SECTION 12 35 53 – LABORATORY CASEWORK

PART 1 - GENERAL

1.00 SUMMARY

A. Section Includes:
   1. Fixed Inset Steel Casework
   2. Work-Surfaces
   3. Sinks
   4. Plumbing Fixtures
   5. Accessory Equipment

1.01 FIXED INSET STEEL CASEWORK DESIGN REQUIREMENTS

A. Flush face design: Doors, drawers and panels are inset into the cabinet carcass and flush with the face plane of the carcass. Front edge of carcass must have a smooth face edge with no side, top bottom or rail elements overlapping.

B. Front edge styling: Front width of end panels 3/4" and front height of top and bottom members 1".

C. Self-supporting units: Completely welded shell assembly so that cases can be used interchangeably or as a single, stand-alone unit. Acceptable to have remove-able back panels to access plumbing. Removable bottom trays are acceptable.

D. Interior of case units: Easily cleanable, flush interior. Base cabinets, 30" and wider, with double swinging doors shall provide full access to complete interior without center vertical post.

E. Drawers: Designed to be easily removable in field without the use of special tools.

F. Drawers and Doors: Drawer and door pulls must be extruded aluminum material with steel metal closed end or PVC end caps. Molded integral plastic pulls are unacceptable.

G. Case openings: Rabbeted joints all four sides of case opening for hinged doors and two sides for sliding doors in order to provide dust resistant case.

H. Framed glazed doors: Identical in construction, hardware and installation to solid

panel doors. Design frame glazed doors to be removable for glass replacement.

I. Finishes: Epoxy Powder Coat, RAL 9002 unless specified as other per project.

1.02 CASEWORK PERFORMANCE REQUIREMENTS

A. Structural performance requirements: Casework components shall withstand the following minimum loads without damage or permanent deformation to the component or to the casework operation:
   1. Steel base unit load capacity: 500 lbs. per lineal foot.
   2. Suspended units: 300 lbs.
   3. Drawers in a cabinet: 100 lbs.
   4. Hanging wall cases: 300 lbs.
   5. Load capacity for shelves of base units, wall cases and tall cases: 40 lbs. per square foot, up to 200 lbs.

B. Metal Finish Performance Requirements:
   1. Abrasion resistance: Tabor abrasion tester CS 10 wheel 14 mg. weight loss per 100 cycles.
   2. Hardness: Surface hardness equivalent to 4H pencil.
   3. Humidity resistance: Withstand 288 hour exposure in saturated humidity with no loss of adhesion or blistering. (ASTM D2247)
   4. Moisture resistance:
      a. No visible effect to surface finish after boiling water trickled over test panel inclined at 45°F for five minutes.
      b. No visible effect to surface finish following 100 hour continuous application of a water soaked cellulose sponge, maintained in a wet condition throughout the test period.
   5. Adhesion: Score finish surface of test panel with razor blade into 100 squares, 1/16" x 1/16", cutting completely through the finish but with minimum penetration of the substrate, and brush away particles with soft brush. Minimum 90 squares shall maintain their finish.
   6. Salt spray: Withstand minimum 144 hour salt spray test. (ASTM B117-64)

C. Chemical Resistance Finish Performance Requirements:

1.03 WORK SURFACE PERFORMANCE REQUIREMENTS

C. Material: Phenolic Resin Panels; 25mm (1") thickness. Must have the perform to the following characteristics:
   1. Self supporting from 1" in thickness and have a high load bearing ability.
   2. Impervious to most materials used in biochemical and medical laboratories: radio-isotopes, human tissue and blood samples or bacteria.
   3. Impermeable to most bacteria, molds or microorganisms.
   4. Resistant to dyes and organic solvents, water-resistant and remain easy to clean or disinfect.
   5. Must be GREENGUARD Indoor Air Quality Certified® and achieve GREENGUARD Children & Schools^{SM} Certification.

1.04 QUALITY ASSURANCE

A. Single source responsibility: Casework, work surfaces, equipment and accessories shall be manufactured or furnished by a single laboratory furniture company.

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

C. Manufacturer's qualifications: Modern plant with proper tools, dies, fixtures and skilled workmen to produce high quality laboratory casework and equipment, and shall meet the following minimum requirements:
   1. Ten years or more experience in manufacture of laboratory casework and equipment of type specified.
   2. Five installations of equal or larger size and requirements.
   3. Case work fabrication, production and assembly must be within the United States of America.

D. Installer's qualifications: Factory trained and/or certified by the manufacturer.

E. Cabinet identification: Cabinets are identified on drawings by manufacturer's catalog numbers. Unless otherwise modified on drawings or in specifications, catalog description constitutes specific requirements for each type of cabinet.

1.05 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 individual and battery of casework units, cross sections, rough-in and anchor placements, tolerances and clearances. Indicate relation of units to surrounding walls, windows, doors and other building components. Provide 1/4" = 1'-0" rough-in plan drawings for coordination with trades. Rough-in shall show free area.

B. Product Data: Submit manufacturer's data for each component and item of laboratory equipment specified. Include component dimensions, configurations, construction details, joint details, and attachments, utility and service requirements and locations.

C. Product Samples Upon Request: Submit for approval:
   1. Top sample.
   2. Finish sample (3" X 5" painted steel).

D. Finish Samples: Submit [3 x 5] [__x__] inch samples of each color of finish for casework, work surfaces and for other prefinished equipment and accessories for selection by [Architect] [Owner].

E. Test Reports: When requested by [Architect] [Owner], submit independent, third party, laboratory certified test reports verifying conformance to test performance specified.

1.06 REFERENCE STANDARDS

1. All casework, worksurface and service fixture construction and performance characteristics shall be in full compliance with SEFA (Scientific Equipment and Furniture Association) standards. At the owner's request, independent, third party testing must be submitted validating compliance and adheres to the architectural specifications.
    1. SEFA 1.2 – Laboratory Fume Hoods
    2. SEFA 2.3 – Installation of Scientific Laboratory Furniture and Equipment
    3. SEFA 3 – Work Surfaces
    4. SEFA 7 – Laboratory and Hospital Fixtures
    5. SEFA 8 – Laboratory Furniture

1.07 DELIVERY, STORAGE AND HANDLING

A. Schedule delivery of casework and equipment so that spaces are sufficiently complete and material can be installed immediately following delivery.

B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

C. Protect all work surfaces throughout construction period with 1/4" corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing."

1.08 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. All painting is completed and floor tile is installed.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Design, materials, construction and finish of casework specified are the minimum acceptable standard of quality for inset steel laboratory casework. The basis of this product specification is A.T. Villa USA Inc, 1233 Mayfair Rd. Ste. 302 Milwaukee, WI 53226

2.02 CASEWORK MATERIALS

B. All materials shall be of the highest quality, whether they be finished parts used in assembly, raw material, or materials and workmanship furnished by others, as part of the completed product.

C. All steel used in the manufacture of metal casework shall be cold rolled, prime grade, or better. Steel shall be inspected prior to fabrication and certified to be free of rust, pits, scratches, or any other defects(s) which prevent parts from being made to blueprint specifications.

D. Gauges:
   1. Gauge specifications for individual steel parts shall be as follows:
      a. Aprons - 18 Ga.
      b. Back Panels - 20 Ga.
      c. Bottom Panels - 18 Ga.
      d. Door & Drawer Outer Pan - 20 Ga.
      e. Door & Drawer Inner Pan - 20 Ga.

f. Drawer Bodies - 20 Ga.
g. Legs, 2" Square Tube - 18 Ga.
h. Shelves - 18 Ga.
i. Side Panels - 18 Ga.
j. Table Frames - 18 Ga.
k. Shelf Support Brackets - 14 Ga.

2.03 CASEWORK FABRICATION

A. Cabinets:
1. Cabinets shall be constructed of prime 18 gauge steel for the sides, backs, and toe space.
2. 1" X 18 gauge steel tubing shall be used for the top front and back rails.
3. Each front joint is to be welded and ground flush to provide a smooth surface.
4. A 4' high X 3' deep toe space shall be standard.
5. Four corners are to be fitted with a stamped and welded 14 gauge leveling gusset plate, and a plated leveling screw.
6. Leveling screws are provided with a slot for easy adjustment, and non marking nylon glides.
7. Removable back panels shall be furnished on all cabinets.
8. Cabinet bottom will be panned up to contain spills and removable for easy cleaning and maintenance.

B. Doors - Base Cabinet Doors:
1. Doors shall be double pan construction, with insulating material fastened to the inside for sound deadening, and strength, to prevent panning and bending.
2. Hinges are five knuckle gauge stainless steel, fastened to both the door and cabinet frame with zinc plated steel screws.
3. Door catches plated, friction roller type.
4. Door closes onto nylon bumpers for noise dampening, and over nylon spacers for alignment.
5. Pulls are to be recessed, aluminum extruded profiles with clear matt finish.

C. Drawers:
   1. Drawer bodies shall be one piece 20 gauge construction, fully coved on all four sides horizontally and formed out of one sheet of steel.
   2. Pulls are to be recessed, aluminum extruded profiles with clear matt finish.

D. Drawer Suspension:
   1. Drawers shall operate on full extension, ball bearing, zinc plated, drawer suspension rated to withstand 10,000 cycles at 100 lbs.

E. Shelves:
   1. Shelves shall be constructed of 18 gauge steel, with channels formed on both the front and back edges. K & V shelf clips are made from 14 gauge steel, and are to be adjustable vertically in 1" increments. Sliding shelves shall use the same ball bearing slides as drawer units.

F. Fabricated Accessories
   1. All accessories required for specific installations shall be fabricated and finished to the same material and quality standards as the base units they will be made to compliment.

G. Wall Cabinets:
   1. Wall cabinets shall be made to the same quality standards as base units. Material used, as noted above. Shelve hangers are to be constructed of 14 gauge steel, and to easily adjust vertically in one inch increments.

   2. Shelves are to be constructed with channel type fronts and backs, as well as flanged ends with nylon button glides. Wall units to have open fronts, sliding glass, framed glass sliding and swinging, or sliding and swinging steel doors as specified. Glass is plate, ground on all exposed edges.

   3. Sliding door units to be furnished with extruded top and bottom channels as well as ball bearing rollers. All wall units are to be furnished with hanger brackets for ease of installation.

H. Floor Units:
   1. Floor units shall be made to the same quality standards as base units. Material used, as noted above.

   2. Shelves and shelf hanger construction, same as wall units.

3. Floor unites to be furnished with the same front and door configurations as the above described wall units.

2.05 METAL FINISH

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: 1.5 mil average and 1.2 mil min.
      b. 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
      a. 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.
      b. 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±3°F / 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:

- 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±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 #	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

c. 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
   a. Purpose of Test
   The purpose of this test is to insure the coating is resistant to hot water.
   b. Test Procedure
   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 (177.44 cc) per minute on the surface, which shall be set at an angle of 45° for a period of five minutes.
   c. Acceptance Level
   After cooling and wiping dry, the finish shall show no visible effect from the hot water.

3. Impact Test
   a. Purpose of Test
   The purpose of this test is to evaluate the ductility of the coating.
   b. 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.
   c. 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
   a. 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.
   b. 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.

c. Acceptance Level
Ninety or more of the squares shall show finish intact.

5. Paint Hardness on Steel Test
   a. Purpose of Test
   The paint hardness test is used to determine the resistance of the coatings to scratches.
   b. 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.
   c. Acceptance Level
   The paint shall have a hardness of 4-H minimum with no visible puncture of the finish surface.

2.06 WORK SURFACES

A. Manufacturers :
   1. Acceptable Manufacturer: Trespa North America, Ltd., 12267 Crosthwaite Cir. Poway, CA 92064
   2. Substitutions: Not permitted.

B. Work Surface Series:
   1. TRESPA TOPLAB PLUS Solid Phenolic Laboratory Tops
      a. Material: Solid phenolic panel.
      b. Modulus of Elasticity: 1,305,000 psi (9,000 N/sqmm) minimum.
      c. Tensile Strength: 10,150 psi (70 N/sqmm) minimum.
      d. Flexural Strength: 14,500 psi (100 N/sqmm) minimum.
      e. Porosity: Nonporous surface and edges.
      f. Microbial Characteristics: Will not support microorganic growth.
      g. Chemical Resistance: Provide solid phenolic panel providing minimum performance when tested for chemical resistance in accordance with SEFA 8 (Laboratory Casework).

C. Dimensions:
   1. Panel Thickness: 1 inch (25 mm).

D. Finish:
   1. Color: White T03.0.0.

E. Accessories
   1. Laboratory Shelving: Provide solid phenolic laboratory shelving where indicated on the Contract Drawings.
   2. Installation Materials: Provide solid phenolic laboratory top manufacturer's joint adhesive, panel adhesive and sealants as required to suit project conditions.

F. Fabrication
   1. Fabricate solid phenolic laboratory tops and accessory items in accordance with manufacturer's recommendations, approved submittals and SEFA 8 - (Laboratory Casework)
      a. Comply with requirements of AWI Custom grade.
      b. Comply with requirements of AWI Premium grade.

G. Edge Treatment:
   1. Type: Standard edge (chamfer) or radius 1/16 inch (2mm).
   2. Ease all top edges and vertical corners to 1/4 inch (6 mm) radius and sand smooth.

H. Joints
   1. Type: As indicated on the Contract Drawings.
   2. It is recommended that the joint between two benches should be level. As a rule joints should be located away from sink areas and over or near supports.

I. Sink cut outs
   1. Type: As indicated on the Contract Drawings.
   2. Type: Routed for drop in sink
   3. It is recommended that an adequate gap should be provided between sink lid and sink hole.

J. Examination
   1. Do not begin installation until substrates have been properly prepared.
   2. Confirm surfaces are plumb and level, with no deflection greater than 1/4 inch (6mm) in 20 feet (6096mm).

3. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

K. Preparation
   1. Clean surfaces thoroughly prior to installation.
   2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

L. Installation
   1. Install in accordance with manufacturer's instructions.
   2. Laboratory Top Installation: Install laboratory tops plumb and level. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.
      a. Fasten laboratory tops to supporting casework with fasteners and adhesive appropriate for use with adjoining construction as indicated on drawings and as recommended by manufacturer.
      b. Form field joints using manufacturer's recommended adhesive. Form inconspicuous and nonporous joints. Seal flexible joints using manufacturer's recommended adhesive.

M. Accessory Items: Install laboratory shelving, and racks with fasteners and adhesive appropriate for use with adjoining construction as indicated on Contract Drawings and as recommended by manufacturer.

N. Field Quality Requirements
   1. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

O. Protection
   1. Protect installed products until completion of project. Remove all protective foil and labels immediately after installation.
   2. Touch-up, repair or replace damaged products before Substantial Completion.

2.07 SINKS, DRAINS AND TRAPS

Data needed to complete: Manufacturer: Just Manufacturing

2.08 LABORATORY FITTINGS

Data needed to complete: Manufacturer: WaterSaver Faucet Co.

Finish: Polished chrome on brass body unless specified otherwise.
Equip valve handles with color coded plastic index buttons as follows:

Service	Indexing	Button Color	Lettering Color
Cold Water	CW	Green	White
Hot Water	HW	Red	White
Air	AIR	Blue	White
Gas	GAS	Orange	White
Vacuum	VAC	Yellow	White
Distilled Water	DW	White	Black
Steam	Steam	Black	White
Oxygen	OXY	Lt. Green	White
Nitrogen	N2	Gray or Brown	Black or White

2.09 ACCESSORY EQUIPMENT

specification for selected accessory equipment from Appendix D.