



Canadian Kitchen Cabinet Association

CKCA Construction and Material Testing Standard for Kitchen Cabinets and Vanities

January 2009

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The purpose of this standard is to establish a set of construction and performance testing standards for Canadian kitchen cabinetry and vanity products. This document was developed in the best interests of international harmonization with other testing standards.

Use and application of this standard is voluntary and it is the responsibility of the user to judge and understand its suitability for their particular use.

Some tests required in this standard may be inherently hazardous. The CKCA will not assume nor accept any responsibility for any injury or damage that may occur during or as a result of tests, wherever performed by any party who voluntarily conducts tests according to the requirements of this standard.

This standard is subject to periodic review, amendment and update at the discretion of the CKCA.

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January 2009

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CKCA Construction and Material Testing Standard

1.0 SCOPE

- 1.1 This standard applies to kitchen cabinets and bathroom vanities and is to be used to gauge the performance of the construction and materials. Test methods outlined in this standard will simulate conditions when cabinets are installed as per manufacturer's specifications. Minimum requirements for type and usage of raw materials and fastener use are also outlined in this standard.
- 1.2 The test methods described in this standard simulate the ambient conditions and normal use, wear and maintenance of cabinets when used in normal application as specified by the manufacturer.
- 1.3 This standard is not intended to be used to measure or certify safety requirements for kitchen cabinets and vanities.

2.0 NORMATIVE REFERENCES

The following documents were referenced during the development and application of this standard.

CAN3-A278-M82, Kitchen Cabinet and Bathroom Vanities, Canadian Standards Association, June 1982 – Withdrawn
EN 14749:2005 – Domestic and Kitchen Storage Units and Worktops – Safety Requirements and Test Methods, 2005
KCMA/ANSI A161.2000 – Performance and Construction Standard for Kitchen Cabinets and Vanity Cabinets, 2006
ANSI/BHMA A156.9-2003 – American National Standard for Cabinet Hardware, 2003
SEFA 8 – 1999 – Laboratory Furniture, Casework, Shelving and Tables, Recommended Practices
CAN-P2E – Criteria and Procedures for the Preparation and Approval of National Standards of Canada, SCC, 1992
Manual of Millwork - Woodwork Institute of California, 1998
Coatings Encyclopedic Dictionary (FSCT, 1995, ed. Stanley LeSota)

3.0 TERMS AND DEFINITIONS

Base cabinet – any cabinet type designed to install directly on the floor. Some form of a top will be applied in the field, such as laminate, wood or granite.

Dowel - A wooden, plastic or metal pin fitting into holes drilled in abutting pieces to align and secure the pieces and prevent motion or slipping. May be used with or without glue. Pre-glued wood dowels which are water activated are also available.

Equilibrium Moisture Content (EMC) - The moisture content of wood below the fiber saturation point is a function of both relative humidity and temperature of surrounding air. The equilibrium moisture content is the moisture content at which the wood is neither gaining nor losing moisture; this however, is a dynamic equilibrium and changes with relative humidity and temperature.

Finish - the surface coating that is applied to a wood cabinet surface. The finish is typically made up of several layers of different materials such as a stain, sealer and clear coat. The finish is a key element in maintaining and protecting the beauty and durability of the wood surface.

Finishing Definitions –

- Overspray** that solids portion of a coating sprayed from a spray applicator which fails to adhere to the part being sprayed.
- Orange peel** a paint surface appearance resembling an orange skin texture.
- Fatty edges** accumulation of paint in the form of a ridge at the edge of a painted surface.
- Runs** narrow downward movement of a paint or varnish film, may be caused by the collection of excess quantities of paint at irregularities on the surface; the excess material continuing to flow after the surrounding area has set.
- Blushing** film defect which appears as a milky opalescence as the film dries; can be a temporary or permanent condition. It is generally caused by rapid evaporation, moisture or incompatibility.
- Saw marks** non natural surface defects caused by improper machining.
- Lap marks** region where a stain extends over an adjacent section. The object of the painter is usually to effect a joint between the two coats without showing the lap.
- Bubbles (Blistering)** film defect, temporary or permanent, in which bubbles of air or solvent vapour, or both, are present in the applied film.
- Cracks** generally the spitting of a dry paint or varnish film, usually as a result of aging. The following terms are used to denote the nature and extent of this defect.
- Hair-cracking** fine cracks which do not penetrate the topcoat; they occur erratically and at random.
- Checking** fine cracks which do not penetrate the topcoat and are distributed over the surface, giving the semblance of a small pattern cracking: specifically, a breakdown in which the cracks penetrate at least one coat and which may be expected to result ultimately in complete failure.
- Crazing** resembles checking, but the cracks are deeper and broader.
- Crocodiling or Alligatoring**
a drastic type of crazing, producing a pattern resembling the hide of a crocodile.
- Fisheyes/Contamination**
paint defect which manifests itself by the crawling of wet paint into a recognized pattern resembling small dimples or fish eyes; small globular mass which has not blended completely into the surrounding material and is particularly evident in a transparent or translucent material.

Framed Construction - A cabinet box that has a face frame. It resembles a flat, empty picture frame attached to the front. Doors are secured to this frame.

Frameless Construction - A cabinetry style in which doors are attached directly to the sides of the cabinet box with hidden hinges. This technique tends to favor a more contemporary look, and it is a hallmark of European-style cabinets.

HVAC - The abbreviation for heating, ventilation, and air conditioning systems, used in building design and construction.

Rail - The horizontal pieces of frames, such as face frames and door frames.

Relative Humidity - The ratio of the amount of water vapor actually present in the air to the greatest amount possible at the same temperature.

Stile - The vertical pieces of frames, such as face frames and door frames.

Moulding - An ornamental strip of material used at joints, cornices, bases, door and window trim, and the like, and most commonly made of wood, plaster, plastic, or metal.

Toe space (toe kick) - the bottom piece of a base cabinet that is recessed several inches from the front surface of the cabinet to allow room for a person's feet when standing in front of the cabinet.

Wall cabinet - cabinet boxes that are mounted to the wall.

4.0 GENERAL REQUIREMENTS AND APPEARANCE

4.1 General Cabinet Construction and Material Requirements

4.1.1 Minimum Requirements - Shelving and Drawers

Shelving components for cabinets that are 914 mm (36") width and greater must have a form of additional strength added to provide support to the shelf (E.g. Center Mullion) or have a minimum thickness of 1".

Shelving for cabinets that are less than 914 mm (36") must have a minimum thickness of 16 mm (5/8").

Drawer Fronts on 3-sided drawers and Additional Fronts on 4-sided drawers shall have a minimum thickness of 16 mm (5/8").

Drawer Sides and Backs shall have a minimum thickness of 16 mm (5/8").

Drawer Bottoms shall have a minimum thickness of 6 mm (1/4").

Standard dimensions of steel drawer components will be as per manufacturer lifetime warranty and specifications. Hardware manufacturer's specifications from manufacturers shall be submitted to testing agency along with manufacturer's drawer sample.

4.1.2 Minimum material requirements – Frameless Cabinetry

The following are proposed minimum requirements for material thickness in frameless construction.

Component	Minimum Thickness
Tops	16 mm = 5/8"
Bottoms	16 mm = 5/8"
Sides	16 mm = 5/8"
Shelves	16 mm = 5/8"
Shelves with centre support	16 mm = 5/8"
Backs with hanging rails (or with European Hanging System)	3 mm = 1/8"
Backs without hanging rails	13 mm = 1/2"
Top Spreader Cabinet Rails (Figure 4.1.2 - min width 76 mm = 3")	16 mm = 5/8"

4.1.3 Minimum material requirements - Face Framed Cabinetry

The following are minimum requirements for material thickness for face frame construction. **Face Frame** must be a minimum thickness of 19 mm (3/4")

Component	Minimum Thickness
Tops	13 mm = 1/2"
Bottoms	13 mm = 1/2"
Sides	13 mm = 1/2"
Shelves	16 mm = 5/8"
Shelves with centre support	13 mm = 1/2"
Backs with hanging rails (or with European Hanging System)	3 mm = 1/8"
Backs without hanging rails	13 mm = 1/2"
Top Spreader Cabinet Rails (min width 76 mm = 3")	16 mm = 5/8"

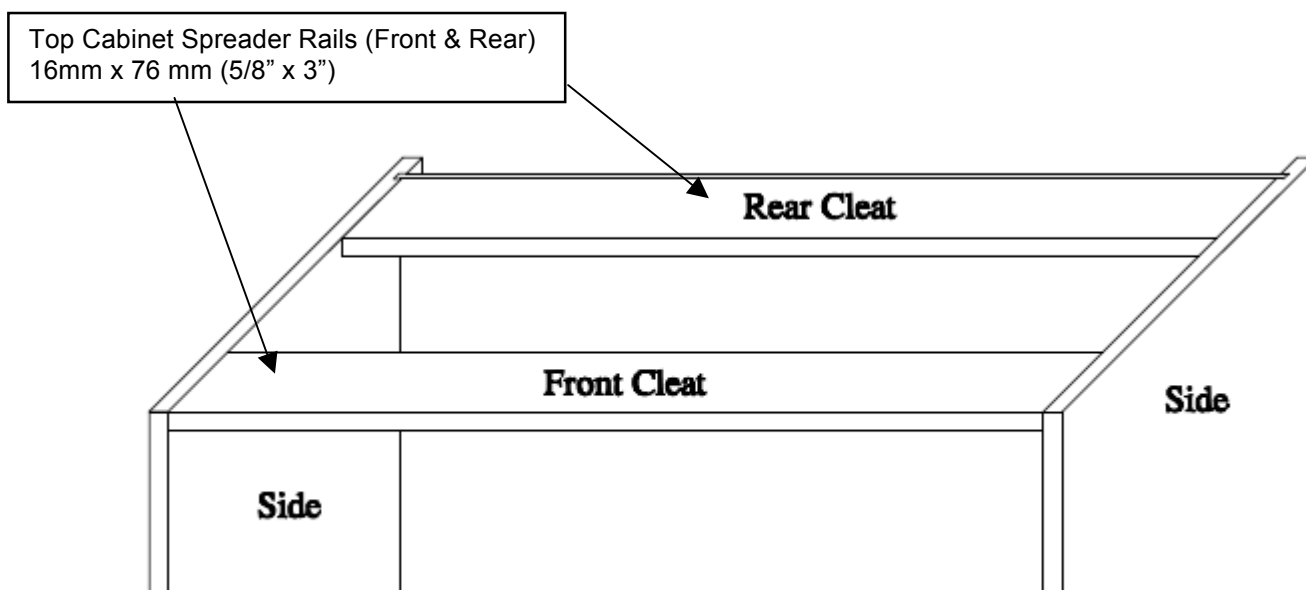


Figure 4.1.2 View of Cabinet Illustrating Top Cabinet Spreader Rails

4.1.4 Corner, Bracing and Joinery Requirements

The minimum requirement for type of assembly aid used to meet this standard is mechanical fastener. The first fastener shall be spaced at a maximum of 37 mm (1 7/16") from each edge or end. Subsequent fasteners shall be spaced a maximum of 160 mm (6 5/16") on centre. Fasteners in hanging rails will replace the requirement of the first fastener at back edge of cabinet.

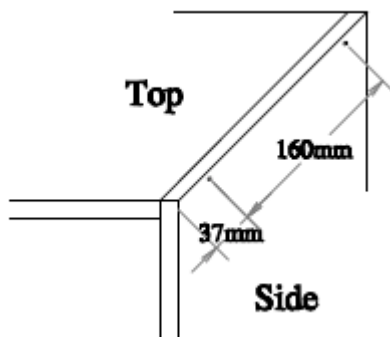


Figure 4.1.2 Top Right Corner Section View

Face framed cabinets: Face frames shall be mortised and tenoned, doweled with wood or metal screw dowels or biscuit joined and securely glued. Frames shall be tenoned and mortised or mechanically fastened to cabinet bodies.

Cabinet backs are to be inset into the Top, Sides and Bottom.

4.1.5 Component Requirements

The following chart describes the components that are required for various cabinet types according to this standard.

Type of Cabinet	Top	Sides	Back	Bottom
Wall	•	•	•	•
Base		•	•	•
Vanity		•	•	•

4.1.6 Toe Space

Cabinets that contain a toe space should have an allowance at least 51 mm (2") deep and 76 mm (3") high.

4.1.7 Utility Cabinets

All utility cabinets shall contain tops, sides, backs, and bottoms. Free standing utility cabinets must have a fixed shelf at 1727 mm (68") from the floor. The sides shall not deflect more than 2 mm (1/16") along the full height of the component.

4.2 Additional Cabinet and Construction, Raw Material and Warranty Requirements

4.2.1 Supplier Conformance

Suppliers of hardware, drawer components and finish materials shall provide evidence of conformance to quality standards and specifications set within their respective industries. As well suppliers are required to provide evidence of lifetime warranty for product. Hardware warranty is only applicable if applied according to the manufacturer's recommended specifications for use.

4.2.2 Manufacturer's Warranty

Cabinet manufacturers that are to be certified to the CKCA standards shall offer at minimum a 3-year warranty on their products and lifetime warranty on hinges and drawer slides.

4.2.3 Hinges (Spacing, Placement)

Doors that are greater than 914 mm (36") in height must have at minimum **3 hinges**.

Height	Weight Range	Required Number of Hinges
0 – 914 mm (0 – 36")	4 – 6 Kg	2
915 mm – 1600 mm (36 1/16" – 63")	6 – 12 Kg	3
1601 mm – 2200 mm (63 1/32" – 86")	12 – 17 Kg	4
2200 mm or 2700 mm (86" – 108")	17 – 22 Kg	5

4.2.4 External Appliances

Where applicable, cabinets should be designed appropriately for appliances, water heaters and other equipment as required by applicable building codes.

4.2.5 Raw Material Requirements

Doors – Maximum Warp - Doors less than 812 mm (32") in height shall have a maximum deflection of 2.5 mm (3/32"). Any door greater than 32" in height shall have a maximum deflection of 5 mm (3/16"). 5-piece wood doors 1270 mm (50") or greater in height should have a mid-rail. Doors shall also be installed and aligned so that they are square with the cabinet and can operate freely without excessive looseness or binding. Installed doors shall have a device sufficient to hold the door closed.

Panel Material – At minimum 45 lb (640 kg/m³) particleboard must be used in the cabinet construction to meet this standard.

4.3 General Appearance and Exposed Construction

4.3.1 Finish Appearance

Visual appearance should be as specified by the kitchen cabinet manufacturer standards. The overall appearance of the coating surface should be smooth and appealing. It is highly recommended that the following apply to the coating:

- ◆ No overspray
- ◆ No orange peel
- ◆ No fatty edges
- ◆ No runs
- ◆ No blushing

- ◆ No saw marks
- ◆ No rag or lap marks in the stain
- ◆ No bubbles or blistering
- ◆ No cracks or checking
- ◆ No fisheyes/contamination in the coating

4.3.2 Exposed Construction

All exposed construction shall be fitted in a workmanlike manner.

Where holes, nails, staples and other mechanical fasteners are used on exterior visible surfaces, the resulting holes shall be filled or repaired to complement the exterior visible surface.

All exposed surface(s), either interior or exterior, including door and drawer edges, shall be free of imperfections and sharp edges.

All framed and frameless cabinetry shall have maximum gap allowances for all exterior and interior joints of cabinets and doors. Any and all joints on the front face of the cabinet or door must not have gaps greater than 0.25 mm (1/128") in width. All other interior and exterior exposed joints shall not be greater than 0.4 mm (1/64"). Maximum allowable length of any gap is 152mm (6"). Interior joints of cabinet shelves shall have no gaps.

5.0 Hardware Requirements

Functional cabinet hardware shall comply with the standard requirements of ANSI/BHMA A156.9-2003 (American National Standards Institute/Builders Hardware Manufacturers Association). Documented evidence shall be submitted by the manufacturer from the supplier of hardware.

6.0 General Test Conditions

- 6.1 All tests shall be made on cabinets installed according to manufacturer's instructions except where otherwise specified.
- 6.2 All tests shall be run at room temperature of 20°C to 27°C (68°F to 80°F) and at a relative humidity of 35 per cent to 70 per cent unless otherwise specified.
- 6.3 Finished products shall be date stamped and tested 3 weeks after manufacture to allow for proper setting and conditioning.
- 6.4 All test samples shall be wrapped sufficiently to minimize transport damage and to maintain structural and finish integrity.
- 6.5 All tests are to be conducted in (SI) metric units.

7.0 Structural Tests

7.1 Static Load for Shelves and Cabinet Bottoms

Purpose: To evaluate the ability of the shelves and bottoms to withstand loading.

Procedure

- 1) Mount cabinets in accordance with the manufacturer's instructions.
- 2) Ensure cabinets are leveled prior to testing.
- 3) Measure and record the height of the shelf, or cabinet bottom using the test platform as a reference.
- 4) Load all shelves and cabinet bottoms with an evenly distributed load of 718 Pa (15 lbs/ft²). Refer to Figure 7.1.
- 5) Allow load to remain in place for 7 days. Allow unit to remain unloaded for 1 hour.
- 6) Upon completion of the dwell time, re-measure the height of the shelves and bottoms.
- 7) Record the difference in height as deflection.

Acceptance Level

The shelves and bottom shall exhibit no loss of functionality, or suffer disabling damage. The shelves and bottoms shall not deflect more than 6.35 mm (1/4") between any two supports.

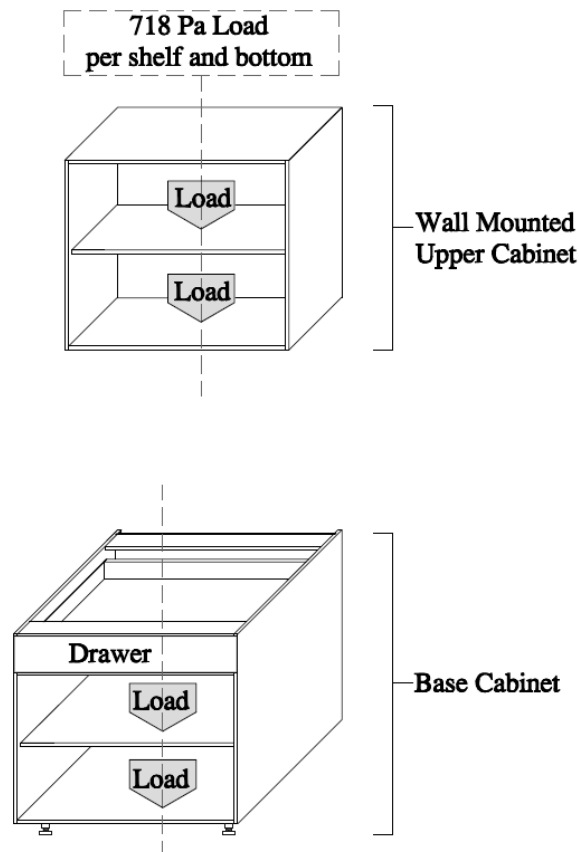


Figure 7.1

7.2 Static Loading for Wall Supported Cabinets

Purpose: To ensure the wall-cabinet mounting interface can withstand reasonable or foreseeable loads typical of heavy use.

Procedure

- 1) Mount the cabinet onto a residential style wall in accordance with the manufacturer's instructions and supplied parts.
- 2) Evenly distribute a total load of 226.8 kg (500 lbs) across all shelves within the cabinet. Allow load to remain for 60 minutes (Figure 7.2).
- 3) Remove load and evaluate.

Acceptance Level

The unit shall exhibit no loss of functionality, or loss of structural integrity. If unsure of loss of integrity, load cabinet with 113.4 kg (250 lbs). If cabinet falls, or exhibits damage, unit is considered to fail.

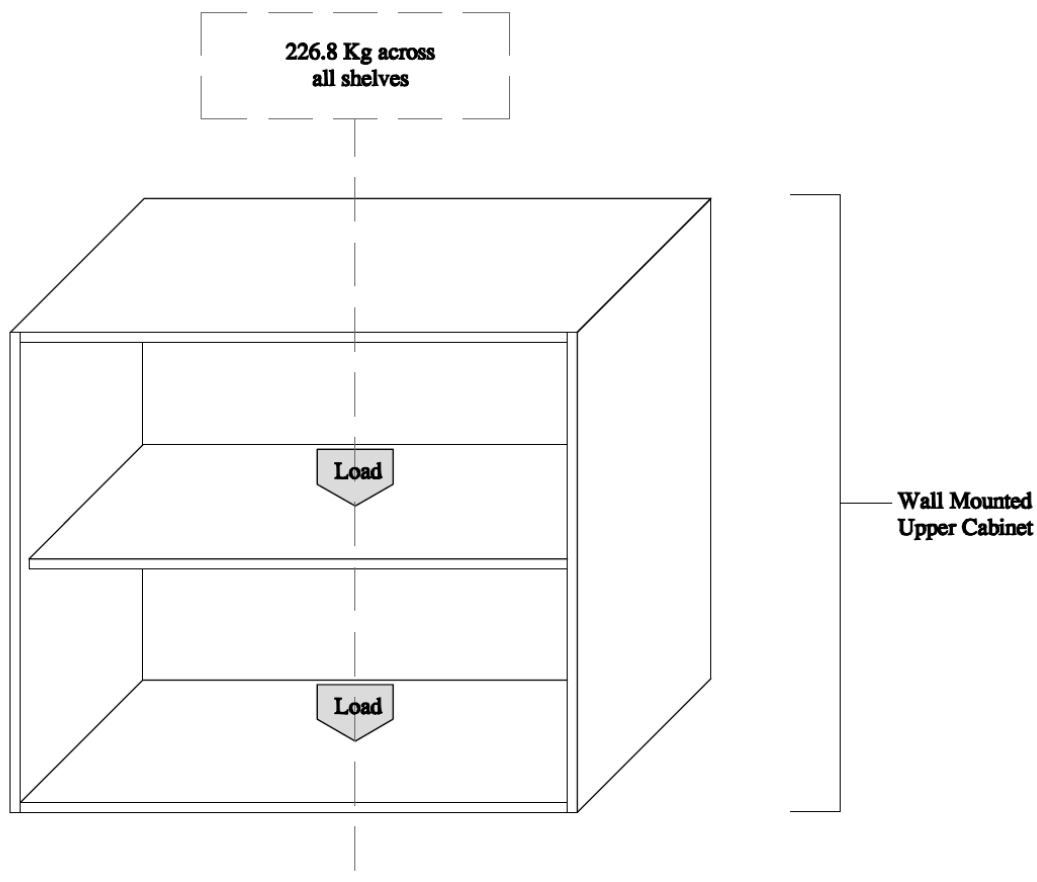


Figure 7.2

7.3 Cabinet Joint Integrity

Purpose: To evaluate the structural integrity of cabinet joints. Evidence of needing this requirement is seen when joining modular cabinets together.

Procedure

- 1) Remove drawers and any hardware that may interfere with the testing.
- 2) Mount cabinet onto a test platform.
- 3) Secure one side of the cabinet to a hard rigid fixture with sufficient strength to withstand the opposing test forces (Figure 7.3).
- 4) Drill a hole in the cabinet side 76 mm (3") from top and 76 mm (3") from side, not larger than 3/8" diameter.
- 5) Place a 3/8" diameter bolt-hook through the cabinet.
- 6) Attach a loading device to the bolt-hook. Apply a horizontally outward force of 113.4 kg (250 lbf). The load should be applied such that 113.4 kg (250 lbs) is reached within 5 minutes but not less than 3 minutes.

Acceptance Level

The joint shall exhibit no signs of failure or disabling damage.

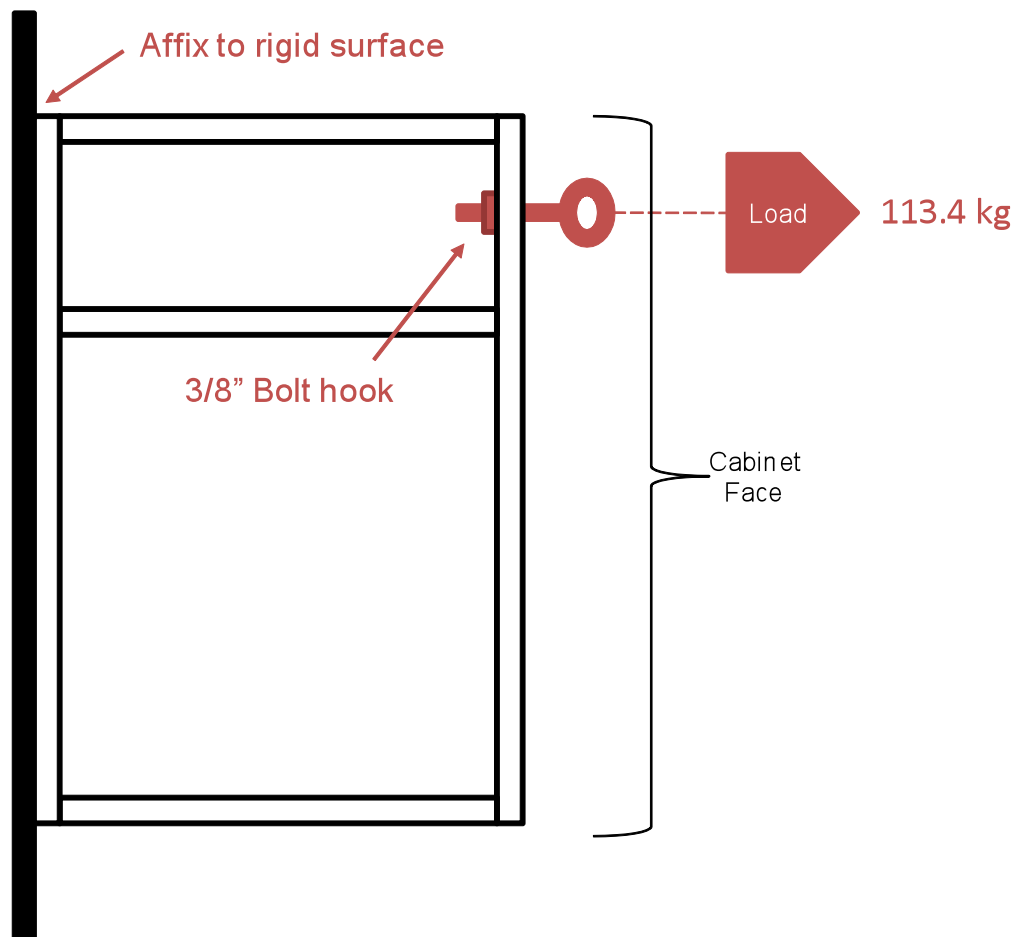


Figure 7.3

7.4 Door Strength Test

Purpose: To evaluate the structural integrity of door hinges and assemblies.

Recommended Test Door Sample Sizes:

Width – 400 mm to 450 mm (16" to 18")

Height - 750 mm to 800 mm (30" to 32")

Procedure

- 1) The cabinet shall be mounted in accordance with the manufacturer's instructions and leveled.
- 2) Two load levels will be utilized for this test depending on the door size.
- 3) For doors with a height of 610 mm (24") or less, a load of 15.9 kg (35 lbf) shall be suspended such that the weight is equally distributed on either side of the door (Figure 7.4).
- 4) For doors greater than 610 mm (24") in height, a load of 29.5 kg (65 lbf) shall be suspended such that the weight is equally distributed on either side of the door.
- 5) Once loaded, the door shall be cycled 10 times from 90° of its fully closed position to 10° of its fully open position, but not to exceed 90° total.

Acceptance Level

The door shall exhibit no loss of functionality or disabling damage.

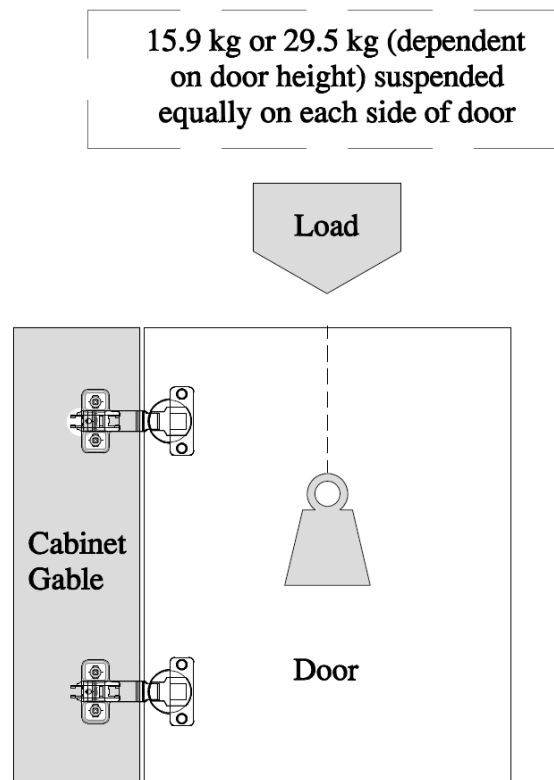


Figure 7.4

7.5 Closing Impact

Purpose: To evaluate the ability of the drawer to withstand impact resulting from being slammed closed.

Procedure

- 1) The unit shall be mounted onto a test platform and leveled (Figure 7.5).
- 2) Open the drawer 2/3 of the drawer depth.
- 3) Position a spring gauge with a spring rate of 4.5 kg/in (10 lbf/in or 1.77 kg/cm) so that it touches the drawer. Open the drawer against the spring gauge until 9 kg (20 lbf) is reached. Release the drawer allowing it to slam closed.
- 4) Repeat procedure for a total of 25 times.

Acceptance Level

The drawer shall exhibit no loss of functionality. The drawer front shall not separate from the joints as a result of the test.

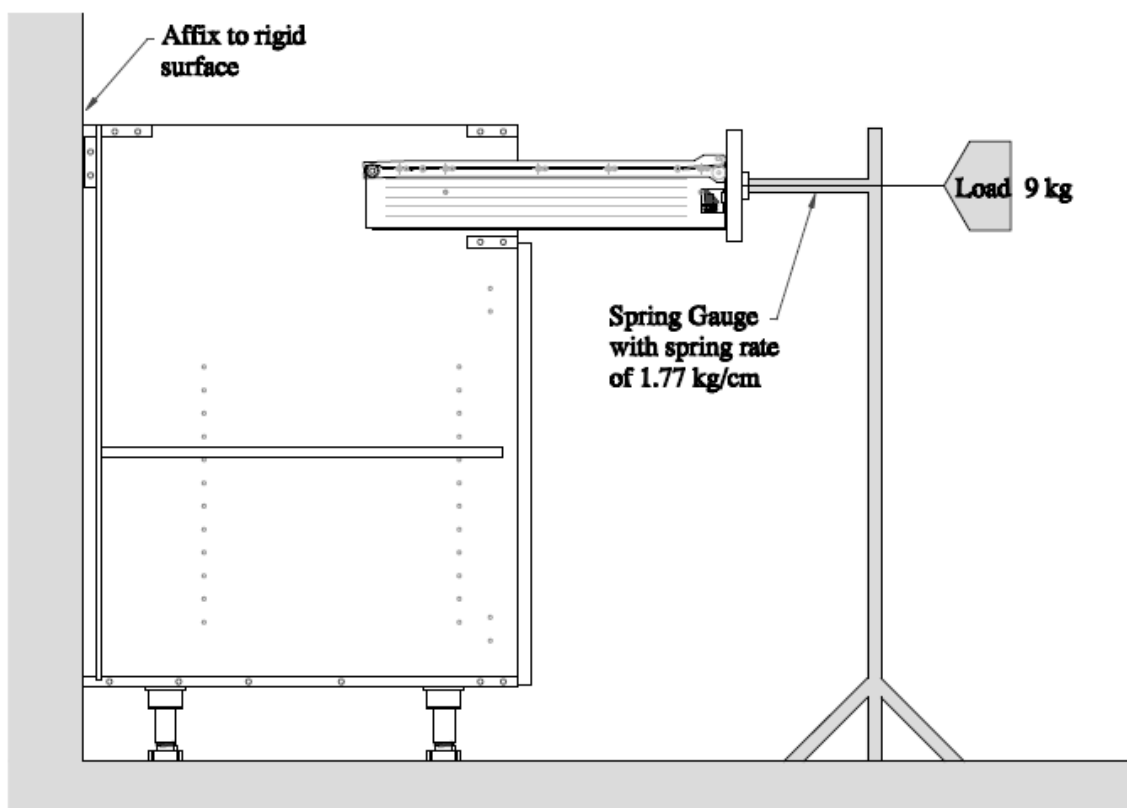


Figure 7.5

8.0 Coatings and Chemical

8.1 Coatings Testing

8.1.1 Cross Hatch/Adhesion

Purpose: To measure the coating's adherence to the wood and to itself or primer. Samples must have a clear natural finish for this test.

Procedure:

- 1) Select an area free of blemishes and any minor surface imperfections, place the sample on a firm base and under an illuminated magnifier.
- 2) Make parallel cuts using a "Cross Cut Tester with 6 Cutting Edges" (spaced 2 mm apart) using sufficient pressure to reach the substrate. All cuts should be done in one steady motion and be approximately ¾" inch long. When making successive single cuts, use a cutting guide (steel ruler) to ensure straight cuts with the guide on the uncut area.
- 3) Brush the film lightly with a soft brush or tissue. Make additional number of cuts at 90 degrees to and centred on the original cuts. Brush the area lightly and inspect the incisions for reflection of light from the substrate.
- 4) Using Permacel 99 tape, cut a piece (1" wide pressure sensitive tape) that is 2 inches longer than the length of the incision area. Place the centre of the tape over the grid, smooth by finger and rub the tape firmly with the eraser end of a pencil. Within 90 seconds remove the tape at an angle of 180 degrees.
- 5) Rate the adhesion in accordance with the following:

0 = edges of the cuts are completely smooth.

1 = small flakes of the coating are visible at the edges and cuts intersection (0 - 5 %).

2 = Coating is flaking around the edges and at the cuts intersection (5 to 15 %).

3 = Coating is flaking around the edges and at the cuts intersection (15 to 35 %).

4 = Coating is flaking around the edges and at the cuts intersection (35 to 65 %).

5 = Flaking and detachment is worse than 65 % of the area.

Acceptance Level:

Level 0 to 3.

8.1.2 Cold and Hot Check

Purpose: To measure the coating's ability to withstand extremes of temperature without failure.

Procedure:

- 1) Condition the samples for at least 24 hours at $23 \pm 3^{\circ}\text{C}$ ($73.4 \pm 5.4^{\circ}\text{F}$), ambient Relative Humidity.
- 2) Expose to $-21 \pm 3^{\circ}\text{C}$ ($-5.8 \pm 5.4^{\circ}\text{F}$), ambient Relative Humidity for 15 hours.
- 3) Expose to $+23 \pm 3^{\circ}\text{C}$ ($73.4 \pm 5.4^{\circ}\text{F}$), 50%±10% Relative Humidity for 9 hours.
- 4) Expose to $+49 \pm 5^{\circ}\text{C}$ ($120 \pm 9^{\circ}\text{F}$), ambient Relative Humidity for 15 hours.
- 5) Expose to $-21 \pm 3^{\circ}\text{C}$ ($-5.8 \pm 5.4^{\circ}\text{F}$), ambient Relative Humidity for 9 hours.
- 6) Expose to $+23 \pm 3^{\circ}\text{C}$ ($73.4 \pm 5.4^{\circ}\text{F}$), 50%±10% Relative Humidity for 15 hours.
- 7) Expose to $+49 \pm 5^{\circ}\text{C}$ ($120 \pm 9^{\circ}\text{F}$), ambient Relative Humidity for 9 hrs.

Acceptance Level:

The coating must not exhibit any failure.

8.1.3 Coating Thickness.

Purpose: To determine the coating thickness as per coating manufacturer's acceptable specifications.

Procedure:

Using a non-metal coating thickness gage, obtain a minimum of three readings randomly taken from each sample submitted.

Point of Reference:

The average coating thickness shall be within the manufacturer's minimum and maximum tolerances.

8.2 Chemical Resistance

Purpose: To measure the coating's ability to withstand the effect of daily household chemicals without failure.

Test Procedure:

- (a) Place 3 ml of each of the following substances on the surface of a cabinet door that is tilted at an angle of 70 to 80° to the horizontal: **Vinegar, orange and grape juices, ketchup and coffee** at 46°C (115°F).
- (b) Allow these substances to remain on the surface for a period of 24 hours at normal room temperature and humidity.

Required Performance:

The door finish shall exhibit no excessive discoloration, or stain or whitening that cannot be dispersed with ordinary polishing, and there shall be no indication of film rupture or shrinkage.

8.3 Detergent and Water Resistance

Purpose: To measure the coating's ability to withstand the effect of moisture and soap without failure.

Test Procedure:

Procedure:

Wet a cellulose sponge with detergent and water solution. Using the wet sponge, wipe the vertical coated side of the sample ensuring the whole area is covered. Let the sample stand for 24 hrs, observe the coating at 6, 8, and 24 hrs for any checking, cracking or major defects.

Required Performance:

1. There shall be no delamination or swelling.
2. The finish shall show no appreciable discoloration and no evidence of blistering, checking, whitening, or other film failure. In event of failure during initial examination following testing, the tested parts shall be permitted to stand for 14 days and then shall be re-examined for the same performance requirements.

9.0 Installation, Application and Maintenance

- 9.1 All cabinet units shall be installed in accordance with the manufacturer's installation instructions.
- 9.2 As well, maintenance instructions should be included with the cabinets when the cabinets are shipped.
- 9.3 The optimal conditions for kitchen cabinets and vanities for in-use application is at a relative humidity between 35% and 50% at 16°C to 32°C (60°F to 90°F), and EMC (equilibrium moisture content) conditions between 8% and 12%.

Casework shall not be subject to abnormal heat, extreme dryness, humid conditions, sudden changes in temperature, or direct sunlight.

It is recommended that the HVAC system at the location of installation be on and functioning, and the kitchen cabinets and vanities shall be acclimated to these conditions for 72 hours prior to installation.

If these guidelines are not followed, severe damage can result to the cabinets, doors and millwork. The fabricator of the cabinets shall not be held responsible for any damage that might develop by not adhering to these guidelines.

10.0 Environmental Requirements

It is highly recommended that all components and raw materials used by manufacturers of kitchen and vanity products are environmentally friendly to encourage sustainable and environmentally friendly housing. It is also recommended that manufacturers adopt a philosophy of reducing waste and consumption and of disposing of waste intelligently and in an environmentally sound fashion.