

APPENDIX 1

LABORATORY STEEL FURNITURE FINISH

1 – STEEL FURNITURE FINISH

A. Preparation and Painting:

1. Prepare all surfaces, make free of defects with welds ground smooth and indistinguishable from surrounding metal.
2. Components shall be cleaned in a four-stage chemical spray process that produces an iron phosphate coating bonded to the steel surfaces. Components shall be thoroughly oven-dried before painting.
3. Components shall be Electro-statically coated with an epoxy/urethane powder applied in a controlled environment then baked / cured in a temperature controlled oven to assure a smooth hard finish. Surface shall be a chemical resistant, high quality laboratory grade finish. The resulting paint coating shall provide a minimum film thickness of 1.2 mils on all exposed parts and an average film thickness of 1.0 mils on all other surfaces.

B. Physical Performance of Coatings:

1. Paint Hardness on Steel

The paint hardness test is used to determine the resistance of the coatings to scratches.

a) Test procedure:

- 1) Pencils, regardless of their brand, are valued in this way: 8-H is the hardest, and next order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B, (which are softest).
- 2) The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel like manner until one is found that will cut or scratch the film. The pencil used before that one, that is the hardest pencil that will not rupture the film, is then used to express or designate the hardness.

b) Acceptance Level:

- 1) The paint shall have a hardness of 4-H minimum.

2. Hot Water Test

The purpose of this test is to insure the coating is resistant to hot water.

a) Test Procedure:

- 1) Hot water (190°F. to 205°F. [88°C to 96°C]) shall be allowed to trickle (with a steady stream and at a rate of not less than 6 ounces [177.44cc] per minute) on the finished surface, which shall be set at an angle of 45-degrees, for a period of five minutes.

b) Acceptance Level:

- 1) After cooling and wiping dry, the finish shall show no visible effect from the hot water.

3. Impact Test

The purpose of this test is to evaluate the ductility of the coating.

a) Test Procedure:

- 1) A one-pound ball (approximately 2" [50.8mm] in diameter) shall be dropped from a distance of 12" (304.8mm) onto a flat horizontal surface, coated to manufacturer's standard manufacturing method.

b) Acceptance Level:

- 1) There shall be no visual evidence to the naked eye of cracks or checks in the finish due to impact.

4. Paint adhesion on Steel

The paint adhesion test is used to determine the bond of the coating to steel. This does not apply to non-steel products.

a) Test Procedure:

- 1) This test is based on ASTM D2197-86 "Standard Method of Test for Adhesion of Organic Coating." Two sets of eleven parallel lines 1/16" (1.587mm) apart shall be cut with a razor blade to intersect at right angles thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush for one minute. Examine under 100-foot candles of illumination.

b) Acceptance Level:

- 1) Ninety or more of the squares shall show finish intact.

5. Humidity Resistance:

No visible effect after a 1000 hour exposure in saturated humidity at 38°C(100°F) per ASTM D2247-85.

6. Salt Spray Resistance:

No visible effect after a 250 hour salt spray test per ASTM B117-85.

C. Chemical Resistance Performance:

1. Chemical Spot Test:

The purpose of the chemical spot test is to evaluate the resistance a finish has to chemical spills.

Note: Many organic solvents are suspected carcinogens, toxic and/or flammable. Great care should be exercised to protect personnel and the environment from exposure to harmful levels of these materials.

a) Test Procedure:

- 1) Obtain one sample panel measuring 14" x 24" (355.6mm x 609.6mm). The received sample to be tested for chemical resistance as described herein.
- 2) Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+ 3F (23+ 2(C) and 50+ 5% relative humidity. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods.
- 3)
- 4) Method A - Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a 1-oz. (29.574cc) bottle and inverting the bottle on the surface of the panel.
- 5)
- 6) Method B – Test non-volatile chemicals by placing five drops of the reagent on the surface of the panel and covering with a 24mm watch glass, convex side down.
- 7)
- 8) For both of the above methods, leave the reagents on the panel for a period of one hour. Wash off the panel with water, clean with detergent and naptha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73± 3°F (23°± 2°C) and 50± 5% relative humidity using the following rating system:

Level 0 - No detectable change.

Level 1 - Slight change in color or gloss.

Level 2 - Slight surface etching or severe staining.

Level 3 - Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	A
2.	Acetate, Ethyl	A
3	Acetic Acid, (98%)	B
4.	Acetone	A
5.	Acid Dichromate, (5%)	B
6.	Alcohol, Butyl	A
7.	Alcohol, Ethyl	A

Test No.	Chemical Reagent	Test Method
8.	Alcohol, Methyl	A
9.	Ammonium Hydroxide, (28%)	B
10.	Benzene	A
11.	Carbon Tetrachloride	A
12.	Chloroform	A
13.	Chromic Acid, (60%)	B
14.	Cresol	A
15.	Dichlor Acetic Acid	A
16.	Dimethylformamide	A
17.	Dioxane	A
18.	Ethyl Ether	A
19.	Formaldehyde, (37%)	A
20.	Formic Acid, (90%)	B
21.	Furfural	A
22.	Gasoline	A
23.	Hydrochloric Acid, (37%)	B
24.	Hydrofluoric Acid, (48%)	B
25.	Hydrogen Peroxide, (3%)	B
26.	Iodine, Tincture of	B
27.	Methyl Ethyl Ketone	A
28.	Methylene Chloride	A
29.	Mono Chlorobenzene	A
30.	Naphthalene	A
31.	Nitric Acid, (20%)	B
32.	Nitric Acid, (30%)	B
33.	Nitric Acid, (70%)	B
34.	Phenol, (90%)	A
35.	Phosphoric Acid, (85%)	B
36.	Silver Nitrate, Saturated	B
37.	Sodium Hydroxide, (10%)	B
38.	Sodium Hydroxide, (20%)	B
39.	Sodium Hydroxide, (40%)	B
40.	Sodium Hydroxide, Flake	B
41.	Sodium Sulfide, Saturated	B
42.	Sulfuric Acid, (33%)	B
43.	Sulfuric Acid, (77%)	B
44.	Sulfuric Acid (96%)	B
45.	Sulfuric Acid (77%) and Nitric Acid (70%), equal parts	B
46.	Toluene	A
47.	Trichloroethylene	A
48.	Xylene	A
49.	Zinc Chloride, Saturated	B

b) Acceptance Level:

- 1) Results will vary from manufacturer to manufacturer. Laboratory grade finishes should result in no more than four Level 3 conditions. Suitability for a given application is dependent upon the chemicals used in a given laboratory.

D. Colors:

1. Provide laboratory furniture paint finish in manufacturer's standard colors. A one or two color scheme may be used. The two color scheme is made up of one color for cabinet bodies, and one color for doors and drawer fronts.