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SEFA 8-P 2007 TESTS

Performed For:
LM Air Technology, Inc
1467 Pinewood Street
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4.0 Base Cabinet

4.1 Description of Test Cabinet:

The unit is a 48" Polypropylene Base Cabinet – 2 drawer, 2 door (48"W x 22.5"D x 36"H). The cabinet was squared and leveled and the drawers, doors, hinges, latches, etc. were inspected and all were operating properly. The cabinet has no shelf.

4.2 Cabinet Load Test

4.2.1 Purpose of Test

The cabinet load test challenges the structural integrity and the load bearing capability of the cabinet construction. The test demonstrates the ability of the cabinet to support heavy loads, but is not intended to test the functional characteristics of the cabinet under heavy loads.

4.2.2 Test Procedure

The cabinet top was loaded using 1,600 pounds (725.7 Kg) of solid steel bars* stacked four high, in eight equally spaced rows (Figure 1). After 10 minutes, the bars were removed from the cabinet.

* Square solid steel bar, 2-1/2" X 2-1/2" X 28-1/4" (63.5 mm X 63.5 mm x 717.55 mm) weighing 50 lbs. (22.68 Kg).

Figure 1

4.2.3 Acceptance Level

There is no evidence of permanent damage.

4.3 Cabinet Concentrated Load Test

4.3.1 Purpose of Test

The purpose of the test is to challenge the functional characteristics of the cabinet when subjected to a concentrated load on the center of the cabinet top.

4.3.2 Test Procedure

Three, 50 pound (22.68 Kg) solid steel bars and two, 5 lb weights (160 pounds, 72.6 Kg total) were placed on top of the cabinet, along the cabinet centerline (Figure 2). With the weight in place, the drawers and doors were operated and inspected.

Figure 2

4.3.3 Acceptance Level

Doors and drawers operated normally. There is no permanent distortion to the front rail, cabinet joinery, doors, or drawers.

4.4 Cabinet Torsion

4.4.1 Purpose of Test

The test evaluates the structural integrity of the cabinet construction when subjected to a torsional load.

4.4.2 Test Procedure

Figure 3

The cabinet was supported on three, 3-1/2" X 3-1/2" X 4" high (88.9 mm X 88.9 mm X 101.6 mm) hardwood blocks, located under the two rear corners and one front corner (not more than 6" (152.4 mm) in from each support corner. The cabinet was secured, diagonally, from the unsupported corner with six, 50 pound (22.68 Kg), solid steel bars (to prevent overturning). Three, 50 pound (22.68 Kg), solid steel bars and two, 5 lb weights (160 pounds, 72.6Kg total) were placed on the unsupported corner of the cabinet and left in position for 15 minutes (Figure 3). The weights were then removed and the cabinet was placed on the floor in its normal, upright, position. The cabinet joinery was inspected and the cabinet was leveled and measured, diagonally, between the corners of the face and the back of the cabinet (Table 1).

Table 1
Diagonal Measurements of Cabinet

Diagonal Location	Initial	Final	Difference
Face 1	57	57 1/16	**1/16**
Face 2	57	57 1/16	**1/16**
Back 1	59 1/4	59 5/16	**0**
Back 2	59 1/4	59 5/16	**0**

4.4.3 Acceptance Level
When returned to normal position, the operation of the cabinet was normal and there was no evidence of permanent damage. The difference between the diagonal measurements does not exceed 1/8" (3.175 mm) front or back.

4.5 Cabinet Submersion Test

4.5.1 Purpose of Test
The test demonstrates the ability of a cabinet to resist standing water.

4.5.2 Test Procedure
The material thickness of the base of the cabinet was measured along the perimeter in 6" increments. The thickness to be submerged in water was recorded and the arithmatic mean was calculated. The cabinet was submerged in 24" of water. After 4 hours, the cabinet was removed and the thickness was immediately measured at the same points and recorded. A new arithmetic mean was calculated. After the unit was allowed to dry it was inspected for damage. (Figure 4) (One drawer was filled with water to keep cabinet from floating.)

Figure 4

4.5.3 Acceptance Level
The cabinet showed no signs of permanent deformation or deterioration. Increase in thickness did not exceed four percent of the initial mean measurements. **The cabinet passed and did not exceed the allowable four percent change in arithmatic mean.**

4.6 Spill Containment Test

4.6.2 Purpose of Test

The test demonstrates the ability of a cabinet to hold standing water.

4.6.2 Test Procedure

The cabinet was placed in an upright position, raised four inches off the floor and supported level. Supports were positioned away from all weld seam areas. The cabinet was filled with water to within an 1/8" of the top of the bottom rail. After one hour, the cabinet and floor underneath were inspected for water droplets. (Figure 5)

Figure 5

4.6.3 Acceptance Level

The cabinet showed no signs of leakage, and had no gaps or voids in weld seams. The cabinet showed no signs of permanent deformation or deterioration. **The cabinet passed. It had no leaks or other signs of damage.**

5.0 Doors

5.1 Door Hinge Test

5.1.1 Purpose of Test

The test demonstrates the durability of the door and its hardware (hinge leaf, screws, etc.) to an applied load of 120 pounds (54.4 Kg).

5.1.2 Test Procedure

Weight was placed on top of the cabinet to prevent it from overturning. A cabinet door was opened 90^o and a sling with two 60 pound (27.2 Kg) weights (120 pounds, 54.4 Kg total) was hung over the top of the door, at a point 12", (304.8 mm) out from the hinge centerline. The door was then slowly moved through the full cycle of the hinge, (up to a 160^o arc) (Figure 6). The weight was removed, the door was swung through its full intended range of motion, and closed.

Figure 6

5.1.3 Acceptance Level.
The open door withstood a load of 120 pounds, (54.4 Kg), when applied to a point 12”, (304.8 mm), from the hinge centerline without significant permanent distortion. Operation of the door after the test showed no distortion or binding of the door or hinges. **The door passed. No permanent damage was detected.**

5.2 Door Impact Test

Figure 7

5.2.1 Purpose of Test

The test demonstrates the resistance to a 190 inch-pound (21.46 N-m) impact to the door face.

5.2.2 Test Procedure

A 10 pound (4.54 Kg) sand bag was then suspended (from a pendulum support) and dropped providing an impact of 190 inch-pounds (21.46 N-m) at the center of a closed door (Figure 7).

5.2.3 Acceptance Level

Door and catch operate normally and show no signs of permanent damage.

5.3 Door Cycle Test

5.3.1 Purpose of Test

The test demonstrates the durability of the door hinge hardware to withstand 50,000 cycles as a reliable measure of longevity.

5.3.2 Test Procedure

A pneumatic cycling mechanism was used to open the door and swing it 90º (Figure 8). The door was opened and closed continuously, without hinge adjustment, at a speed of 8 cycles per minute, for 50,000 cycles.

Figure 8

5.3.3 Acceptance Level

The door operated for the full cycle period without deterioration that significantly affected the function of the door. **After 50,000 cycles, the door and catch operated normally and show no evidence of permanent damage.**

6.0 Drawers

6.1 Drawer Static Load Test

6.1.1 Purpose of Test

The test demonstrates the ability to support a point load given to the front of the drawer and will challenge the drawer suspension system and the attachment of the drawer head to the drawer.

6.1.2 Test Procedure

Four, 50 pound (22.68 Kg) weights (200 Pounds, 90.72 Kg total) were placed on top of the cabinet (to prevent over-turning). A drawer was opened to 13" (330.2 mm) of travel and 120 pounds (54.4 Kg) was hung from the drawer head, at the centerline of the drawer, for 5 minutes (Figure 9). The weight was then removed and the drawer was operated through the full cycle.

Figure 9

6.1.3 Acceptance Level

There was no interference with the normal operation of the drawer and the drawer head remained tightly fastened to the drawer.

6.2 Drawer and Door Pull Test

6.2.1 Purpose of Test

This test will evaluate the strength of the pull and the pull hardware. This test will be performed in two orientations, horizontal and perpendicular to the mounting hardware.

6.2.2 Test Procedure

50 pounds (22.68 Kg) of weights were placed in the drawer (to prevent over-turning).
A drawer was place on top of a cart and a 40 pound (18.14 Kg) weight was place on the drawer pull. This test was then repeated in the next orientation. (see fig.10)

Figure 10

6.1.3 Acceptance Level

The pull and pull hardware pasted. No damage was recorded.

6.3 Drawer Impact Test

6.3.1 Purpose of Test

The test demonstrates the resistance to impact of the drawer bottom and the slide mechanism.

6.3.2 Test Procedure

A drawer was opened 13” (330.2 mm) and an 8 pound, (3.63 Kg), sand bag was dropped, from a height of 24" (609.6 mm), into the bottom of the drawer, at the centerline of the width of the drawer (Figure 11).

Figure 11

6.3.3 Acceptance Level

After testing, the drawer was operated through a full cycle.
The drawer operated normally and there was no visible damage to the drawer.

6.4 Drawer Internal Rolling Impact

6.4.1 Purpose of Test

The test evaluates the strength of the drawer head, bottom of opening and closing the drawer with a rolling load.

Figure 12

6.4.2 Test Procedure

The drawer was positioned on a table at a 45º angle and a 2" (50.8 mm) diameter by 12" (304.8 mm) long steel rod, that weighs approximately 10 pounds (4.54 Kg), was positioned 13" (330.2 mm) from the target impact area such that the rod rolled freely to impact the back of the drawer. The back was subjected to three impacts and then the drawer was reversed and the front was subject to three additional impacts (Figure 12).

6.4.3 Acceptance Level

The drawer passed. The joints on both front and back had no signs of failure. No gaps in the joints were visible.

6.5 Drawer Cycle Test

6.5.1 Purpose of Test

The test is intended to replicate years of the drawer's operation under full load.

Figure 13

6.5.2 Test Procedure

A load of 10 pounds, (4.5 Kg), was uniformly distribute in the drawer and the force required to activate the drawer was measured and recorded. A pneumatic mechanism was then used to operate the drawer over its full range of motion to within ¼", (6.4 mm), of full extension for 25,000 cycles at a rate of 4 cycles per minute (Figure 13).

6.5.3 Acceptance Level

The door operated freely without evidence of dragging, rubbing or binding. The force required to open and close the drawer after testing did not exceed 20% of the force required before the test. **The drawer opens and closes fully. It completed the 25,000 cycles, and the force was not above the maximum allowable force of 8 pounds.**

7.0 Shelving

7.1 Shelf Load Test

7.1.1 Purpose of Test

The test demonstrates the ability of a shelf and its mounting hardware to support normal laboratory loads.

7.1.2 Test Procedure

Since this base cabinet has no internal shelf, this test is not applicable to this cabinet.

This base cabinet, 48" Polypropylene Base Cabinet – 2 drawer, 2 door (48"W x 22.5"D x 36"H), has passed all applicable test requirements of
SEFA 8 P – 2007.

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