SECTION 12345
METAL LABORATORY CASEWORK

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard metal casework components of base cabinets, wall cabinets, storage cabinets, cabinet understructures for fume hoods, shelf units, and other units.
2. Tops, sinks, accessories and mechanical and electrical service fixtures common to laboratory casework are included as work of this section.
3. Service fixtures are supplied as part of this work. Installation of service fixtures is included under Division 15 and 16 sections.

B. Related Sections:

1. Section 06100 – Rough Carpentry: Blocking
2. Section 06200 – Finish Carpentry
4. Section 11610 – Laboratory Fume Hoods
5. Division 15 – Mechanical: Service fittings, fixtures and connections.

1.2 SUBMITTALS:

A. Product Data:

1. Submit manufacturer's data and installation instructions for each type of metal casework unit.
   a. Include independent laboratory certification that applied finish complies with specified chemical and physical resistance requirements.

2. LEED MRc4: Recycled Content
   Provide a statement from the manufacturer stating recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial.

B. Shop Drawings:

1. Submit shop drawings for metal casework showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fixtures with lines thereto. Show details and location of anchorages and fitting to floors, walls, and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
2. Coordinate shop drawings with tops, fixtures and other work involved.

1.3 QUALITY ASSURANCE:

A. Manufacturer Qualifications:

1. Provide metal casework (for integration with tops, sinks, fume hoods and service fixtures, as required) manufactured and furnished by the same company for single responsibility.

B. Chemical and Physical Resistance of Finish: Finish shall be electrostatically applied powder coat of laboratory grade formulation meeting most current SEFA-8 chemical resistance requirements.

1. Perform tests following "Performance Requirements and Evaluations for Metal Laboratory Furniture" by Scientific Apparatus Makers Association (SAMA Standard), as applicable.

2. Submit an independent testing laboratory report certifying that the (exterior) finish of metal casework is capable of withstanding the following tests, with no change, or slight change of gloss, slight discolouration, or slight temporary softening of the film with no loss of adhesion and no loss of film protection.

a. Reagents: Not less than 10 drops (0.5cc) applied to finish surface, covered with watch glass (concave side down) for 60 minutes, then washed and dried. Apply volatile reagents to a cotton ball and cover with an inverted 2 oz. wide mouth bottle to retard evaporation. Provide ratings as indicated below for the following reagents:

b. REAGENT RATING

c. Acetic Acid, 93% Excellent
d. Formic Acid, 33% Good
e. Hydrochloric Acid, 37% Excellent
f. Nitric Acid, 25% Excellent
g. Nitric Acid, 60% Good
h. Phosphoric Acid, 75% Excellent
i. Sulfuric Acid, 28% Excellent
j. Sulfuric Acid, 85% Excellent
k. Ammonium Hydroxide, 28% Excellent
l. Sodium Hydroxide, 10% Excellent
m. Sodium Hydroxide, 25% Excellent
n. Acetone, 100% Excellent
o. Carbon Tetrachloride, 100% Excellent
p. Ethyl Acetate, 100% Excellent
q. Ethyl Alcohol, 100% Excellent
r. Ethyl Ether, 100% Excellent
s. Formaldehyde, 37% Excellent
t. Hydrogen Peroxide, 5%  Excellent
u. Methylethyl Ketone, 100%  Excellent
v. Phenol, 85%  Good
w. Xylene, 100%  Excellent
x. Where concentrations are indicated percentages are by weight.
y. Moisture Resistance: No visible effect when finish surface exposed to the following:
   1) Hot water at a temperature of 190° F. to 205° F., trickled down the surface at 45° angle for 5 minutes.
   2) Constant moisture using a 2" x 3" x 1" cellulose sponge, soaked with water, in contact with the surface for 100 hours.
z.. Performance Test Results (Adhesion): Ninety or more squares of the test sample shall remain coated after the scratch adhesion test.
aa.. Performance Test Results (Hardness): The test sample shall have a hardness of 4-H using the pencil hardness test.
bb. Adhesion and Flexibility: No peeling or cracking or exposure of metal when metal is bent 180° over a 0.25" diameter mandrel.

1.4 WARRANTY:

A. The manufacturer shall guarantee all materials and workmanship provided for a period of 1 year from date of substantial completion. Any defects due to the use of improper material or workmanship on the part of manufacturer occurring within that time shall be promptly rectified, by repair or replacement of the defective materials or correction of defective workmanship after notification by the Owner.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

A. Fisher Hamilton Scientific, Inc.

B. Kewaunee Scientific Corporation.

C. Submit alternative manufacturers for consideration of approved equals.

2.2 MATERIALS:

A. Metal:

   1. Prime furniture steel, stretcher or roller leveled, free of scales, buckles, or other defects; ASTM A366, Class 1 (matte) finish.
   2. Minimum Metal Gage: Provide steel casework components of the following minimum U.S. Standard gages.

      a. 20 Gage: Interior door panel and adjustable shelves. Add reinforcement or use 18 gage material for shelves over 36" long.
b. 18 Gage: Sides, ends, exterior door panels, fixed backs, bottoms, tops and soffits, drawer bodies, drawer liners and removable back panels.

c. 16 Gage: Top and intermediate front horizontal rails, table aprons and top gussets.

d. 14 Gage: Hinge reinforcement, case and drawer suspension channels, and table legs.

e. 11 Gage: Corner gussets for leveling bolts and apron corner braces.

3. **LEED MRc4: Recycled Content**
   Include recycled content as much as possible.

**B. Liner Material:**

1. High density, non-asbestos, incombustible, calcium silicate panel consisting of autoclave portland cement, mineral fillers and synthetic fibers, used for acid storage cabinets only.

**C. Hardware:**

Architect shall specify associated hardware, such as:

1. Drawer Suspension: Self-closing, self-centering, full extension, hold open feature, 100 lbs. min. capacity.
2. Cabinet Hinges: TBD
3. Pulls: TBD
4. Lock Type: TBD
5. Label Holder: TBD
6. Removable Access Panel: TBD
7. Glass: TBD
8. Door Catches: TBD
9. Leveling Device: TBD

**2.3 FABRICATION:**

**A. General:**

1. Furnish casework fabricated to the quality standards and specifications for Fisher Hamilton Scientific, Inc. "Modular Steel Laboratory Equipment" or Kewaunee Scientific Corporation "Metal Laboratory Furniture", or approved equal.

**2.4 PERFORMANCE:**

**A.** Laboratory basework shall conform to the requirements of the Scientific Equipment and Furniture Associations (SEFA-8 latest edition).
B. In addition to the SEFA requirements, cabinets should also meet the following structural requirements:
1. Steel base unit load capacity: up to 500 lbs. per lineal foot suspended across cabinet ends.
2. Suspended units: 300 lbs. (static).
5. Hanging wall cases: 300 lbs.
6. Load capacity for shelves of base units, wall cases and tall cases: 100 lbs.

2.5 SPECIAL PURPOSE STORAGE CABINETS:

A. Acid Storage Cabinets:

1. Fabricate acid storage cabinets of the same gages of metal and construction features as other base cabinets except they shall be completely lined with a corrosion resistant liner. All fasteners used inside acid cabinets (hardware and back panel screws) shall be stainless steel.

2. Cabinet is to be specifically designed for the storage of acids and bases.

3. Provide a full depth removable shelf of the same material as cabinet and lined with a corrosion resistant liner. The removable shelf shall be polypropylene; perforated to allow vapors to reach the vent. Acid cabinet vents should be generally installed about 10” from the top. (A perforated shelf allows spills to be contained in the bottom pan).

4. Provide a polypropylene liquid tight pan covering on the entire bottom of the cabinet or similar devise, to provide containment for leaks and spills.

5. Below fume hoods, vent each cabinet through the hood work surface with a 1.5” corrosion resistant rigid vent pipe. Vent pipe may be increased to a larger diameter, once pipe extends above fume hood, per Mechanical design. The acid vent kit shall be polypropylene supplied by cabinet vendor. Hood base corrosive cabinets shall be vented through hood work surface using Manufacturer’s vent kit. When two corrosive cabinets are used, each cabinet must be vented separately through work surface. Vent duct shall terminate below lower baffle and at least 1” above work surface. Penetration between work surface and vent duct must be sealed with chemical resistant type caulk. When acid cabinets are installed below fume hoods, the doors should be louvered.

B. Solvent Storage Cabinets:

1. Specifically design solvent cabinet for the storage of flammable and combustible liquids in conformance with the requirements listed by UL, OSHA and NFPA No. 30 – latest edition.
2. Provide units with a maximum internal temperature of 325°F, when subjected to a 10-minute fire test using a standard time-temperature curve per NFPA No. 30.

3. Fabricate the bottom, top, sides and doors of 18-gage steel with all double panel construction and a 1.5” air space between panels. Furnish with electrical grounding connection.


5. Provide UL-Listed self-closing latching doors synchronized so that both doors will always fully close. Equip right hand door with three point latching system that automatically engages when doors close. Equip door latch system with lock. Equip each door with a fusible link hold open feature to ensure the door closes when the temperature outside of the cabinet exceeds 165°F.

6. Provide a 2” deep liquid tight pan covering on the entire bottom of the cabinet to provide containment for leaks and spills.

7. Provide a full depth, adjustable shelf designed to allow circulation within the cabinet.

8. Vent each cabinet into building hazardous exhaust system with a 1.5” corrosion resistant rigid vent pipe. Materials used for venting must meet a Flame Spread Rating of 25 or less. Vent pipe may be increased to a larger diameter, once pipe extends above fume hood, per Mechanical design. Provide a minimum of 10 air changes per hour. Two such vents must be provided, one high and one low and each must have a fire baffle.

C. Vacuum Pump Cabinets:

1. Specifically designed metal cabinet to provide a means to store and vent vacuum pumps and their emissions and heat loads.

2. Vacuum pump cabinet shall have hinged doors with integral toe space without a cabinet bottom. Vacuum pump cabinet shall have removable and solid back panel(s) for utility access and visual inspection. Back panel shall incorporate an integral 2-1/2" vent hole for a separate vent assembly.

3. Vacuum pump cabinet shall incorporate acoustical insulation on the interior door panels, side, back and underside of the top panel. Insulation shall be an open cell foam of conal design.

4. Storage unit shall incorporate an integral electrical switch (120V, 20 amp) with pilot light to indicate the operational mode of the vacuum pump unit.

5. Storage unit shall have an electrical duplex outlet, located in the rear of the cabinet, for the vacuum pump plug end. Outlet to be accessible from the inside of the cabinet. Outlet shall be hard-wired to the electrical switch.
6. Separate mobile platform shall be capable of supporting 300lbs. Front two casters shall be locking/swivel models. Lipped construction shall safely contain any incidental spills or provide a 2” deep liquid tight pan covering on the entire bottom of the cabinet to provide containment for leaks and spills.

7. Optional door louvers will be incorporated when the exhaust fan is specified.

8. Switch shall be supplied with an optional 20' long, 1/2" trade size flexible metal conduit.

9. Optional variac voltage transformer (mounted in flush panel) shall be factory installed in the flush front panel to provide a variable voltage source for instrumentation. Variac shall include a metal enclosure, cover plate, toggle switch, duplex electric receptacle, fuse holder and pilot light. Electrical input 120VAC, 50/60Hz – output 140VAC, 10AMP. Variac will be supplied with a 20' long, 1/2" trade size flexible metal conduit.

10. An optional 235cfm exhaust fan will be supplied for greater heat loads. The exhaust fan assembly will be attached to the exterior of the cabinet for maximum pump storage and airflow. The fan assembly shall incorporate a 4” diameter duct collar connection. Connection to the building HVAC exhaust by others.

PART 3 – EXECUTION

3.1 EXAMINATION:

A. Verify rough-ins for mechanical and electrical services for sizes, locations and adequacy; blocking and supports for wall mounted items and floors for compliance with specified load bearing capacity.

3.2 INSTALLATION:

A. Install plumb, level, true and straight with no distortions. Use adjustable leveling devises for base units. At other conditions, shim as required, using concealed shims. Where metal casework abuts other finished work, scribe and apply filler strips for accurate fit with all fasteners concealed where practicable.

B. Adjust top of base cabinets within 1/16” in each 4-foot of countertop surface.

C. Fasten cabinets to floor at toe space, with fasteners spaced 48” o.c. Bolt continuous cabinets together. Secure individual cabinets with not less than 2 fasteners into the floor.

D. Align similar adjoining doors and drawers to a tolerance of 1/16”.

E. Doors and drawers must operate smoothly without warp or bind.
F. Special Purpose Storage Cabinets: Install and setup in strict compliance with manufacturer’s written installation instructions. Adjust leveling feet or other methods to ensure the unit is equally supported around the base on the floor. When required, install acid cabinet vent kit and coordinate the installation of venting solvent storage cabinet to fume hood exhaust system. Each cabinet shall be vented separately and with sufficient mixing distance so as not to create chemical incompatibility. Materials used for venting must meet a Flame Spread Rating of 25 or less - including all materials used in connecting the back of the cabinet to the exhaust duct. Materials used for venting shall be rigid construction – flexible material shall not be permitted. Any solvent cabinet vent opening which has not been vented with vent pipe shall have manufacturers’ bungs secured in place. Base cabinets shall be cleaned after installation.

END OF SECTION 12345