SECTION 12 35 53.13 – STEEL LABORATORY CASEWORK AND RELATED PRODUCTS

PART 1 — GENERAL

1.00 SUMMARY AND SCOPE

A. Section Includes:

1. Use of **LabSpace Solutions (Lab Furniture LLC) STEELTECH COLLECTION Laboratory Furniture** as the steel casework specification standard for design, materials, construction and finish of casework, specified as the minimum acceptable standard of a universal steel laboratory casework line. Include delivery to the site, set in place, level, and scribe to walls and floors as required. Furnish and install all filler panels, knee space panels and scribes as shown on drawings.
2. Furnish and deliver all electrical switches and receptacles and utility service outlet fittings listed in these specifications, drawings and equipment schedules as mounted on the laboratory furniture. Separately package all plumbing and electrical fittings that are not permanently installed in equipment. Mark for delivery to the installation site.
3. Furnish and deliver all laboratory sinks, cup sinks, drains, drain troughs, sink outlets and integral tailpieces that occur above the floor, where these items are part of the equipment or listed in these specifications, equipment schedules and drawings.
4. Furnish service supports where specified and set in place; service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.
5. Remove all debris and dirt accumulated from installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and organized.

B. Related Divisions:

1. Divisions 5 & 6: Behind-the-Wall Blocking and Studs
2. Division 9: Base Molding
3. Division 11: Laboratory Fume Hoods (Section 11 53 13)
4. Division 22: Plumbing
5. Division 26: Electrical Fittings and Connections
6. Division 27: Communications

C. Related Publications:

1. SEFA 3 – Laboratory Work Surfaces, Scientific Equipment and Furniture Association
2. SEFA 8-M – Laboratory Grade Metal Casework, Scientific Equipment and Furniture Association
3. NFPA 30 – Flammable and Combustible Liquids Code, National Fire Protection Association
4. NFPA 45 – Fire Protection for Laboratories Using Chemicals, National Fire Protection Association
5. UL 1275 – Flammable Liquid Storage Cabinets, Underwriters Laboratories
6. ASTM D522 – Mandrel Bend Test of Attached Organic Coatings

1.01 BASIS OF WORK

A. It is the intent of this specification to use **LabSpace Solutions (Lab Furniture LLC) – STEELTECH COLLECTION Laboratory Furniture** as the standard of construction for laboratory furniture. The construction standards of this product line shall provide the basis for quality and installation.

B. Supply all equipment in accordance with this specification. Alternate products differing in materials and construction from this specification require written approval from the owner/architect. Procedures for obtaining approval for an alternate manufacturer are defined in Section 2.00.A of this specification.

C. General Contractors should secure a list of approved laboratory furniture manufacturers from the architect as protection against non-conformance to these specifications.

D. All bidders have the option of clarifying deviations to the specified design, construction or materials. Without such clarifications, sealed quotations to the owner or owner representative will be considered to be in total conformance to the requirements of the specification.

1.02 QUALITY ASSURANCE

A. Single-Source Responsibility: The steel laboratory furniture contractor shall also provide the worksurfaces and fume hoods under the same contract to assure coordinated staging and shipment and single-source responsibility.

B. SEFA Standards: Casework shall be built to the construction and performance standards of SEFA 8-M, Laboratory Grade Metal Casework, including the load capacities in Section 2.05.A.

C. Finish Performance: Provide independent test lab certification that the furniture finish meets the performance requirements described in Section 2.05 of this specification.

1.03 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's data and installation instructions for casework.

B. Samples: Samples from non-specified manufacturers will be required and reviewed per this specification. Unless otherwise directed, approved sample units will be retained by the Owner's Representative.

1. 6-inch (150 mm) square samples of each type of countertop material. One sample of all top materials shown or called for, of sufficient size to perform finish requirement tests.
2. One full-size, finished base cabinet complete with hardware, doors and drawers, but without countertop.
3. One full-size, finished wall cabinet complete with hardware, doors and adjustable shelves.
4. One sample each of hinged and sliding doors.
5. One of each service fitting specified, complete with accessories and specified finish.
6. One of each type of sink and accessory item specified.
7. Adhesives and sealants.

C. Shop Drawings: For metal laboratory casework. Include plans, elevations, sections, details and attachments to other work.

1. Coordinate shop drawings with other work involved.
2. Provide roughing-in drawings for mechanical and electrical services when required.

PART 2 — PRODUCTS

2.00 MANUFACTURERS

A. The basis of this specification is steel casework manufactured to the standards of **LabSpace Solutions (Lab Furniture LLC), 1451 Lake Dr SE Unit 6173, Grand Rapids, MI 49506**. The specified design is the **STEELTECH COLLECTION**. All laboratory casework covered by this specification shall be the product of one manufacturer and be fabricated at one geographic location to assure shipping continuity and single-source responsibility. All quotations from a manufacturer other than LabSpace Solutions shall contain a review of the following capabilities:

1. List of shop facilities
2. Proof of financial ability to fulfill the contract
3. List of a minimum of ten (10) installations over the last five (5) years of comparable scope
4. Proof of project management and installation capabilities

B. The selected manufacturer shall warrant that all products are free of defects in material and workmanship for a period of one year. The purchaser shall notify the manufacturer's representative immediately of any product defects. The manufacturer shall have a reasonable opportunity to inspect the goods. The purchaser shall return no product until receipt of written shipping instructions from the manufacturer.

2.01 CABINET MATERIAL

A. Steel: Cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies shall be fabricated from cold rolled steel.

2.02 DRAWER AND DOOR STYLE

A. Inset – Square Edge: Drawers and doors, when closed, shall be recessed to create an overall flush face with 1/8" reveals. The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel. The top front corners of the door shall be welded and ground smooth.

2.03 MATERIALS

A. General Requirements: It is the intent of this specification to provide a high-quality steel cabinet specifically designed for use in the laboratory environment.

B. Steel:

1. Cold Rolled Steel: Cold rolled sheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge U.S. Standard, roller leveled, and treated at the mill to be free of scale, ragged edges and deep scratches.

C. Hardware and Trim:

1. Drawer and Door Pulls: Pulls shall be securely fastened to doors and drawers and shall be: (Choose one)
    a. Pull Style 1 – Aluminum recessed (standard)
    b. Pull Style 2 – 5/16" diameter steel wire pull finished in stainless steel, mounted on 4" centers
    c. Pull Style 3 – Anodized aluminum in a flat rectangular shape, mounted on 4" centers
2. Sliding Door Pulls: Sliding door pulls shall be aluminum recessed.
3. Hinges: Inset style cabinets shall use five-knuckle hinges made of Type 304 stainless steel, .089" thick, 2-1/2" high, with brushed satin finish, of the institutional type with a five-knuckle bullet-type barrel. Hinges shall be attached to both door and case with three screws through each leaf. Doors 48" or less in height shall be hung on two (2) hinges, and doors over 48" in height shall be hung on three (3) hinges. Welding hinges to door or case will not be accepted. (Note: meets SEFA 8-M.)
4. Drawer Slides: Heavy-duty, full-extension, soft-close, self-closing, zinc-plated, ball-bearing slides rated for 150-pound loads. (See Drawer Assemblies in Section 2.04.B.11.)
5. Locks: Locks, when shown or called for, shall be 5-disc tumbler with interchangeable cylinder. Exposed lock noses shall be nickel plated and stamped with identifying numbers.
6. Catches: Nylon-roller, spring-loaded, self-aligning catch with a steel strike plate. Double doors without locks shall have a catch on each door. Provide two catches on doors more than 48 inches (1200 mm) in height. Polyethylene roller type catches are not acceptable.
7. Shelf Clips: Shelf adjustment clips shall be nickel-plated, die-formed steel.
8. Base Molding: Base molding provided by others.
9. Label Holders: Label holders, where called for, shall be self-adhesive aluminum with satin finish, designed for 2-1/2" x 1-1/8" cards.
10. Sink Supports: Sink supports shall be the hanger type, suspended from base cabinet end panels by four 1/4" diameter rods, threaded at the bottom end and offset at the top to hang from two full-depth reinforcements welded to the top of the end panels. Two 3/4" x 1-1/2" x 12-gauge channels shall be hung on the threaded rods to provide an adjustable sink support.

2.04 CONSTRUCTION

A. Steel Cabinet Construction:

1. General:
    a. The steel furniture shall be of modern design and constructed in accordance with the best practices of the scientific laboratory equipment industry. Quality shall be ensured by the use of proper machinery, tools, dies, fixtures and workmanship to meet the intended quality and quantity for the project.

b. All cabinet bodies shall be flush front construction with the intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts, in the same plane without overlap. Exterior corners shall be MIG welded with heavy backup reinforcements.

c. Case openings of inset style cabinets shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust-resistant case.

d. All cabinets shall be free of burrs and sharp edges and have an easily cleanable, smooth interior.

e. Cabinets shall be designed on a standardized grid pattern to allow reconfiguration of doors and drawers.

2. Steel Gauges: Steel used in construction of cases shall be 18 gauge, except as follows:

a. Leveling glide reinforcements: 12 gauge.

b. Top and intermediate front horizontal rails and reinforcement gussets: 16 gauge.

c. Drawer and door assemblies, cabinet bottoms, bottom back rail, toe space rail and adjustable shelves: 20 gauge.

B. Base Cabinets:

1. End uprights shall be formed into not less than an L formation at top, bottom and back and a 3/4" wide front C formation. The pilaster shall be formed as part of the side panel, creating a single-piece structure, and shall be perforated for the support of drawer channels, intermediate rails, hinge screws and shelf adjustment holes.

2. A 7/8" high top horizontal rail shall interlock with end panels and be flush at the face of the unit. Top rails not flush with the face of end uprights are not acceptable.

3. Intermediate rails shall be provided between doors and drawers. Rails shall be recessed behind doors and drawer fronts.

4. The cabinet bottom shall be formed of one piece of steel, except in corner units, formed down on sides and back to create a square-edge transition, and shall be removable for installation access and cleaning. Bottoms shall not be welded in place.

5. The toe space rail shall extend up and forward to engage the bottom panel to form a smooth-surfaced, fully enclosed toe space, 3" deep x 4" high.

6. Back construction shall be a three-piece system with a vertical drawer/door support rail and two removable back panels. Back panels shall not be welded in place.

7. Each bottom corner of the base cabinet shall have a 3/8"-16 leveling bolt, 2-1/2" long, capable of supporting 500 lbs. Access to the leveling bolts shall be through cutouts in the cabinet bottom. Leveling bolt access requiring special tools or requiring the cabinet to be lifted is not acceptable.

8. Adjustable shelves shall be formed down 1/2", returned back 1/2" and up 3/8" into a channel formation front and rear, and formed down 3/4" at each end. Shelves over 42" long shall be further reinforced with a channel formation welded to the underside of the shelf. Shelves shall be adjustable on 1-3/8" increments.

9. Steel door assemblies for solid panel swinging doors shall consist of an inner and outer door pan. The outer door pan shall be formed on all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel. The inner door pan shall be flanged on all four sides with a hat channel support welded to the inside. The door assembly shall be 3/4" thick and contain sound-deadening material. Door assemblies shall be painted prior to assembly and punched for attaching pulls. The inner pan shall have a tabbed, laser-cut opening for in-field installation of locks when required.
10. Doors shall be easily removed and hinges easily replaced if needed. Hinges shall be applied to the cabinet and door with 10-24 screws. Welding of hinges to either cabinet or door is not acceptable.
11. Drawer Assemblies: Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front, fully coved at the interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in the drawer head. Drawer heads shall be 3/4" thick.
12. Knee space panels shall be 20-gauge steel construction with the same finish as base cabinets, and easily removable for access to mechanical service areas.

C. Special Purpose Storage Cabinets:

1. Acid Storage Cabinets: Acid storage cabinets shall use the same gauges of steel and construction features as other base cabinets, except they shall be completely lined with a one-piece polyethylene corrosion-resistant liner. The liner shall be 1/4" thick, molded into a seamless tub, including top, sides and bottom, with a 1" lip at the bottom front to contain spills. Tubs shall include integral cleats at both ends and back to support an optional shelf. Doors shall be self-closing. Each door shall have a set of louvers at the top and bottom and a 1/8" sheet polyethylene liner. Cabinets shall be furnished with vent ports in the back panel, plugged until venting is required. Where specified, each cabinet shall be vented into the fume hood exhaust with a 1-1/2" vent pipe. When specified or shown on drawings, cabinets shall include a full-depth phenolic resin shelf.
2. Flammable (Solvent) Storage Cabinets: Cabinets shall conform to OSHA regulations and the requirements of NFPA 30, Flammable and Combustible Liquids Code, and shall be Factory Mutual (FM) 6050 approved and/or Underwriters Laboratories (UL) 1275 listed. Cabinets shall limit the internal temperature at the center, one inch (25 mm) from the top, to not more than 325°F (162.8°C) when subjected to a ten-minute fire test that simulates the fire exposure of the standard time-temperature curve specified in NFPA 251. Cabinets shall be furnished with two 2-1/2" diameter vent openings in the back panel, sealed with bungs. Cabinets shall not be vented unless required by the local authority having jurisdiction; where venting is required, provide a flame arrestor at each vent. The bottom, top, back, door and sides of the cabinet shall be constructed of metal and finished in the same manner as the metal casework specified herein, provided that the bottom, top, door and sides of the cabinet are at least 18-gauge sheet steel, double-walled, with a 1-1/2 inch (38 mm) air space. Joints shall be riveted, welded or made tight by equally effective means. Provide an adjustable, full-width metal shelf supported with locking clips to avoid inadvertent tipping. Doors shall be self-closing with a continuous piano hinge and three-point

locking mechanism. The door sill shall be raised at least 2 inches (50 mm) above the bottom of the cabinet to retain spilled liquid within the cabinet. Finish as specified for metal laboratory casework, except interior and shelf finish shall be three mils thick. Apply signage, in a contrasting color and conspicuous size, to cabinet doors reading "FLAMMABLE – KEEP FIRE AWAY."

3. Vacuum Pump Cabinets: Vacuum pump cabinets shall have the same specifications and construction standards as base cabinets. The interior of the cabinet shall be lined with 1-inch-thick neoprene foam for sound deadening and easy cleaning, with an interior pull-out shelf for easy maintenance of the pump system. Each cabinet shall be furnished with an electrical knockout for a duplex receptacle mounted on the inside cabinet back and an electrical knockout for a toggle switch mounted in the top front panel.

D. Upper Wall Cabinet Construction:

1. Upper cabinets shall have a completely finished interior, the same as the exterior, and shall be hung with a French cleat so that no mounting hardware is visible on the interior when installed.
2. End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. The front edge of the upright shall be 3/4" wide. The pilaster shall be formed as part of the side panel, creating a single-piece structure, and shall be perforated for the support of intermediate rails, hinge screws and shelf adjustment holes.
3. Cabinet tops shall be formed with a 7/8" high C formation at the front edge and turned down at the back to engage a wall-hanging French cleat.
4. Cabinet bottoms shall be formed down on all four edges and welded in place.
5. Cabinet backs shall be welded on all four sides. Backs shall be perforated for shelf adjustment holes, with holes concealed at the back.
6. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear, and formed down 3/4" at each end. Shelves over 36" long shall be reinforced with a hat channel welded to the bottom of the shelf. Shelves shall be adjustable on 1-3/8" increments.
7. Glazed doors shall be 3/4" thick and consist of an inner and outer door pan welded together to form a single unit. The outer door pan shall be 20-gauge steel, formed into a channel or flanged shape on all four sides, and pierced and formed to create a 3" wide frame around the glass opening at the center of the door. The inner door pan shall be 20-gauge steel, flanged on all four sides, and pierced for a glass opening in the center of the door. Glass shall be held in place by a rubber or vinyl gasket around the entire edge of the glass. Doors shall be glazed with: (Choose one)
    a. 1/8" float glass
    b. 1/8" tempered glass
    c. 1/4" safety glass
8. Solid panel doors shall consist of an inner and outer door pan. The outer door pan shall be formed into a channel or flanged shape on all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. The inner door pan shall be

flanged on all four sides and reinforced with a hat channel for rigidity. The door assembly shall be 3/4" thick and contain sound-deadening material.

9. Sliding doors shall rest on a bottom steel track welded to the cabinet, using nylon rollers. The track shall be designed to resist accidental removal of doors.
10. Swinging doors 48" or less in height shall be hung on one pair of hinges; doors over 48" in height shall be hung on three hinges.
11. Plate glass sliding doors shall operate on an extruded aluminum track at the bottom of the cabinet and in an extruded aluminum channel at the top. The bottom of each glass door shall be furnished with a continuous aluminum shoe the full length of the door, equipped with two nylon rollers that operate on the extruded aluminum track. The aluminum shoes shall be equipped with pulls for operation of the doors and to prevent bypassing of the doors. Plate glass doors shall close against rubber bumpers. Plate glass doors shall be: (Choose one)
    a. 1/4" float glass
    b. 1/4" tempered glass
    c. 1/4" safety glass

E. Steel Full Height (Floor) Cabinet Construction:

1. End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. The front edge of the upright shall be 3/4" wide. The pilaster shall be formed as part of the side panel, creating a single-piece structure, and shall be perforated for the support of intermediate rails, hinge screws and shelf adjustment holes.
2. Cabinet tops shall be formed into a channel shape at the front with a flange at the rear and sides, and MIG welded on all four sides. The front fascia channel shall be strengthened with MIG-welded reinforcements.
3. The cabinet bottom shall be formed of one piece of steel, except in corner units, formed down on sides and back to create a square-edge transition, and shall be removable for installation access and cleaning. Bottoms shall not be welded in place.
4. Toe space rails shall interlock in back of the bottom rail and with the end panel to provide a welding plate, and shall extend to the floor with a flange turned back and up for support.
5. Cabinet backs shall be MIG welded on all four sides and hemmed along the edges for rigidity. Backs shall be perforated for shelf adjustment holes on 1-3/8" centers.
6. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear, and formed down 3/4" at each end. Shelves over 36" long shall be further reinforced with a hat channel formation spot welded to the underside of the shelf. Shelves shall be adjustable on 1-3/8" increments.
7. Glazed doors shall be 3/4" thick and consist of an inner and outer door pan welded together to form a single unit. The outer door pan shall be 20-gauge steel, formed into a channel or flanged shape on all four sides, and pierced and formed to create a 3" frame around the glass opening in the center of the door. The inner door pan shall be 20-gauge steel, flanged on all four sides, and pierced for a glass opening in the center of the door, with a hat channel spot welded to the pan for additional rigidity.

Door glazing shall be held in place by a rubber or vinyl gasket around the entire edge of the glass. Doors shall be glazed with: (Choose one)

a. 1/8" float glass

b. 1/8" tempered glass

c. 1/4" safety glass

8. Solid panel doors shall consist of inner and outer pan formations mechanically assembled after painting. All full-height solid panel doors shall be further reinforced by a full-height hat channel formation welded to the inner pan. Doors shall be 3/4" thick and contain sound-deadening material.
9. Sliding doors shall rest on a bottom steel track welded to the cabinet, using nylon rollers. The track shall be designed to resist accidental removal of doors.
10. Swinging doors 48" or less in height shall be hung on one pair of hinges; doors over 48" in height shall be hung on three hinges.

F. Apron and Leg Assembly Construction:

1. In general, freestanding tables and/or apron and leg assemblies consist of welded leg assemblies connected to aprons by mechanical fasteners.
2. Table apron rails shall be formed of 18-gauge steel with 4" high rails formed top and bottom into a C-channel.
3. Table legs shall be 2" square welded tubing. A threaded rivnut shall accommodate a 5/16"-18 x 2-1/2" long leveling glide.
4. Stretchers shall be constructed of 14-gauge steel tube and furnished where indicated on drawings. They shall be secured to table legs either as fully welded assemblies or by a weld nut assembly using a 1/2"-13 bolt.

2.05 PERFORMANCE REQUIREMENTS

A. Steel Casework Construction Performance:

1. Steel base unit load capacity: 500 lbs. per lineal foot.
2. Suspended units: 300 lbs.
3. Drawers in a cabinet body: 150 lbs.
4. Utility tables (four-legged): 600 lbs. with levelers; 300 lbs. with casters.
5. Hanging wall cases: 300 lbs.
6. Shelves of base units, wall cases and tall cases: 40 lbs. per square foot, maximum load 200 lbs., up to 48" wide.
7. Mobile cabinets: 300 lbs.

B. Steel Paint System Finish and Performance:

1. Steel Paint System Finish:

After cold rolled steel component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate

solution to provide a uniform, fine-grained crystalline phosphate surface that provides both an excellent bond for the finish and enhanced protection against humidity and corrosive chemicals.

After the phosphate treatment, the steel shall be dried, and all steel surfaces shall be coated with a chemical- and corrosion-resistant, environmentally friendly, electrostatically applied epoxy powder coat finish. All components shall be individually painted, ensuring that no area is vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum corrosion and wear resistance.

The completed finish system in standard colors shall meet the performance test requirements specified under SEFA 8-M. Standard colors: Off White (OW), Platinum (PL), Green (GR), Burgundy (BY), Beige (BG), Appliance White (AW), Ivory (IV), Light Almond (LA), Light Blue (LB), Black (PB), Sea Blue (SB), Dark Taupe (TD), Matte Gray (MA) and Deep Blue (DB). Custom color matching is available.

2. Performance Test Results (Chemical Spot Tests):

   a. Testing Procedure:

      Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" diameter watch glass, convex side down, to confine the reagent. Spot tests of volatile chemicals shall be made by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide-mouth bottle to retard evaporation.

      All spot tests shall be conducted so that the test surface is kept wet throughout the entire test period, at a temperature of 77° ±3°F. For both methods, leave the reagents on the panel for one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

   b. Test Evaluation: Evaluation shall be based on 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.

      After testing, the panel shall show no more than three (3) Level 3 conditions.

   c. Test Reagents:

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	Cotton ball & bottle

Test No.	Chemical Reagent	Test Method
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichloroacetic Acid	Cotton ball & bottle
16.	Dimethylformamide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle
18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle
20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle
22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Iodine, Tincture of	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Chloride	Cotton ball & bottle

Test No.	Chemical Reagent	Test Method
29.	Monochlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass
32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

* Where concentrations are indicated, percentages are by weight.

3. Performance Test Results (Heat Resistance): Hot water (190°F–205°F) shall be allowed to trickle, in a steady stream at a rate not less than 6 ounces per minute, on the finished surface set at an angle of 45° from horizontal for a period of five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
4. Performance Test Results (Impact Resistance): A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of a steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact on close visual examination.
5. Performance Test Results (Bending Test): An 18-gauge steel strip, finished as specified, when bent 180° over a 1/2" diameter mandrel, shall show no peeling or flaking of the finish (ASTM D522).
6. Performance Test Results (Adhesion): Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines

1/16" apart shall be cut with a razor blade to intersect at right angles, forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating but not into the substrate, then brushed lightly with a soft brush and examined under 100 foot-candles of illumination. (Based on ASTM D2197, Standard Test Method for Adhesion of Organic Coatings.)

7. Performance Test Results (Hardness): The test sample shall have a hardness of 4H using the pencil hardness test. Pencils, regardless of brand, are rated as follows: 8H is the hardest, and next in order of diminishing hardness are 7H, 6H, 5H, 4H, 3H, 2H, F, HB, B (soft), 2B, 3B, 4B and 5B (softest).

   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, designates the hardness.

2.06 WORKSURFACES

A. Materials: (Choose one or more and import information from the WORKSURFACES specification.)
   1. Epoxy resin tops, 1" thick
   2. Phenolic resin tops, 1" thick
   3. Plastic laminate tops, 1" thick
   4. Butcher block tops, 1-1/2" thick

2.07 SINKS, CUP SINKS AND DRAINS

A. Sinks: (Choose one or more and import information from the SINKS, CUP SINKS AND DRAINS specification.)
   1. Molded epoxy resin sinks
   2. Stainless steel sinks

B. Cup Sinks: (Choose one or more and import information from the SINKS, CUP SINKS AND DRAINS specification.)
   1. Molded epoxy resin
   2. Polyethylene

PART 3 — EXECUTION

3.00 SITE EXAMINATION

A. It is the responsibility of the owner/owner representative to ensure that the installation area is ready for installation of the finished laboratory furniture, and that critical dimensions and any special conditions have been verified and followed by the other contractors.

3.01 INSTALLATION

A. Preparation: Prior to beginning installation of casework, check and verify that no irregularities exist that would affect the quality of execution of the work specified.

B. Performance:

1. Casework:
    a. Install level, plumb and square with the aid of the leveling device at each corner of each base cabinet. Where casework abuts other finished work, install fillers and scribe for an accurate fit, ensuring there are no visible gaps. Conceal all fasteners and shims.
    b. Adjust top rails within 1/16" on a single plane. Fasten cabinets to framing, blocking or partitions within the utility space. Bolt adjacent cabinets together, ensuring joints are flush, tight and uniform.
2. Worksurfaces:
    a. Where required due to field conditions, scribe to abutting surfaces.
    b. Only factory-prepared field joints, located per approved shop drawings, shall be permitted. Secure the joints in the field, where practical, in the same manner as in the factory.
    c. Secure worksurfaces to casework and equipment components with materials and procedures recommended by the manufacturer.

C. Adjust and Clean:
1. Repair or remove and replace defective work, as directed by the owner and/or owner's representative, upon completion of installation.
2. Adjust doors, drawers and other moving or operating parts to function smoothly.
3. Clean finished casework, applying touch-up as required.
4. Clean worksurfaces and leave them free of all grease and streaks.
5. Leave the area broom clean and orderly.

D. Protection:
1. Provide protective measures to prevent casework and equipment from being exposed to other construction activity.
2. Advise the owner and/or owner's representative of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by other trades.

END OF SECTION 12 35 53.13