	332		
Sweet Gum												
Hard Maple	lumber	3/4"	356	534	209	313	133	206	88	133		
Pecan		1-1/16"	1021	1536	592	888	373	560	249	374		
Red Oak												
Birch	lumber	3/4"	400	600	232	348	146	219	98	146		
Hickory		1-1/16"	1134	1701	660	990	414	621	277	415		
Medium density particleboard (raw or covered with " melamine")		3/4"	78	117	46	69	29	43	19	28		
		1"	185	277	109	164	69	102	45	66		
Medium density fiberboard (raw or covered with " melamine")		3/4"	100	150	58	87	36	54	25	38		
		1"	237	356	137	206	85	128	59	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.



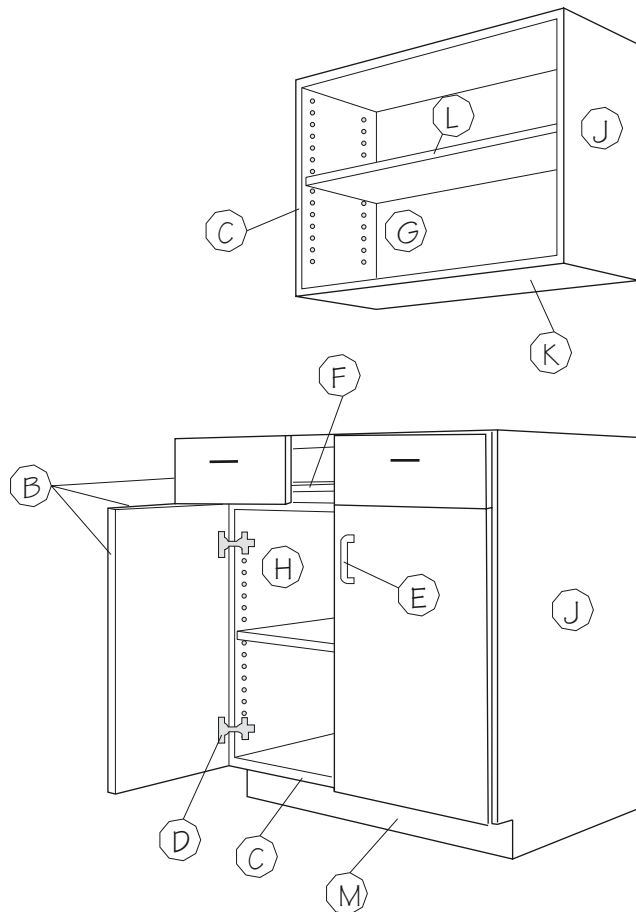
Technical Criteria

1600-T-1

Universal Standards

In the absence of specifications, the following standards apply to all cabinets fabricated under this section:

- Exclusions listed in Section 1600-G-4 are, by reference, a part of the performance standard.
- Sinks and sink trim are excluded.
- Electrical items are excluded.
- Appliances are excluded.
- Cabinet shelves conform to 1600-G-7 table.
- Cabinets 762 mm [42"] in width and more shall have center support.
- Standard cabinet dimensions are in 76 mm [3"] increments. [Special dimensions are available from many manufacturers, but must be clearly specified.]
- File cabinets will be approximately 406 mm [16"] or 483 mm [19"] wide.
- All cabinet doors will have the same material type and thickness, applied in the same machine direction, on both sides. [Color of material may vary from outside to inside, with the inside of the door often finished in the same color as the inside of the cabinet body.]



1600-T-2

Owner Selections/Prevailing Standards

It is the responsibility of the owner and/or owner's representative to select exposed and semi-exposed finish materials from the manufacturer's offerings. Selections other than manufacturer's offerings may be available. Consultation with proposed manufacturers is recommended.

The following are the prevailing selections in the absence of specifications:

A. **Face Style** — Flush Overlay — VGS laminate exposed surface faces, with CLS cabinet liner or thermoset decorative overlay (vendor's choice) semi-exposed surfaces.

B. **Door and Drawer Face Edging** — minimum 1/50" PVC, solid color to match or blend with VGS exposed surfaces.

C. **Body Front Edging** — minimum 0.5 mm [1/50"] PVC, solid color to match or blend with semi-exposed surfaces.

D. **Door Hinges** — Concealed 100-125° nickel plated 35 mm "European" hinges with pressed-in-place synthetic, barbed hinge screw pockets.

E. **Door and Drawer Pulls** — Metal wire pulls, secured with screws 96-102 mm [3³/₄"] on center.

F. **Drawer Slides** — minimum 100# rated, epoxy coated bi-rail roller bearing slides with positive stop in both directions, self closing. File drawers will have full extension slides.

G. **Open Interior** — Interior surfaces VGS laminate to match exterior Exposed surfaces, including matching sides, interior upper and lower surfaces, cabinet backs, shelves and their front edges. Open units, partially open units, and units with glass doors are included in this classification.

H. **Closed Interior** — Thermoset decorative overlay with matching back. Units with solid doors, both hinged and exposed surfaces of sliding doors, are included in this classification.

J. **Exposed Ends** — VGS laminate to match adjacent cabinet/door/drawer exposed surface faces.

K. **Wall Unit Bottoms** — VGS laminate to match adjacent cabinet/door/drawer exposed surface faces.

L. **Shelf Edges** — minimum 1/50" PVC, solid color to match or blend with semi-exposed surfaces, except in Open Interior as described above.

M. **Toe Base** — Unit side panel is continuous to the floor. Separate Toe Base finish material cabinet substrate with VGS to match exposed surfaces unless specified as vinyl base [which is furnished by others], will be unfinished cabinet substrate.

1600-T-3

Alternate Surface Materials: Cabinet Components (other than Doors & Drawer Fronts)

In the absence of specifications, when other than prevailing standards of Section 1600, the following standards will apply. Where more than one method or material is listed, woodworkers will supply their choice from the alternatives. Counter tops are covered in Section 400C.

Materials for Transparent Finish	
Exposed Panel Products (Transparent Finish)	"A" Grade Face Veneer (particleboard core)
Matching of Panel Products across Cabinet Faces	None Required
Direction and Matching of Wood Grain	None Required
NOTE: Sequence match on one item or a suite of items, and/or balance or center match on each panel may be available from some manufacturers and must be clearly specified if required.	
Exposed Solid Lumber Parts (Transparent Finish)	Grade II (compatible for color) Same species_& cut as adjacent face veneer on panel product unless otherwise specified
Semi-exposed Parts (Transparent Finish)	Panel Product "B" Grade Face Veneer or Thermoset decorative overlay (at option of the woodworker)
	Lumber Grade II solid lumber (compatible species to exposed, cut or sawing at option of the woodworker)
Concealed Parts (Transparent Finish)	Mill Option
Materials for Opaque Finish	
Exposed Panel Products (Opaque Finish)	Medium density fiberboard, medium density overlay, or close grain hardwood veneer on particleboard or MDF core
Exposed Solid Lumber Parts (Opaque Finish)	Close grained hardwood
Semi-exposed or Concealed Parts (Opaque Finish)	Mill Option
Materials for High Pressure Decorative Laminate Finish	
Exposed Panel Products (HPDL Finish)	VGS nominal .028" thick (core: particleboard, other core only by direct specification)
Semi-exposed Panel Parts (HPDL Finish)	Thermoset decorative overlay on particleboard core
Concealed Parts (HPDL Finish)	Mill Option
	All unrestrained laminated/overlaid surfaces must be balanced construction or covered with a moisture barrier sheet
	Fixed cabinet members not in close proximity to concrete or other high moisture conditions do not require balance or moisture barrier sheet
Direction and matching of wood grain or patterned decorative surfaces is not required on any surface.	
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 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 should work together to develop sound solutions.	

1600-T-4

Alternate Edge Treatments of Exposed and Semi-exposed Components

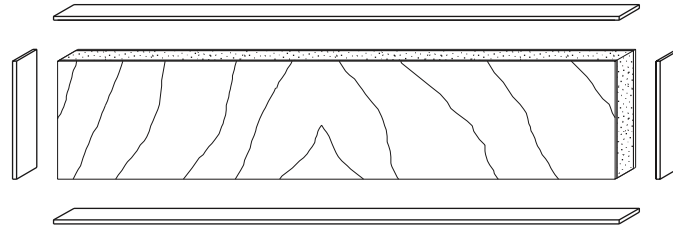
In the absence of specifications, when other than prevailing standards of 1600-T-2, the following standards will apply. Where more than one method or material is listed, woodworkers will supply their choice from the alternatives. Counter tops are covered in Section 400C of this Standard.

Visible edges of panel products shall be treated by applying edge bandings using automatic edgebander or glue and pressure as indicated below. Back edges and ends of adjustable shelves within cases are not considered to be visible. Edge banding in excess of this standard must be specified. PVC edge banding is available in several thicknesses and should be evaluated and specified or approved by the design professional when desired. The following standards apply to square, self edged cabinet parts. Special design considerations may require special engineering solutions by the manufacturer.

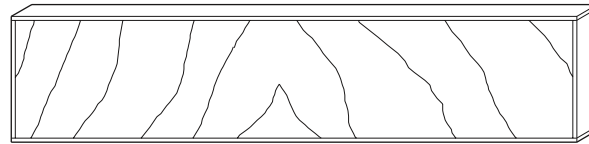
Component	Finish Condition		
	Transparent	Opaque	High Pressure Decorative Laminate
Body Members	Same Species as Face	Close Grain Material	PVC to match face
Exposed Shelves	Same Species as Face	Close Grain Material	PVC to match interior
Semi-exposed Shelves	Compatible with interior	Compatible with interior	Compatible with interior
Doors and Drawer Fronts **	Same Species as Face	Close Grain Material	PVC to match face

NOTE: ** All Edges must be banded. (This was an additional requirement of the 6th edition). Sequence of lamination at the option of the manufacturer, usually after faces. Minimum edge band thickness 0.5 mm [.018"].

Depending on the use of cabinets, thicker edgebands may be specified to enhance durability. PVC edgebands are recommended for HPDL cabinets and components. Consult a member company for engineering and specification details.

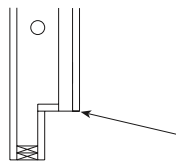
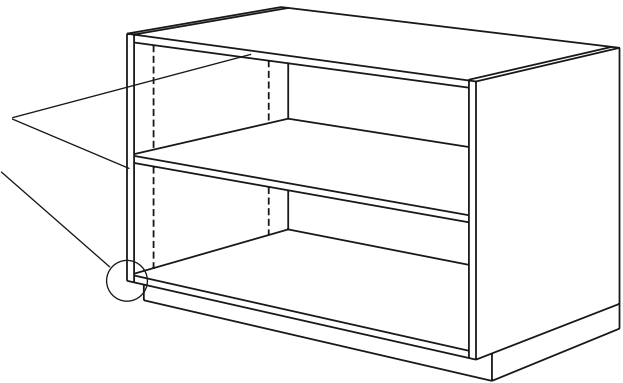


Unless specified, sequence of lamination determined by woodworker



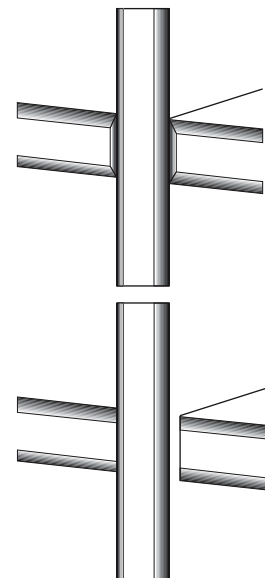
Hot melt applied HPDL edge banding shall be primed before application for proper adhesion unless the hot melt adhesive used has been specially formulated for the application of HPDL without requiring pre-application of a primer.

NOTE: Edgebands, to the extent of standard length materials, run the full length of a single vertical or horizontal member without a joint or splice. Joints align with the plane of the case body at intersections. Finishing front edges of cases with a single piece of laminate 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.

NOTE: When radiused details are specified at cabinet body edges, the exposed edge is generally applied and profiled at the same time. The edges at the seams may appear as shown at right due to the radius applied to the elements.



When not in violation of design, leading edges of intersecting members may be set back, provided setback is consistent. Other design and engineering details are available.

1600-T-5

Surface Materials: Flush (Panel Product) Cabinet Doors and Drawer Fronts

In the absence of specifications, when other than prevailing standards of 1600-T-2, the following standards will apply. Where more than one method or material is listed, woodworkers will supply their choice from the alternatives.

Materials for Transparent Finish	
Exposed Panel Products (Transparent Finish)	"A" Grade Face Veneer with balanced veneer back, compatible species (particleboard or MDF core)
Matching of Panel Products across Cabinet Faces	None Required
Direction and Matching of Wood Grain	None Required
NOTE: Sequence match on one item, and/or balance or center match on each panel may be available from some manufacturers and must be clearly specified if required.	
Materials for Opaque Finish	
Exposed Panel Products (Opaque Finish)	Medium density fibreboard (MDF), Medium density overlay, or close grain veneer; balanced construction and finish (particleboard or MDF core)
Materials for High Pressure Decorative Laminate Finish	
Exposed Panel Products (HPDL Finish)	VGS nominal .028" thick both face and back (particleboard or MDF core)
Direction and matching of wood grain or patterned decorative laminates is not required on any surface. 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 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 should work together to develop sound solutions.	

1600-T-6

Surface Materials: Stile and Rail Wood Doors and Drawer Fronts

In the absence of specifications, when other than prevailing standards of 1600-T-2, the following standards will apply. Where more than one method or material is listed, woodworkers will supply their choice from the alternatives.

Materials for Transparent Finish		
Exposed Panel Products (Transparent Finish)	"A" Grade face veneer (particleboard core)	
Matching of Panel Products across Cabinet Faces	None required	
Direction and Matching of Wood Grain	None required	
NOTE: 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.		
Exposed Solid Lumber Parts (Transparent Finish)	Grade II (compatible for color) Same species as adjacent face veneer on panel product unless otherwise specified	
Semi-exposed Parts (Transparent Finish)	Panel Product	"B" Grade face veneer (same species as exposed, cut or slicing at option of the woodworker)
	Lumber	Grade II solid lumber (compatible species to exposed, cut or sawing at option of the woodworker)
Raised Panels	Solid raised panel, glued for width - Maximum 14" (over 14" must be rim raised panels, particleboard or MDF core with Grade II lumber same as veneer)	
NOTE: All panels within view from one location may be Rim Raised or Solid in any combination.		
Flat Panels	Veneered flat panel product, minimum 1/4" thickness	
Materials for Opaque Finish		
Exposed Panel Products (Opaque Finish)	Medium density fiberboard, medium density overlay, or close grain hardwood veneer on particleboard or MDF core	
Exposed Solid Lumber Parts (Opaque Finish)	Close grained hardwood	
Semi-exposed or Concealed Parts (Opaque Finish)	Mill Option	
Raised Panels	Solid Raised Panel, glued for width - Maximum 14" (over 14" must be rim raised panels, particleboard or MDF core with close grained hardwood)	
	Solid simulated raised panel door: Medium density fiberboard one-piece construction	
NOTE: All panels within view from one location may be Rim Raised or Solid in any combination.		
Flat Panels	Close grain hardwood veneer, medium density fibreboard or tempered hardboard, 1/4" minimum thickness	
Glass panels, decorative wire panels, stained glass, beveled glass, etched glass, etc. must be specified, including appropriate safety considerations.		

1600-T-7

Drawer Sides, Subfronts, and Backs

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

Material	Selection
Solid hardwood lumber (minimum 1/2" finished thickness)	Species selected by manufacturer and consistent through out project
7 ply all hardwood veneer core plywood (no voids)	
Edgebanded Thermoset Decorative Overlay (minimum 1/2" thickness particleboard core)	Color selected by manufacturer and consistent throughout project
NOTE: Pre-manufactured drawer systems, including metal sides, bottom-mount and epoxy-coated slides, are available and must be evaluated and specified or approved by the design professional when desired. AWI woodwork manufacturer will select the fabrication system(s) from those listed above in any combination.	

1600-T-8

Drawer Bottoms (6 mm [1/4"] Minimum Thickness)

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

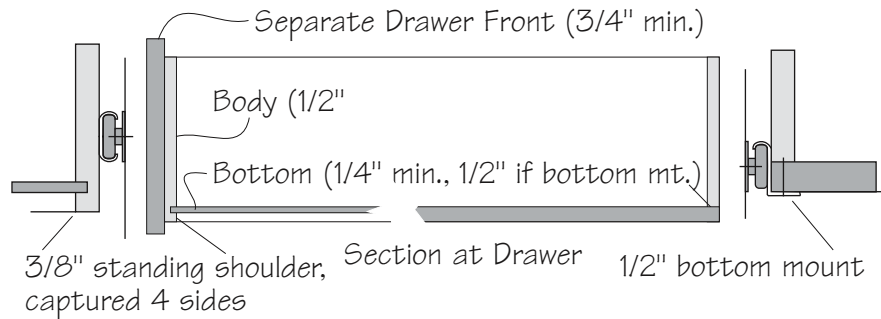
Material	
Thermoset decorative overlay panel product on particleboard core	NOTE: Pre-manufactured drawer systems may require minimum 1/2" thickness for bottom, and must be evaluated and specified or approved by the design professional when desired.
Hardwood veneered panel product on any core	
Hardboard (smooth side visible inside)	

1600-T-9

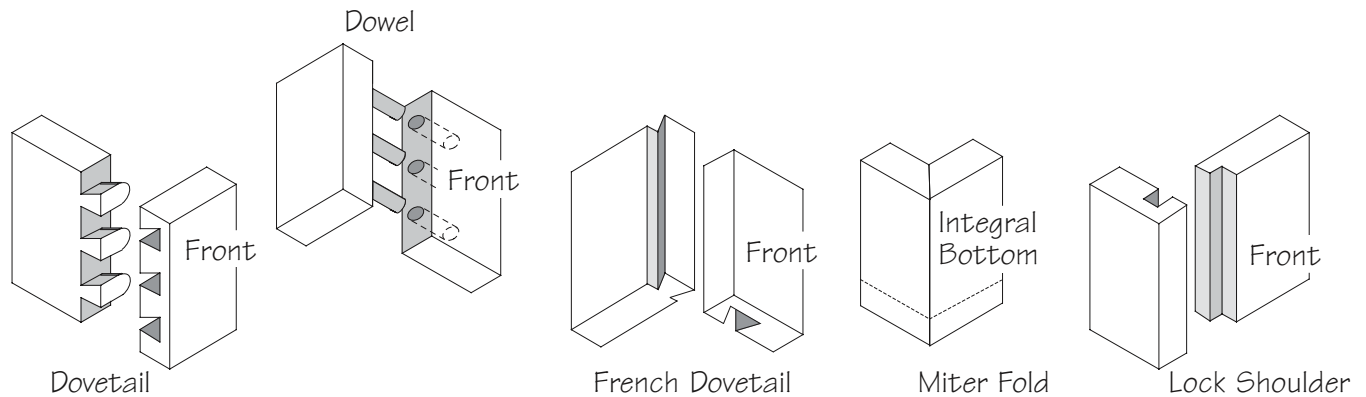
Drawer Construction Techniques/Hardware

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

Construction Techniques	
Dovetailed, lock shoulder or doweled, glued under pressure	Min. 32 mm dowel spacing to 102 mm [4"] high, 64 mm dowel spacing above 102 mm [4"]
Inset bottoms shall be set into sides and front, 6 mm [1/4"] deep groove with minimum 10 mm [3/8"] standing shoulder	See illustrations
Onset bottoms (minimum 12.7 mm [1/2"] materials) only in conjunction with bottom mounted slides	
Miter fold (minimum 12.7 mm [1/2"] materials)	5 sides machined from a single piece simultaneously, glued under pressure
NOTE: Four-sided drawer box may be separate from the attached drawer front.	
Hardware, combination metal and roller bearing drawer slides:	
Pencil and box drawers	min. 45 kg [100 lb.], three-quarter extension
Designated file drawers	min. 45 kg [100 lb.], full extension



Drawer Section - Figure 1600-05



Drawer Joinery - Figure 1600-06

1600-T-10

Adjustable Shelf Techniques/Hardware

Multiple Holes (minimum 5mm diameter with pins) 32 mm on center; or manufacturer standard adjustable shelf standards and clips.	NOTE: Consult with manufacturer for design solutions when heavy shelf loading is anticipated.
---	---

1600-T-11

Joinery of Cabinet Body Members

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

A. Fixed case body members* (shelves, bottoms, tops and rails which are fastened to sides, ends and dividers) shall be joined using concealed dado, dowels, European assembly screws, or interlocking mechanical fasteners. Where the concealed dado or dowel methods are employed, cases shall be assembled utilizing glue and pressure. The dado method must be reinforced with blind nailing or blind screwing.

B. No nails, screws or other fastenings may be visible on exposed surfaces. Mechanical fasteners may be visible on semi-exposed surfaces.

C. Rails or top panels must be provided where case will have a separate top in order to permit concealed fastening of the separate top through such rails or panels.

D. Groove cabinet backs into sides and recess to allow for installation strips, or apply 12.7 mm [$1/2$ "] (minimum) backs with minimum #8 low root, high thread (not "drywall") screws spaced maximum 8" on center. Anchor strips not required for back 12.7 mm ($1/2$ ") or thicker, so attached.

E. Finished ends will not show evidence of back attachment or anchor strips.

*Note: Where not in violation of design, surfaces of intersecting body members may be set back not to exceed 3.2 mm [$1/8$ "] provided setback is consistent within the cabinet.

1600-T-12

Face Frame and Trim Joinery

Joinery Table for Face Frames and Trims	
Face Frame Stile and Rail Assembly	
Glued mortise and tenon or concealed pocket screw	Method selected by manufacturer and consistent throughout any one project.
Dowel or biscuit joints, glued under pressure	
Attachment of Face Frame to Body Members	Glue and finish nail
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
NOTE: Filling nail holes is done during finishing. When factory finishing is not specified and/or part of the fabrication contract, the responsibility for filling and smoothing of fill material lies with the finishing contractor.	

1600-T-13

Smoothness of Exposed Surfaces (Minimum Requirements)

Sanding Criteria	
Maximum length of sanding cross scratches allowed on exposed surfaces after finishing.	6 mm [1/4"]
Minimum sanding grit required on exposed surfaces.	120
Consult with an AWI woodwork manufacturer regarding special conditions and finishing requirements.	

1600-T-14

Tightness and Flushness of Plant Assembled Joints

Gap Tolerances	
Maximum gap between Exposed components	.8 mm [1/32"]
Maximum length of gap in Exposed components	127 mm [5"]
Maximum gap between Semi-exposed components	1.6 mm [1/16"]
Maximum length of gap in Semi-exposed components	203 mm [8"]
Maximum gap between each end of adjustable shelf and shelf clip	1.6 mm [1/16"]
NOTE: No gap may occur within 1220 mm [48"] of another gap (except adjustable shelf ends.)	

1600-T-15

Chemical Resistance

When specified for laboratory use in which chemical resistance is a factor, the minimum acceptable chemical resistance for exposed and semi-exposed surfaces shall be a high pressure laminate formulated for such applications. Design criteria in excess of this standard shall be clearly called out in the contract documents.

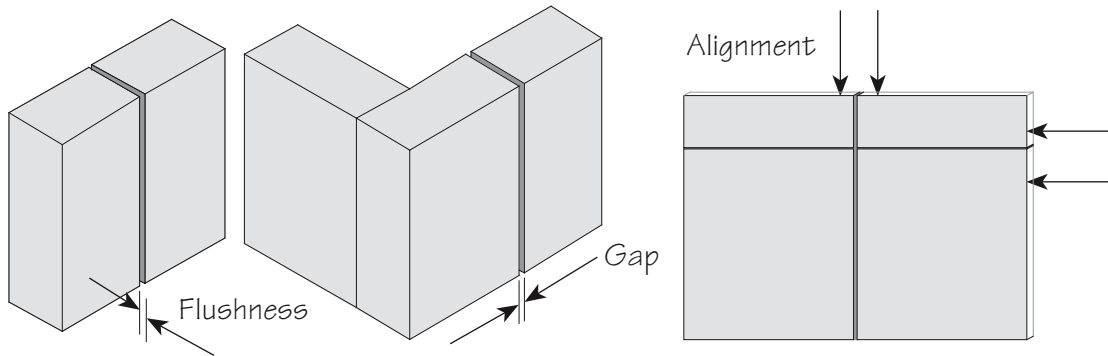


Compliance Criteria

1600-C-1

Fitting of Cabinet Doors and Drawers (Maximum Deviation)

Target Fitting Tolerances	
Gap between doors, drawers, panels, and frames	3 mm [1/8"] ±0.8 mm [1/32"]
Flushness of adjacent door and drawer faces	4 mm [5/32"] max. variation
NOTE: Tolerances are subject to component size, hardware choices, allowable warp, installation variations, etc. The recommended targeted maximum deviations listed are subject to the above conditions.	

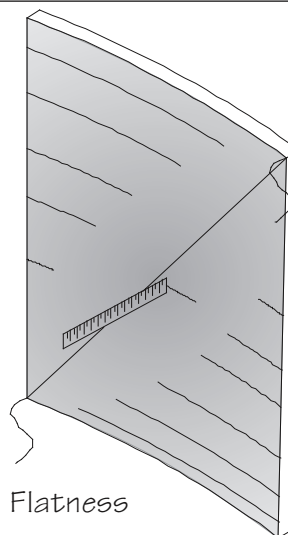


Fitting Tests - Figure 1600-07

1600-C-2

Flatness of Cabinet Doors and Removable Panels (Maximum Deviation)

Measured diagonally, per 305 mm [lineal foot] (or portion thereof) of diagonal measurement, the following maximum deviation from flat:	.9 mm [.036"]
EXAMPLE: When the diagonal measurement of the illustrated panel is 1220 mm [4'], the maximum distance between the string and the face of the panel will be about 3.6 mm [9/64"] - 4×0.9 [.036"] = 3.6 [.144"] and 9/64" = about .141"	

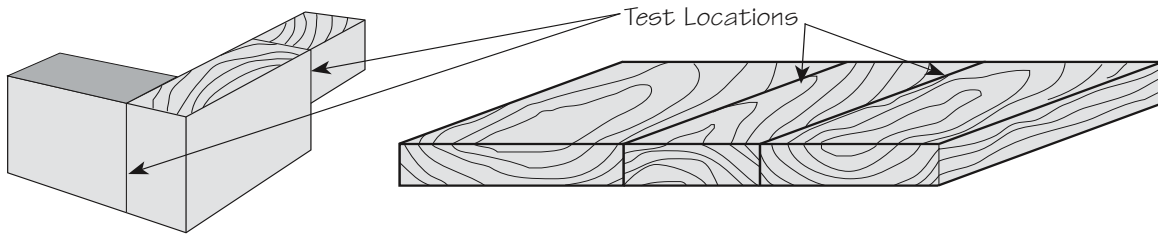


Flatness Test - Figure 1600-08

1600-C-3

Flushness Between Factory Assembled Joints (Maximum Variation)

Flushness Tolerance	
Measured with a feeler gauge	.1 mm [.005"]



Flushness Test - Figure 1600-09

1600-C-4

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.

1600-C-5

Tightness and Flushness of Plant Assembled Joints

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

1600-C-6

Edgebanding Performance

Edgebanding Tolerances	
Flushness with adjacent surfaces (maximum variation)	.1 mm [.005"]
All edgebanding must be free of delamination, bubbles, and all adhesive residue.	