PART 1 GENERAL

1.00 SUMMARY

A. Section Includes:
   1. Heavy Duty Mobile Bench Structures
   2. Worksurfaces
   3. Shelving Structures
   4. Cabinets: Mobile, Suspended and Overhead
   5. Accessories fixed to Mobile Bench System

B. Related Sections:
   1. Section 11610 – Laboratory Fume Hoods are a part of this section.
   2. Section _____ - _____ : Furnishing and installation of plumbing utilities and final connections.
   3. Section _____ - _____ : Furnishing and installation of exhaust ductwork and equipment, and final connection to fume hood(s).
   4. Section _____ - _____ : Furnishing and installation of electrical utilities and final connections.

1.01 ALTERNATE PROPOSALS

Acceptable proposals from alternative manufacturers are allowed only if they meet with the minimum design bases of the proposed furniture system.

1.02 SYSTEM DESIGN REQUIREMENTS

A. Modular dimensioned, caster based structures allowing the addition of suspended base cabinets, overhead cabinets, mobile cabinets, shelving, electrical services, gas services, data services and common laboratory accessories.
   1. Overall height of fully assembled units to not exceed 77” to allow benches to be accessed through standard building doorways.
   2. Bench units must be assembled using mechanical fasteners to allow full knock down assembly and disassembly. Uprights shall not be welded to base structure.

B. Base: Heavy duty base weldment designed to mechanically support heavy duty vertical uprights and lower shelf structure
   1. Modular units shall be suitable for wall, peninsula and island configurations.
   2. Bench structures can be ganged side-to-side and front-to-back.
   3. Bench units shall be equipped with heavy duty leveling casters. Leveling casters must provide adjustment mechanism that raises the caster fully from touching the floor to prevent unintentional rolling of the bench units. Neither leveling pad or caster wheels shall mar, mark, damage or otherwise deface the building floor finishes in any way.

C. Vertical Structure (Uprights): Heavy duty aluminum extruded material.
   4. Uprights shall be mechanically fastened to base.
   5. Uprights shall be machined to have tapped holes for worksurface and shelf support structures adjustable in one inch (1”) increments.
   6. Front and rear surface of the upright shall have the ability to mechanically attach accessories.

D. Worksurface and shelf support frames: Modular, interchangeable structures supported from and mechanically fastened to the vertical uprights. Minimum design requirements:
   1. Adjustable height configurations, adjustable in one inch (1”) vertical increments.
   7. When units are placed back-to-back no will be permissible between the worksurfaces or shelving when placed in the same plane.

E. System Requirements:
   1. Benching system structural components shall independently support worksurface and shelf assemblies, under-counter and overhead cabinets and accessories and services.

2. Benching system and structural components shall be self-supporting and independent of the building structure.
3. Units main structural components shall be a mechanically fastened assembly.
4. Under counter cabinet fastening devices shall be positively locked into the worksurface frame structure.
5. Mounting devices shall use common tools for installation, adjustment and relocation.
6. Removal of under-counter cabinets shall be possible without removing the benches worksurface or additional cabinets.
7. Overhead cabinet units shall be mechanically fastened to the uprights.
8. Overhead cabinets shall be fully self-supporting up to 68” linear dimension.
9. Vertical height of adjustments of worksurfaces and shelves shall be made with simple, positive mechanical fasteners, using common hand tools.
10. Lower shelf structure and worksurface shall be removable and provide a minimum of 24.5” clear usable space below the worksurface support structure (set at 36” A.F.F.) for equipment clearance.
11. Overall benching units shall not exceed 77” in total height when fully assembles to allow access through a building’s standard doorframe (6’-8”).
12. Benching units shall be tested and certified to support a live load of 2,600 pounds minimum, not including the dead weight of the bench unit and casework, distributed over four leveling casters and maintain full mobility.
13. Benching system shall have the capability to host common laboratory services and accessories both vertically and horizontally.
14. Table and framing system shall be design to allow for full off-site assembly and be designed for a complete knock down assembly and disassembly allowing for onsite assembly, disassembly and complete re-configurations of the benching system.
15. All units and storage shall be ADA compliant.

1.03 SUBMITTALS

Include number of each type of submittal required if this information is not covered in Division 1 or elsewhere.

A. Shop Drawings: Provide 3/4"=1'-0" scale elevations of all components, cross sections, rough-in and anchor placements, tolerances and clearances. Provide 1/4"= 1'-0" rough-in plan drawings for coordination with trades. Rough-in shall show free area.

1.04 QUALITY ASSURANCE

A. Single source responsibility: Laboratory furniture system, casework, work surfaces, laboratory equipment, chemical fume hoods and accessories shall be manufactured or furnished by a single laboratory furniture manufacturer.

B. Manufacturer’s qualifications: Modern plant with proper tools, dies, fixtures and skilled workmen to produced high quality laboratory casework and equipment, and shall meet the following minimum requirements:

1. Five years or more experience in manufacture of laboratory casework and equipment of similar product type specified.

C. Installation: Only factory trained or certified installers shall be allowed to perform work.

D. Laboratory furniture systems shall not be UL Listed in a manner that restricts the re-configuration of services after initial installation. System shall be able to host components that are UL submitted, approved and listed. Products must bear the UL Mark and shall be identified to those products that were evaluated by UL and found to comply with UL’s requirements.

1.05 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of laboratory furniture system so that spaces are sufficiently complete that material can be installed immediately following delivery.

B. Protect finished surfaces from soiling or damage during handling and installation.

1.06 PROJECT CONDITIONS

A. Do not deliver or install equipment until the following conditions have been met:
   1. Windows and doors are installed and the building is secure and weather tight.
   2. Ceiling, overhead ductwork and lighting are installed.
   3. Ceiling grid installed prior to install of Ceiling Service Panels if applicable.
   4. All painting is completed and floor tile is installed.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Design, materials, construction and finish of laboratory furniture specified is the minimum acceptable standard of quality for adaptable laboratory casework. The basis of this specification is A.T. Villa USA, Inc., 1233 N. Mayfair Road, Suite 302, Milwaukee, WI 53226 1-800-554-9259.

B. Basis of design for the Heavy-Duty Mobile Laboratory Bench is the A.T. Villa USA, Inc. Ergolab Mobile Bench System.

2.02 BENCH FRAME STRUCTURE

A. General requirements for mobile benching system:
   1. Nominal table frame dimensions:
      a. Width: [36"] [48"] [60"] [72"]
      b. Depth: [30"]
   1. Benches shall be constructed of extruded aluminum. Cold rolled steel and stainless steel.
   2. Benches must be easily upgraded to meet the requirements for NMR or Non-Ferrous environments.
   3. Benches shall have the ability to be shipped fully assembled or unassembled (flat-packed).
   4. Benches must be able to maintain structural integrity with the removal of all shelf and/or work-surface structures.
   5. Benches shall have a stabilizing back panel between the uprights to prevent lateral racking of units.
   6. Worksurfaces shall be height adjustable from 20” - 42” in 1” increments.
   7. Allow for off sight assembly and transport to project facility fully assembled.
   8. Assemble with common tools and fasteners.
   9. Weight load and performance requirements:
      c. Heavy duty mobile benches shall be rated to support 2,600 pounds in addition to the weight of the benching system and the worksurface and shelf material weights.
      d. Benches shall maintain full rolling mobility when loaded to full capacity.
      e. Worksurface shall be rated top support a 1,500 pound uniform load.
      f. Shelving structures supporting phenolic resin and epoxy resin shall be rated to support a minimum 500 pound uniform load.

B. Base weldment assembly:
   10. Base Weldment:
      g. Side Leg Weldment shall be 14 gauge cold rolled steel, two part integral construction with two internal structural support ribs and 5/16” cold rolled steel caster supports.
      h. Horizontal Cross Tube: 7 gauge 2” x 4” rectangle tubing.

i. Base side leg weldments and horizontal cross tube shall be fully welded at joints. Caster support plates shall be welded to base weldment.

11. Base weldment assembly:
    a. Base weldment assembly shall receive base end caps.
    b. Base end caps shall be injection molded urethane with strong radius profile and edges, able to withstand high impact.
    c. Base end caps shall be installed at all for corners of the base (2 front and 2 rear).
    d. FootMaster GD-80F or equivalent leveling caster with 1100lb. Weight load capacity per caster.
    e. Leveling caster shall be tested and proven to withstand a continual weight full bearing weight load of 750 pounds for 48 hours minimum without any signs of flattening of the caster bearing surface. Test shall be conducted on hard surface such as concrete or equivalent.

C. Vertical structural supports (Uprights):
12. Uprights to be manufactured using extruded aluminum (6005-T) material, heat-treated (T5) or equivalent structural strength.
13. Uprights shall be drilled and tapped to every two inches (2”) minimum to allow mechanical attachment of worksurface and shelf support structures.
14. Uprights shall be engineered to be stackable for vertical modularity with ability to attach upright extensions that allows low benches (36”h) to be upgraded to full height benches (77”h).
15. Upright extensions available in nominal height of 41”.
16. Benches equipped with extensions will meet full weight load capacity requirements of 2600 pounds and must not reduce weight load capacity of overhead shelving and cabinets.
17. Benches equipped with sectioned, modular vertical members have same weight carrying capacity of one-piece full height units.
18. Upright Extensions must be easily installed with standard tool(s).
19. Uprights must provide front and rear T-slot for attachment of a variety of accessories including cable management.

D. Worksurface and shelf support structures:
1. Nominal table frame dimensions:
    a. Width: [36"] [48"] [60"] [72"] [84”] [96"]
    b. Depth: [30"] (24" nominal frame depth allowing a minimum 4” rear overhang of worksurface to provide a rear service chase area for wall mounted services)
    c. Adjustable Height: [29" to 36"] A.F.F. including .75" thick top.
2. Leg structure support: 2.5” square tubing, 12 gauge hot rolled steel with 2.25” inner telescoping 12 gauge leg. Telescoping tubing shall be corner welded by high-frequency resistant welding and externally scarfed to agree with corner radii. Levelers are 3/8” – 16 NC x 2” long.
3. Leg and side aprons to be fully welded and not require side gussets for stability.
4. Front, back and side aprons: 3” x 1” cold rolled electric welded 14 gauge steel tubing. All welds seams of tubing to be oriented to the internal portion of the framing.
5. Rear work surface support:
    a. Steel weldment of 14 gauge HRPO steel with height adjustability.
    b. Minimum 8” high.
    c. Shall be mechanically fastened between opposing rear legs to prevent frame racking.
6. Table frame structure shall allow the option to add cabinet stop feature for mobile cabinets.
7. Table frame structure shall provide the ability to mechanically suspend base cabinets from the table frame.
8. Table frames shall be able to support sinks, sink fixtures and sink cabinets.

2.04 PLUMBING FIXTURES

A. General requirements:
   1. The upright frame structure shall house a maximum of three plumbing services per side.
   2. Plumbing lines (non-flammable gases) – 1/2” OD PVC flexible hose connected to valve fitting at worksurface with quick disconnect attached to the hose with compression fittings at location connecting ceiling service panel or other gas piping location. No mechanical breaks shall occur in the hose line from the valve fitting to the quick connect fitting at the ceiling. Each half of the quick disconnect (coupler and nipple) are equipped with a valve fitting.
   3. Plumbing lines (flammable gases) – 3/8” OD #304 stainless steel braided flexible hose connected to valve fitting at worksurface with quick disconnect attached to the hose with compression fittings at location connecting ceiling service panel or other gas piping location. No mechanical breaks shall occur in the hose line from the valve fitting to the quick connect fitting at the ceiling. Each half of the quick disconnect (coupler and nipple) are equipped with a valve fitting. All fitting shall be stainless steel.
   4. Plumbing lines with the quick disconnects are to be arranged so services cannot be intermixed.
   5. All service valves and quick connects shall be media keyed and color-coded. Keyed media connects cannot be accidentally switched.
   6. All burning gases hoses shall be specified as #304 stainless steel.

2.05 SERVICE CONNECTIONS

A. General requirements:
   1. All services (plumbing, power, phone and data) make a direct and uninterrupted connection at the ceiling manifold system.
   2. All services (plumbing, power, phone and data) shall be installed in a modular manner allowing the system to be altered at anytime after installation.
   3. All services (plumbing, power, phone and data) must be UL Listed components keeping the frame structure non UL Listed.
   4. Power services will have a 20 amp cord plug extending to the ceiling manifold system. Plug end to be twist lock on single frame and double sided (shared) frame.
   5. Phone CAT6 line will have a male plug-in extending to the ceiling interface panels. (Connections to the facility to be provided by others.)

      Data CAT6 line will have a male plug-in extending to the ceiling interface panels. (Connections to the facility to be provided by others.)

2.06 CEILING INTERFACE PANELS

A. General requirements
   1. Ceiling Interface Panel (CIP) (*often referred to as ceiling service panels*) shall integrate within most standard-duty T-grid acoustical suspended ceiling systems.
   2. CIP shall provide a means to mount and connect electrical outlets, data outlets and quick connect service fixtures.
   3. CIP shall accommodate single sided and back-to-back bench configurations.
   4. CIP will ship with junction boxes factory attached. Electrical outlets, data outlets, cover plates and service fixtures shall be ordered separately and field installed.
   5. CIP shall be a minimum of 18 gauge cold rolled steel with a urethane powder coat finish.
      a. Nominal Dimensions:
      b. Widths: 24" x 24" (12” x 24” optional)
      c. Height (including junction boxes): 3"
   6. CIP system shall be equipped with quick disconnect fitting for service hose connections. Each keyed disconnect shall include nipple and coupler with color-keyed band marking media.
   7. Service lines: polyurethane and/or for non-burning gases and braided stainless steel for burning gases will attach to quick-connects.
   8. ACT grid installer shall provide additional wire support at all four corner locations of the CIP in the grid.

2.07 SHELVES

A. General requirements for shelves:
   1. All shelf supports shall be powder coated cold rolled steel.
   2. Shelf platforms shall be available in steel, phenolic resin or plastic laminate with 3mm wood edge banding.
   3. Shelves shall overhang 1" behind the face of the vertical tubular support.
   4. Shelf brackets: 14 cold rolled powder coated steel.
   5. Vertical shelf adjustment: one-inch increments.
   6. Load capacity: 200 pound uniform load per shelf

B. Outside Shelf:
   1. Nominal dimensions:
      a. Widths: [34] [46] [58] [70] (for full width shelves)
      b. Widths: [25"] [31"] [41"] [47"] (for split shelves on frames 60” – 96”)
      d. Depth: [12"] [15"]
   2. Shelf brackets shall rise above the shelf surface to provide sides.

C. Shelf Types (Specifier Option):
   1. Steel shelf – powder coated:
      a. Steel shelf surfaces shall be 18 gauge cold rolled steel
      b. Shelves shall have front and rear support channels spot welded to underside of shelf assembly.
      c. Front support channel shall be 14 gauge cold rolled steel minimum.
      d. Rear support channel shall be 18 gauge cold rolled steel minimum.
      e. Shelves shall have integrated rear retaining lip
   2. Phenolic resin shelf:
      a. Phenolic resin shelves shall be chemical resistant material fully tested for laboratory use (Trespa TopLab Plus® or equal)
      b. Phenolic resin shelves to be 3/4" thick.
      c. Phenolic resin shelves shall have rear steel support (cold rolled and powder coated) that can act as rear retaining lip.
   3. Wood shelf:
      a. Wood laminated shelf to be 1" thick with 3mm hardwood banding on front and sides.
      b. Wood laminated shelving shall have .75 thick x 2” tall back retaining lip of solid wood.

D. Shelf Retainer Options (Specifier’s Option):
   1. Powder coated steel shelf options:
      a. Retaining components shall be #303 stainless steel.
      b. .25” diameter rods as standard with .375” available option.
      c. Mounts with center turret system.
      d. Ends bend 90 degrees into shelf platform on steel shelves.
      e. Rear retaining lip shall be integral in the shelf design.
   2. Wood and phenolic resin shelf options:
      a. Retaining components shall be #303 stainless steel.
      b. .25” diameter rods as standard with .375” available option.
      c. Mounts with center and end turret system.
      d. Rear retaining lip shall be integral in the shelf design of solid hardwood.

2.08 WORK SURFACES AND SPLASH GUARDS

A. General requirements for worksurfaces:
   1. All work surface table frames supports and backsplash support hardware shall be powder coated cold rolled steel.
   2. Shall be supported on all front, rear and sides by table assemblies.
   3. Load capacity: Load ratings are dependent on the tables frame system (2.02).

B. Work surfaces:
   1. Nominal dimensions:
      a. Widths: [36"] [48"] [60"] [72"] [84] [96"]
      b. Depth: [30"]
      c. Thickness: .75” standard

C. Work surface Types - Material Options (Specifier Option):
   1. Phenolic resin – .75" thick (1” thick option) Trespa TopLab Plus® or equal.
   2. Epoxy resin – .75" thick (1” thick option).
   3. Laminate – 1.25” thick
   4. Stainless Steel - .75” thick

D. Side and Back Splashes:
   1. Nominal dimensions:
      a. Heights: 4”

E. Side and Back Splashes Types - Material Options (Specifier Option):
   1. Phenolic resin – .75" thick
   2. Epoxy resin – .75" thick
   3. Laminate - .75” thick
   4. Stainless Steel – Integral - .75” thick

2.09 BASE CABINETS

A. Design requirements, performance requirements, materials, fabrication and hardware are based on modular steel laminate and wood casework specifications as manufactured and cataloged. The basis of this product specification is A.T. Villa USA, Inc., 1233 N. Mayfair Road, Suite 302, Milwaukee, WI 53226.

B. Base cabinets construction materials (Specifier Option).
   1. Steel base cabinets with steel door and drawer faces.
   2. Steel base cabinets with wood door and drawer faces.
   3. Laminate with laminate doors and drawers

C. Base cabinets shall be offered as mobile (with casters) and suspended (hung from table frames).

D. Cabinets with casters shall be constructed without toe spaces. The cabinet shall be constructed with a reinforced base capable of supporting a 4" high caster assembly in each corner. Casters shall be swivel locking type in front and non-locking in the rear of cabinet. Casters shall have a combined load rating of 660 pounds minimum. Cabinets with casters shall be completely finished on four sides and top since surfaces are considered visible.

E. The entire cabinet assembly shall be reinforced to permit mobility without twisting and achieve a height of 30" including the flush 1" counter top.

F. Suspended base cabinets shall be constructed with reinforcements at the top of cabinet to allow cabinets to be suspended from table frames without cabinet top deflection.

G. Suspended base cabinets shall be designed to allow them to be suspended at any location between the legs of the tables.

H. Base cabinets shall, except as noted, incorporate a flush overlay design in which the cabinet body is completely concealed.

I. Mobile base cabinets with multiple drawers shall be equipped with an anti-tipping device to allow only one drawer to open at a time.

J. Steel cabinets shall be constructed as follows:
   1. Nominal dimensions:
      a. Mobile base cabinets shall be nominally 29" high with casters
      b. Suspended base cabinets shall be nominally 25” high.
      c. Widths: [18”] [24”] [30”] [36”] (mobile and suspended)

   d. Depths: 22” (mobile and suspended)
2. Cabinet carcass wall thickness shall be .75” in appearance from the front face of the cabinets.
3. Cabinet exterior walls shall be 20 gauge cold rolled steel.
4. Cabinet sides shall have two interior hat channels per side of 18 gauge cold rolled steel, spot welded to shell panel.
5. Cabinet tops shall have two interior hat channels per side of 18 gauge cold rolled steel, spot welded to shell panel with structure integrity to allow cabinets to be suspended from the laboratory table frame system.
6. Cabinet bottoms shall have two exterior hat channels per side of 18 gauge cold rolled steel, spot welded to shell panel.
7. Shelving height adjustment at 1.25” increments.
8. Doors and drawers shall have closing bumpers applied to them at installation.
9. Hinges:
   a. Shall be institutional grade three knuckle hinges with an opening angle of 270°.
   b. Shall be height and depth adjustable to allow for field adjustment.
   c. Shall have a self-closing mechanism built into them.
   d. Shall have a quick release device to easily remove and replace door.
10. Slides:
   a. Shall be full extension ball bearing slides.
   b. Shall have a 100 pound load rating.
   c. Shall be compatible with an anti-tipping device.

K. Laminate cabinets shall be constructed as follows:
1. Nominal dimensions:
   a. Mobile base cabinets shall be nominally 29" high with casters.
   b. Suspended base cabinets shall be nominally 25” high.
   c. Widths: [18”] [24”] [30”] [36”] (mobile and suspended).
   d. Depths: 22” (mobile and suspended).
2. Cabinet carcass top, sides, bottoms, drawer and door panels shall be .75” thick.
3. Cabinet carcass panels shall have all edges banded with .5mm PVC edge banding.
4. Cabinet doors and drawers shall have all edges banded with 3mm PVC edge banding with a .125” radius on all edges.
5. Suspended laminate cabinets shall be equipped with steel internal bracing to secure cabinets to system table frames.
6. Shelving height adjustment at 1.25” increments.
7. Doors and drawers shall have closing bumpers applied to them at installation.
8. Hinges:
   a. Shall be institutional grade three knuckle hinges with an opening angle of 270°.
   b. Shall be height and depth adjustable to allow for field adjustment.
   c. Shall have a self-closing mechanism built into them.
   d. Shall have a quick release device to easily remove and replace door.
9. Slides:
   a. Shall be 3/4 extension roller slides.
   b. Shall have a 50 pound load rating.
   c. Shall be compatible with an anti-tipping device.

2.10 OVERHEAD CABINETS

A. Design requirements, performance requirements, materials, fabrication and hardware are based on modular steel laminate and wood casework specifications as manufactured and cataloged. The basis of this product specification is A.T. Villa USA, Inc., 1233 N. Mayfair Road, Suite 302, Milwaukee, WI 53226 1-800-554-9259.

B. Overhead cabinets construction materials (Specifier Option).
1. Steel or laminate overhead cabinets with sliding glass doors.

a. Cabinets shall have an aluminum extruded dual channel track installed on the top and bottom of the cabinet for the glass panels. Extruded channel shall be finished in a clear matt anodized color.
b. Glass shall be .25” thick, tempered and have a polished edge.
c. Finger pulls shall be provided in matching aluminum to the track system

2. Overhead cabinets secure to uprights of the furniture system.

C. Steel overhead cabinets shall be constructed as follows:

1. Nominal dimensions:
   a. Overhead cabinets shall be nominally 24" high.
   b. Widths: [36”] [48”] [60”] [72”]
   c. Depths: 14”
2. Cabinet carcass wall thickness shall be .75” in appearance from the front face of the cabinets.
3. Cabinet exterior walls shall be 20 gauge cold rolled steel.
4. Cabinet sides shall have two interior hat channels per side of 18 gauge cold rolled steel, spot welded to shell panel.
5. Cabinet tops shall have two interior hat channels per side of 18 gauge cold rolled steel, spot welded to shell panel with structure integrity to allow cabinets to be suspended from the laboratory table frame system.
6. Cabinet bottoms shall have two internal hat channels (front and rear) of 18 gauge cold rolled steel, spot welded to shell panel.
7. Bottom of cabinets must have a flat panel visible surface.
8. Shelving height adjustment at 1.25” increments.
9. All sides of steel overhead cabinets shall be considered finish side and be painted accordingly.

D. Laminate cabinets shall be constructed as follows:

1. Nominal dimensions:
   a. Overhead cabinets shall be nominally 24" high.
   b. Widths: [36”] [48”] [60”] [72”]
   c. Depths: 14”
2. Cabinet carcass top, sides, bottoms, drawer and door panels shall be .75” thick.
3. Cabinet carcass panels shall have all edges banded with .5mm PVC edge banding.
4. Cabinet doors and drawers shall have all edges banded with 3mm PVC edge banding with a .125” radius on all edges.
5. Suspended laminate cabinets shall be equipped with steel internal bracing to secure cabinets to system table frames.
6. Shelving height adjustment at 1.25” increments.

2.11 FINISHES

A. Metal finish:

1. Preparation: Spray clean metal with a heated cleaner/phosphate solution, pre-treat with iron phosphate spray, water rinse, and neutral final seal. Immediately dry in heated ovens, gradually cooled, prior to application of finish.
2. Application: Electrostatically apply urethane powder coat of selected color and bake in controlled high temperature oven to assure a smooth, hard satin finish. Surfaces shall have a chemical resistant, high grade laboratory furniture quality finish of the following thickness: Liquid, dipped, solvent based finishes are not and will not be acceptable.
    a. Exterior and interior exposed surfaces:
    b. 1.5 mil average and 1.2 mil min.
    c. Backs of cabinets and other surfaces not exposed to view: 1.2 mil average.

B. Cabinet Surface Finish Tests: All casework construction and performance characteristics shall be in full compliance with SEFA 8 standards. At the owner's request, independent, third party performance testing must be submitted validating compliance and adheres to the finish specifications.

1. Chemical Spot Test

1.1 Purpose of 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.

1.2 Test Procedure

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.
Place panel on a flat surface, clean with soap and water and blot dry. Condition the panel for 48-hours at 73+3F (23+2C) and 50+5% relative humidity. Test the panel for chemical resistance using forty-nine different chemical reagents by one of the following methods:

Method A -Test volatile chemicals by placing a cotton ball saturated with reagent in the mouth of a one-ounce (29.574cc) bottle and inverting the bottle on the surface of the panel.
Method B -Test 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.
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 naphtha, and rinse with deionized water. Dry with a towel and evaluate after 24-hours at 73 _+ F (23 _+ C) and 50 _+ 5% relative 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
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.	Dimethylformanide	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.	Hydrochloric 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 Hydroxide, 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

1.3 Acceptance Level

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.

2. Hot Water Test

2.1 Purpose of Test

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

2.2 Test Procedure

Hot water, 190oF to 205oF (88oC to 96oC), 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 surface, which shall be set at an angle of 45-degrees, for a period of five minutes.

2.3 Acceptance Level

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

3. Impact Test

3.1 Purpose of Test

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

3.2 Test Procedure

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

3.3 Acceptance Level

There shall be no visible evidence to the naked eye of cracks or checks in the finish due to impact.

4. Paint Adhesion on Steel Test

4.1 Purpose of Test

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

4.2 Test Procedure

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.

4.3 Acceptance Level

Ninety or more of the squares shall show finish intact.

5. Paint Hardness on Steel Test

5.1 Purpose of Test

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

5.2 Test Procedure

Pencils, regardless of their brand, are valued in this way: 8-H is the hardest, and next 11 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). 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.

5.3 Acceptance Level

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

2.12 BULLETIN BOARDS

1. General requirements - Bulletin boards are a dyed linoleum material (Forbo bulletin board® or equivalent), framed in powder coated steel frame, color to match structure frame system. Bulletin boards shall be both acoustical and tackable. Refer to drawing details. Bulletin board frame must mount to system frame in an integral manner and shall not mount to the face of the uprights.
2. Nominal dimensions:
   a. Widths: [42"] [48"] [60"] [72"] [96"]
   b. Heights: [24"] [16"]

2.13 MODESTY PANELS

1. General requirements - Steel (powder coated to match frame system) shall mount directly to rear frame. Modesty panel shall be mechanically fastened.
2. Nominal dimensions:
   a. Widths: [36"] [48"] [60"] [72"] [84”] [96"]
   b. Heights: [23"] mounts directly below the worksurface, between the uprights.

2.14 TASK LIGHTS

1. General requirements - Task light shall be a T8HQ type (T5 Specifier Option). Task lights shall be gangable with an integral on/off switch. Switch will turn on/off all lights ganged to it.
2. Task light minimum performance levels shall be as follows: with 40 foot candle room lighting at the work surfaces, the task light shall increase the work surface illumination to 80/100 foot candles.
3. Nominal dimensions:
   a. Widths: [24"] [36"] [48"] [60”] (smaller dimensions may be required for split shelves)

PART 3 EXECUTION

3.01 INSTALLATION

A. Furniture system installation:
   1. Install system in strict accordance with manufacturer’s instructions.
   2. Set system components level on two planes with no distortion. Securely anchored to building structure using concealed shims where necessary in wall mount.

B. Install applications casework, work surfaces and accessory items per Section 12345.

3.02 ADJUSTING

A. Repair or remove and replace defective work, as directed by [Architect] [Owner] upon completion of installation.

3.03 CLEANING

A. Clean shop finished laboratory furniture system surfaces and touch up as required.

3.04 PROTECTION OF FINISHED WORK

A. Provide all necessary protective measures to prevent exposure of laboratory furniture system and attached components from exposure to other construction activity.

B. Advise contractor of procedures and precautions for protection of the installed laboratory furniture system and related components from damage by work of other trades.

ENVIRONMENTAL COMPLIANCE

1. Recycled Steel Content for Laboratory Casework
All steel used in the product fabrication shall comply with the LEED (Leadership in Energy and Environmental Design) Green Building Rating System. The manufacturer must submit documentation (i.e. "Source of Materials", Invoices, Third Party Validation, etc.) for steel purchased for this project providing recycled content. Such documentation shall be submitted to the Owner Representative/Architect for approval prior to award of contract.

A. Sheet Steel: All cold rolled sheet steel used in the fabrication of laboratory cabinets, fumehoods and modular laboratory systems shall have a minimal of 20% recycled steel content.
B. Recycled Steel Content: Of this 20% recycled content, 60% shall be purchased scrap (i.e. old cars, appliances) with the remaining 40% from generated in-house scrap and manufacturing fall-off.
C. Fabricators Scrap: Fabricators shall provide documentation that manufacturing fall-off is recycled to respective steel mills and does not enter the solid waste system and/or become a product of land fill space.

2. Finish for Steel Laboratory Products
All Steel Laboratory Products shall utilize a dry powdercoat paint process by means of electrostatically spray, providing high-transfer efficiency low waste generation. Any liquid-applied coatings shall not be acceptable. Manufacturer shall supply documentation that waste generated during the painting process, is a solid, non-hazardous material.

A. Pretreatment: Finish process shall incorporate a phosphate conversion coating during the pretreatment/ cleaning operation. Electrostatic application of dry powder shall follow. Coated parts shall pass through curing ovens, which shall cause the powder to melt, flow, gel, cure and bond onto the phosphatized steel substrate.
B. Chemically Resistance Finish: Only highly chemically resistant, dry powdercoated finishes will be acceptable.
C. Operator Protection: The application is convenient and easily mastered through robotic application plus manual detailing. The painting process is cleanly contained and has no solvent odor and is performed in an air-conditioned room.
D. Overspray Powder Paint: Shall be captured and resprayed. Efficiency shall be 99% effective in coating usage, reducing waste generation. A closed collection system shall be utilized for overspray that is not reused. Powder overspray, which can not escape the facility, is collected in bulk, eliminating the need for daily replacement/disposal of filter media.
E. VOC Emissions: Powder paint shall be sprayed and baked with a near zero (.29 lbs per gallon maximum) VOC (Volatile Organic Compounds) emissions.
F. Offgasing: After all steel powdercoated parts have cooled from the curing ovens, the coating shall be firm and stable. No further emissions or offgasing/ decomposition vapors shall occur at room temperature.