# SECTION 12 30 00 - CASEWORK

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
   1. *Uniform General Conditions for Construction Contracts*, State of Texas, 2010 (UGC).
   2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction.*

### 1.2 SUMMARY

A. Section includes:
   1. Modular/Fixed Base Cabinets (B- , SC- )
   2. Wall Cabinets (W- )
   3. Tall Storage Cabinets, Wood (T- )
   4. Tall Storage Cabinets, Metal (ST- )
   5. Mobile Metal Lab Benches (M- )
   6. Fume Hood Base Cabinets, Wood (F- )
   7. Fume Hood Base Cabinets, Metal (See 11 53 00 Laboratory Equipment)
   8. Umbilical
   9. Adjustable Wall Shelves (SH-1)
   10. Support Systems for Shelving over Peninsulas (SH-2)
   11. Support Systems for Shelving over Peninsulas (SH-3)
   12. Free-standing Fixed Height Tables, Wood (M- 5)
   13. Overhead Service Carrier
   14. Worksurfaces
   15. Laboratory Sinks and Cupsinks
   16. Laboratory Service Fittings
   17. Electrical Fittings
   18. Solvent, Acid Tall Storage Cabinets (ST- )

B. Related Requirements:
   1. Division 06 10 53 Section "Miscellaneous Rough Carpentry" .
   2. Division 09 65 13, Section "Resilient Base and Accessories"
   3. Division 11 53 00, Section "Laboratory Equipment": Fume Hoods

4. Division 15 - Mechanical: Furnishing and installation of plumbing utilities and final connections.
5. Division 15 - Mechanical: Installation of plumbing service fixtures and service fittings furnished in this section.
6. Division 16 - Electrical: Furnishing and installation of electrical utilities and final connections.

## 1.3 DEFINITIONS

A. Abbreviations:
   1. CFM: Cubic feet per minute.
   2. MDF: Medium-density fiber board.
   3. PSI: Pound per square inch.

B. Broom clean: A condition in an interior area in which surface debris has been removed by dry methods.

C. Service fittings and fixtures: Service fittings include gas, air, vacuum, and special gas valves including factory piped turrets when mounted on work surfaces; hot, cold, reagent grade water faucets; remote control valves for fume hoods; and vacuum breakers.

D. Service lines: Conduit, junction boxes, conduit fittings, wire disconnect switches and fuse or circuit breakers necessary to carry electrical services from building roughing-in outlets in floors or walls through equipment to service fixtures.

E. Rough-in point: Individual or common supply of mechanical, electrical, and heating, ventilating and air conditioning (HVAC) through wall, floor, or ceiling, generally located within the utility umbilical, equipment chase, or service space behind cabinets.

F. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, tops of cabinets less than 72 inches above floor, and visible surfaces in open cabinets or behind glazed doors.
   1. Ends of cabinets visible when the full installation is completed, shall be considered exposed.

G. Semi-exposed Surfaces of Casework: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interiors faces of doors. Tops of cabinets 72 inches or more above floor, back panel in knee spaces, the three non-visible edges of adjustable shelves, holes and openings including notches at shelving and grommets shall be considered semi-exposed. Toe space shall be considered semi-exposed.

H. Concealed Surfaces of Casework: Includes sleepers, web frames, dust panels, and other surfaces not visible after installation.
   1. Ends of cabinets installed directly against and completely concealed by walls or other cabinets after installation shall be considered concealed.

## 1.4 ACTION SUBMITTALS

A. Product Data: Provide manufacturer's data and installation instructions for each type of laboratory casework unit, service fixtures, and accessories .

1. Certification by an independent testing laboratory indicating that applied finish complies with specified chemical and physical resistance requirements.
2. Certification by an independent testing laboratory that the casework complies with the specified requirements.

B. Shop Drawings: Large scale plans, elevations, cross sections, and details indicating layouts, dimensions, service run spaces and attachment to other works.
1. Indicate locations of hardware and keying of locks.
2. Indicate locations and type of service fittings.
3. Indicate locations of blocking and reinforcements required for installing casework.
4. Include details of utility spaces showing supports for conduits and pipings.
5. Include details of support framing system.
6. Include coordinated dimensions for laboratory fume hoods specified in other Sections.

C. Samples for Initial Selection:
1. Factory-applied finishes and other materials requiring color selection.

D. Samples for Verification:
1. Two of each type of casework material with each type of specified finish.
2. Two of each type of work surface material with each type of specified finish.
3. Finished wood samples shall be submitted to establish acceptable range of color, grain characteristics and quality of wood veneers and finishes. Finish samples shall be furnished on same material as intended installation items.
4. Acceptable samples will be used for comparison inspections at project. Retain acceptable sample units in building until completion of work and remove sample units from premises when directed by Architect.

E. Contract Closeout Submittals
1. Project Record Documents:
   a. Provide 1 set of record documents including plans, elevations, cross sections, and details indicating layouts, dimensions, service run spaces and locations and types of service fixtures installed. Include any and all deviations from the base design.
   b. Marked up shop drawings and documents will not be acceptable.
2. Cleaning Data: Manufacturer's instructions for cleaning casework finishes and work surfaces.
3. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. LEED Submittals: (Projects authorized for LEED certification only)

Retain individual provisions as necessary for individual projects.

1. Product Data for [**Credit WE 2**] [**Credit WE 3.1**] [**Credit WE 3.1 and Credit WE 3.2**] [**Credit WE 2 and Credit WE 3.1**] [**Credit WE 2, Credit WE 3.1, and Credit WE 3.2**]: Documentation indicating flow and water consumption requirements.

2. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1-2004, without amendments, Section 7 - "Service Water Heating."

3. Product Data for Credit EA 4: Documentation indicating that [**equipment and refrigerants**] [**clean agents**] comply.

4. Product Data for Credit EA 5: For specified metering equipment.
5. Product Data for Credit MR 4.1[ **and Credit MR 4.2**]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

6. Product Certificates for Credit MR 5.1[ **and Credit MR 5.2**]: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

7. Product Certificates for Credit MR 5.1[ **and Credit MR 5.2**]: For products and materials required to comply with requirements for regionally manufactured[ **and regionally extracted and manufactured**] materials. Include statement indicating cost for each regionally manufactured material.

    a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

8. Certificates for [**Credit MR 6**] [**Credit MR 7**]: Chain-of-custody certificates indicating that <**Insert products**> comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
9. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

10. Product Data for Credit EQ 4.1: For [**adhesives**] [**and**] [**sealants**], documentation including printed statement of VOC content.

11. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content.

12. Product Data for Credit EQ 4.2: For paints and coatings, documentation including printed statement of VOC content[ **and chemical components**].

13. Product Data for Credit EQ 4.4: For [**hardwood plywood**] [**particleboard**] [**MDF**] [**composite wood products**] [**used in <Insert product>**], documentation indicating that product contains no urea formaldehyde.

14. Laboratory Test Reports for Credit EQ 4: For [**adhesives**] [**sealants**] [**composite wood products**] <**Insert product**> [**used inside the weatherproofing system**], documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Shop Drawings:

1. Include plans, elevations, sections, and [**mounting**] [**attachment**] details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail fabrication and assembly of <**Insert portion of Work**>.
4. Include diagrams for power, signal, and control wiring.

H. Samples: For each exposed product and for each color and texture specified, <**Insert dimensions**> in size.

I. Samples for Initial Selection: For [**each type of unit.**] [**each type of exposed finish**] [**units with factory-applied finishes**].

J. Samples for Verification: For [**each type of unit.**] [**each type of exposed finish.**] [**the following products, in manufacturer's standard sizes:**]

1. <**Insert list of products**>.

K. Product Schedule: For <**Insert product**>.[ **Use same designations indicated on Drawings.**]

L. Delegated-Design Submittal: For <**Insert product or assembly**>.

## 1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Provide laboratory casework with tops, sinks, service fixtures, and accessories, manufactured or furnished by a single laboratory casework company.

B. Integrate fume hoods specified in Section 11 53 00 with casework as shown on drawings.

C. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

D. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

## 1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage:
1. If installation cannot commence in a timely manner after delivery, casework and equipment may be placed in storage. Additional costs for handling, shipping and storage shall be borne by the Contractor.
2. In the case of items, such as service fittings, that may be shipped to the job site and used over the course of several months installation, provide a secure, locked storage area for use to safeguard this equipment at the job site prior to installation.

B. Protection:

1. Protect finished surfaces from soiling and damage during delivery, storage, and handling. Cover with polyethylene film or other protective covering.
2. Laboratory casework and counters are not to be used as workbenches, work platforms, and scaffolding for any portion of the work by any trade. Furniture and casework, as installed, is considered to be finished equipment and shall be protected from damage by all trades.
3. The Contractor shall protect installed laboratory casework and equipment, especially the laboratory work surface, from debris, paint and damage in the course of the construction sequence.

## 1.7 PROJECT CONDITIONS

A. Environmental Requirements:
1. Interior spaces where casework, service fittings, and accessories are to be installed shall be conditioned to final design temperature and humidity level for minimum 24 hours prior to and continuously after installation, and in accordance with SEFA 2.3.
2. Do not deliver or install casework, tops, service fittings, and accessories until the following conditions have been met:
   a. Windows and doors are installed and the building is permanently closed in and weathertight.
   b. Ceiling, overhead ductwork and lighting are installed.
   c. All painting is completed and floors are finished.

## 1.8 SEQUENCING

A. Casework:
1. Base Cabinets:
   a. On Flooring:
      1) Flooring without integral cove base: Install after installation of finish flooring, before rubber base.
2. Base and wall cabinets:
   a. Walls: Install after last coat of paint.

## 1.9 WARRANTY

A. See Section 01 77 00 - Closeout Procedures, for additional warranty requirements.

B. Wood Casework: Provide written warranty signed by the manufacturer guaranteeing to correct failures in products which occur within one year commencing on the Date of Substantial Completion, without reducing or otherwise limiting any other rights to correction which the Owner may have under the Contract Documents. Correction may include repair or replacement.

C. Solid Polymer Work Surface: Provide written 10 year warranty against defects in materials. Warranty shall provide material and labor to repair or replace defective materials. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.

D. Warranties shall commence on Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

1. Thermo Fisher-Hamiliton.
2. Keur Industries.
3. Kewaunee Scientific Corp.
4. Substitutions: see section 01 25 00 – Substitution Procedures.

B. Fixtures and Accessories:
1. As listed by individual items – See Drawings.

### 2.2 PERFORMANCE REQUIREMENTS

A. Casework and Adjustable Shelving:
1. Loading Requirements: Casework components shall withstand the following minimum loads without damage to the component or to the casework operation when tested in accordance with SEFA 8.
    a. Base unit load capacity:
        1) 200 lb per square foot of cabinet top area.
        2) Leveling bolts: 500 lb each; minimum one per corner of each base cabinet.
    b. Drawers in a cabinet: 150 lb uniform load with smooth operation for minimum 10,000 cycles of opening and closing.
    c. Hanging wall cases: 300 lb.
    d. Shelves:
        1) 40 lb/sf up to a maximum of 200 lb with nominal temporary deflection, but without permanent set.
2. Chemical Resistance Requirements: Test the exterior finish of laboratory casework and adjustable shelving for resistance to chemical reagents in accordance with SEFA 8, and meets Level 1 rating - slight change in color or gloss, and with no loss of adhesion and no loss of film protection.
    a. Moisture Resistance: No visible effect when finish surface exposed to the following:
        1) Tested in accordance with SEFA 8.
        2) Constant Moisture using a 2 inch x 3 inch x 1 inch cellulose sponge, soaked with water, in contact with surface for 100 hours.

b. Cold Crack: No effect when subjected to 10 cycles of temperature change from 20 degrees F for 60 minutes to 125 degrees F for 60 minutes.
   1) Adhesion: Tested in accordance with SEFA 8; ninety or more squares of the test sample shall remain coated after the scratch adhesion test.
   2) Flexibility: No peeling or cracking or exposure of metal when metal is bent 180 degrees over a 1/2 inch diameter mandrel.
c. Hardness: Tested in accordance with SEFA 8 for surface hardness equivalent to 4H or 5H pencil.
d. Abrasion resistance: Maximum weight loss of 5.5 mg. per 100 cycle when tested on a Taber Abrasion Tester #E40101 with 1000 gm wheel pressure and Calibrase #CS10 wheel.
e. Humidity resistance: Withstand 1000 hour exposure in saturated humidity at 100 degrees F.
f. Salt spray: Withstand minimum 200 hour salt spray test.

## 2.3 PRODUCT OUTLINE

A. Numbering system indicated in the casework drawings legend are provided to indicate casework size, and configuration. Reference Laboratory Casework Legend Sheet.

B. Wood Cabinets:
   1. Species: Refer to Materials Section.
   2. Cabinet Construction and Door Style: AWI - Flush overlay with square edge door.
   3. Grain Direction:
      a. Door fronts and exposed sides of individual cabinets: Vertical.
      b. Drawer fronts:
         1) Horizontal.
   4. Grain Pattern:
      a. Matching Between Adjacent Veneer Leaves:
         1) Slip Match.
      b. Matching within Individual Panel Faces:
         1) Running Match.
      c. Adjacent cabinets are not required to be grain matched, however, similar grain patterns, color shades and tones are required.
   5. Finish: Clear, complying with SEFA 8.

C. Metal Cabinets:
   1. Material: Cold rolled sheet steel.
   2. Design, Color, and Finish:
      a. Cabinet Construction and Door Style: Flush overlay with square edge metal door.
      b. Finish: Powder coated, complying with SEFA 8.
      c. Color: Select from manufacturers standard colors.

## 2.4 MATERIALS, FABRICATION: WOOD LAB CASEWOOK

A. Materials:
   1. The following definitions apply to wood laboratory casework units:
      a. Exposed portions of casework include surfaces visible when doors and drawers are closed. Bottoms of cases more than 4'-0" above floor shall be considered as

exposed. Visible shelves and members in open cases or behind glass doors also shall be considered as exposed portions.

b. Semi-exposed portions of casework includes those members behind opaque doors, such as shelves, divisions, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6'-6" or more above floor shall be considered semi-exposed.

c. Concealed portions of casework include sleepers, web frames, dust panels, and surfaces not usually visible after installation.

2. Woods: All woods shall be air-dried, then kiln-dried to a moisture content of 5% to 6%. Temper kiln-dried lumber to a moisture content of 6% to 8% before use. Maintain moisture content throughout production. Woods shall be free of knots and imperfections. Manufacturer shall supply evidence-certifying kiln drying of wood.

3. Exposed Materials: Do not use exposed faces of lighter-than-average color joined with exposed faces of darker-than-average color. Do not use two adjacent faces that are dissimilar in grain, figure, and natural character markings.

a. Solid Lumber: For banding and edging only, quarter sawn premium grade maple complying with solid lumber standards of Architectural Woodwork Institute (AWI) "Quality Standards" Section 100, free from defects to the extent indicated for Grade 1 in referenced AWI standard, and selected for compatible grain and color.

b. Face Veneer: Quarter Sawn premium grade Maple book matched and selected for grain and color compatible with exposed solid lumber, no defects; complying with Grade 1 for surface grade of panels as indicated in AWI "Quality Standards" Section 200, Premium Grade. Provide solid cross bandings without voids. Edgeband exposed edges with solid wood of maple stained to match face veneer, as detailed.

c. Solid Lumber: Clear, dry, premium grade quarter sawn maple, free from defects and selected for compatible grain and color. Stain and finish to match veneer.

d. Solid Lumber for shelving: Quarter sawn premium grade maple, 1” nominal thickness, stained and finished to match veneer.

4. Semi-Exposed Materials:

a. Solid Lumber: Dry, sound, selected to eliminate appearance defects. Any species of hardwood, of similar color and grain to exposed portions.

b. Plywood: Hardwood, ANSI/HPMA HP-1983, Good Grade (1), or softwood ANSI/VOL. PROD. STD. PS-1, Group 1, A-A, INT, of species to match color and grain of exposed members, where exposed both sides or A-B, INT where exposed one side.

5. Concealed Members:

a. Solid Lumber: Dry, sound, selected to eliminate appearance defects. Any species of hardwood of similar color and grain to exposed portions.

b. Plywood: Hardwood, ANSI/HPMA HP, Good Grade (1), or softwood ANSI/VOL PROD. STD. PS-1, Group 1, A-A INT, matching color and grain of exposed members subject to approval by the Architect. Plywood for casework shall conform to AWI Premium grade standards.

c. Solid Lumber or Plywood: Any species, with no defects affecting strength or utility.

d. Hardboard: ANSI/AHA A135.4-1984; Class 1, tempered.

6. Glass for Glazed Doors: ASTM C 1036-1985, Type I, Class 1, double strength, quality q3 (Grade "B").

a. Clear Wood Finish:

1) General: Provide complete factory finish to comply with chemical and physical resistance requirements. After installation, touch up or refinish damaged portions equal to original factory finish.

2) Preparation: Sand exposed and semi-exposed components, using machine and hand methods. Machine marks, cross sanding, tool marks or other surface blemishes are not acceptable.

3) Exposed Portions: Apply finishes as follows:
   a) Architect shall select stain color.
   b) Sealer coat, thoroughly dried, sanded and dusted.
   c) Sealer coat, thoroughly dried.
   d) Two coats of highly chemical resistant to produce a smooth, satin luster free of imperfections.\
4) Semi-Exposed Portions: Apply sealer coat, colored to match exposed portions, and follow with heavy application of clear, water repellent finish coat to provide a smooth, washable surface.
5) Concealed Portions: One heavy coat of water repellent finish.

B. Fabrication:
1. Fabricate in compliance with the standards indicated for Premium Grade in AWI "Quality Standards" Section 400 and its Division 400A "Wood cabinets", Premium Grade throughout.
   a. Sizes and thickness indicated for each component of wood casework are minimum sizes/dimensions. Manufacturer's standards that exceed the minimum sizes/dimensions indicated will be acceptable.
   b. Provide full flush overlay type of cabinet construction, as shown on drawings and as described in Architectural Woodwork Institute (AWI) standards including AWI publication "Architectural Casework - General".
2. Fabricate with wood grain on exposed surfaces of doors and cabinet bodies running in a vertical direction. Wood grain on drawer fronts shall be horizontal. Veneer leaves shall be book matched and balanced.
3. Fabricate cabinet fronts cut from one piece of material. Cabinet face plywood shall utilize not more than 4 veneer leaves.

## 2.5 BASE CABINETS (B-, SC-)

A. Door Panels: Provide 3/4" thick veneer particle board doors with matching 1/8" maple edge banding stained to match veneer.

B. End Panels: Provide 3/4" thick veneer particle board cabinet end panels with 3/4" x 1/2" hardwood edge banding of type specified. Glue end panels to top, bottom and all intermediate frames utilizing blind mortise and tenon joints and countersunk screws. Extend exposed end panels full depth to wall; no end fillers will be permitted.

C. Cabinet Backs: Provide 3/16" minimum thick hardwood plywood, rabbet into the end panels. Provide removable panels allowing access to plumbing chase, but designed to protect the interiors from dust and vermin. Plastic channel retainers are not acceptable.

D. Cabinet Bottoms: Provide 3/4" thick veneer particleboard. Where access to the floor below the cabinet is required, frame cabinet bottoms to receive a removable 3/4" thick plywood bottom panel.

E. Vertical Dividers: Provide 1" thick veneer particle board, grooved, glued and screwed into top, back and bottom rails and extending to floor for support.

F. Shelves: 1" solid quarter sawn maple stained to match veneer. Shelves adjustable 2" centers on pin and socket supports. Shelves shall be grooved at rear bottom and dropped over shelf supports to lock in place. Provide 2-degree rearward slope to prevent forward migration of contents by vibration.

G. Toe Space: provide 2-1/2" deep x 4" high casework toe space.

H. Top Panels: Provide 3/4" thick veneer particleboard tops, conforming to requirements for "exposed" locations on casework units identified as "movable".

I. Frame Members: Fabricate table frames, counter frames and other framed case goods of type of wood and with not less than the sizes indicated on drawings for each type of member or, if not indicated, not less than the following:
   1. Top Horizontal
      a. Side and Rear Member: 1-3/4" x 1-1/4" Premium Maple
      b. Front Member: 2-1/4" x 1-1/4" Premium Maple
      c. Center Mullion: 2-1/2" x 1-1/4" Premium Maple
   2. Intermediate Horizontal
      a. Front Member: 1-3/4" x 3/4" Premium Maple
      b. Side and Rear: 1-3/4" x 3/4" Premium Maple
      c. Center Mullion: 2-1/2" x 3/4" Premium Maple
   3. Bottom Horizontal (When Required)
      a. Side and Rear: 1-3/4" x 3/4" Premium Maple
      b. Center Mullion: 2-1/2" x 3/4" Premium Maple
      c. Front Member: 3-3/4" x 3/4" Premium Maple

J. Drawers: Provide 7/16" thick, plain sawn Natural Birch drawer sides with 3/4" thick specified hardwood veneer edge banded panel drawer head. Provide glue and dovetailed type joints on drawers. Except as otherwise indicated, provide 1/4" thick tempered hardboard drawer bottoms, pre-finished with a white epoxy coating, set and glued into 1/4" grooves, 4 sides. Provide a continuous groove for divider clip installation, at all 4 sides.
   1. For drawers over 24" wide, provide 1/4" thick tempered hardboard with stiffeners glued to underside not to exceed 1'-0" o.c.

## 2.6 WALL CABINETS, WOOD (W-)

A. Panels: Fabricate intermediate panels of 3/4" thick veneer particleboard and finished ends, where required of 3/4" thick veneer particleboard. Provide veneer facing of type specified.

B. Tops: For open cabinet or cabinets with glazed doors provide 3/4" thick veneer particle board, and for tops in cabinets with solid doors provide 3/4" thick hardwood, mortised and tenoned into end panels, and secured with glue and countersunk screws.

C. Glazed Doors: Fabricate doors from 3-3/16" x 3/4" thick Premium maple framing, mortised, tenoned, doweled and glued. Set glass into door frame and secure with a matching wood stop. Hang each framed glass door leaf on one pair of hinges for wall cabinets under 48" in height.

D. Cabinet Backs: Provide 1/2" thick plywood, hardwood for semi-exposed interior and Premium Anigre for exposed interiors.

E. Cabinet Bottoms: Provide 3/4" thick veneer particleboard for semi-exposed interiors and Premium Anigre plywood for exposed interior and exterior.

F. Shelves: Provide wall-hung units with full width adjustable shelves, 1" nominal thickness, solid maple; quantity of shelves as indicated on drawings.

2.7 TALL STORAGE CABINETS, WOOD (T- )

A. Design and construct for full enclosure to assure dust proofing of the case interior. Furnish all end panels 3/4" thick with a 3/4" x 1/2" minimum solid lumber facing. Finished ends shall be solid plywood ends or 1/4" thick plywood finish panel. Top for open or glazed door shall be 3/4" thick plywood, mortised and tenoned or doweled into end panels, secured with glue and countersunk screws. The top in solid door cases shall be 3/4" thick solid lumber and in both types of construction with a 2-1/4" x 3/4" solid lumber fascia.

B. Shelves shall be minimum 1" thick solid maple. To assure a complete rigid case, the center shelf is structurally joined to the end panels and glued. All other shelves (4) are adjustable on 1-1/4" centers.

C. Case bottoms shall be 3/4" thick veneer rabbetted and glued to end panels. Glued blocks, 3" long, shall further support and strengthen all joints. Provide all cases 22" in depth with a 1/2" thick plywood bottom and a 4" wide x 3/4" thick hardwood facing. Provide flush case interior. Provide a 2-1/2" x 4" high totally enclosed toe space. Other sizes and materials are as follows:
   1. End Panel: 3/4", veneer core with 1" x 3/4" solid lumber facing
   2. Top: 3/4", veneer core
   3. Top Fascia: 3/4" x 2-1/2" solid lumber
   4. Bottom: 3/4", veneer core
   5. Base Rail: 1" x 4-3/4" solid lumber
   6. Toe Space Rail: 3/4" x 4" hardwood plywood

D. Swinging Doors: Doors shall either be hollow core plywood panel or glass framed in 1-1/16" solid lumber frame, hung on 1-1/2 pair of 2-1/2" long offset type hinges.

2.8 MATERIALS, FABRICATION: METAL LAB CASEWORK

A. Materials:
   1. Prime furniture steel, stretcher or roller leveled, free of scales, buckles, or defects; ASTM A 366-1985, Class 1 (matte) finish.

B. Fabrication:
   1. General: Complete assembly and finish work at point of manufacture. Perform unit assembly on precision jigs, to provide units which are square, fully reinforced with angles, gussets, and channels, integrally framed and welded to form a dirt and vermin retardant enclosure. Reinforce sink base cabinets for sink support. Maintain uniform clearance around door and drawer fronts, not exceeding 3/32".

C. Performance Test and Ratings:
   1. Terms referred to in PERFORMANCE TEST RESULTS are as follows:
   2. "Excellent" - indicates that test leaves no visible effect on the finish film other than an increase in gloss.
   3. "Good" - indicates that the test leaves no effect other than slight discoloration, decrease in gloss or temporary slight softening of the finish film with no loss of adhesion and film protection.

D. Performance Test Results* (Chemical Spot Tests):
   1. Chemical spot tests shall be made by applying 10 drops (approximately 1/2 cc) of each reagent to the surface to be tested. Each reagent shall be covered by a watch glass, convex side down, in the center of the puddle to hold the reagent in place, except volatile

solvents shall have the reagent applied to a cotton ball, which in turn is covered by an inverted 2 ounce wide mouth bottle to retard evaporation. Reagents shall be allowed to remain on the surface for the time specified, and the tests shall be conducted in such manner that the testing surface is kept wet throughout the entire test period. After the time allowed for the test has elapsed, the surface shall be washed with soap and water, and dried before examination and evaluation. (This test approximates the actual condition of a reagent bottle setting in a puddle of the reagent on a surface).

a. Test Reagents*; Time In; Rating
    1) Acetic Acid 98%; 60; Good
    2) 1 Sulfuric Acid 25%; 60; Excellent
    3) Sulfuric Acid 85%; 60; Good
    4) Hydrochloric Acid 37%; 60; Excellent
    5) Nitric Acid 25%; 60; Excellent
    6) Phosphoric Acid 75%; 60; Excellent
    7) Perchloric Acid 70%; 60; Excellent
    8) Methylene Chloride; 60; Excellent
    9) Sodium Hydroxide 25%; 60; Excellent
    10) Sodium Hydroxide 10%; 60; Excellent
    11) Ammonium Hydroxide 28%; 60; Excellent
    12) Hydrogen Peroxide 5%; 60; Excellent
    13) Ether; 60; Excellent
    14) Ethyl Alcohol; 60; Excellent
    15) Ethyl Acetate; 60; Excellent
    16) Xylene; 60; Excellent
    17) Acetone; 60; Excellent
    18) Formaldehyde 37%; 60; Excellent
    19) Carbon Tetrachloride; 60; Excellent
    20) Methyl Ethyl Ketone; 60; Excellent
        a) *Where concentrations are indicated, percentages are by weight.

2. Performance Test Results (Bending Test):
    a. An 18 gauge steel strip, finished as specified, when bent 180o over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
3. Performance Test Results (Adhesion):
    a. 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 angle 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. Examine under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".
4. Performance Test Results (Hardness):
    a. The test sample shall have a hardness of 4-H using the pencil hardness test.
    b. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest).
    c. 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.

2.9 MOBILE METAL LAB BENCHES (M- )

A. Adjustable worksurface frames and bench base provide support for the worksurface, and suspended casework. Cantilevered worksurface frames get their support from the Structural Modules and are adjustable in height in 1" increments. Free Standing Bench Frames are floor mounted, with an attached Structural Module.
   1. Adjustable Height Cantilevered Worksurface Frame:
      a. The frame is a 3 sided welded assembly of 1 5/8" x 1 1/4" x 12 gauge CRS channel. A 12 gauge U channel is welded to the front channel for suspended cabinet support.
      b. The support leg is an 11 gauge rectangular shaped assembly with an 18 gauge inner support filler. The 11 gauge support legs are part of the final assembly that engage into the outside row of standards for support on 1" increments.
   2. Adjustable Height Free Standing Bench Frame:
      a. The upper frame is the an 11 gauge rectangular shaped assembly with an 18 gauge inner support filler. The 11 gauge support legs are part of the final assembly that engage into the outside row of standards for support on 1" increments.
      b. The Lower support leg is an 11 gauge rectangular shaped assembly with an 18 gauge inner support filler and structural modesty panel. The lower leg is welded to an 11 gauge horizontal bottom support member with leveling feet.
      c. The upper leg is an 11 gauge telescoping member, which marries into the lower leg section, providing height adjustability in 1" increments.
      d. The Adjustable Height Free Standing Bench Frame can be attached to a Structural Module by use of an attachment kit.
   3. Adjustable Height Mobile Bench Frame:
      a. This table is the same an 11 gauge rectangular shaped assembly with an 18 gauge inner support filler. The 11 gauge support legs are part of the final assembly that engage into the outside row of standards for support on 1" increments, but includes 4" heavy duty rubber tired castors mounted to bottom support member.
   4. Work Top:
      a. Counter tops shall be epoxy resin as defined in this specification; all clips, screws and parts for fastening the top to bench frame shall be included.
   5. Adjustable Shelving:
      a. Adjustable Module Shelving attaches to the structural module upright, with height adjustability on 1' increments.
         1) Upper Mobile Bench Shelving: Upper Carrier Module Core Shelves are 16 gauge steel formed down 1", then returned back and up into a channel formation. Shelves are 12" deep, and match the length of the structural module of the Mobile Bench. Steel shelves are available with a steel front edge seismic lip. Provide 2” upturn at shelf rear to prevent any objects from sliding off the rear of the shelf.
   6. Casework mounted on Mobile Benches:
      a. Base cabinets suspended from the mobile benches will be wood casework construction, and shall be as noted in the wood casework section of this specification. Casework is flush face construction, with doors and drawers in the same plane as the cabinet face frame, without overlap. The doors are square edged, with stainless steel wire pulls. A 5 knuckle stainless steel hinge is used for swinging doors. The drawer has a one piece body, and a 150# self closing drawer guide.

2.10 CASEWORK HARDWARE:

A. Hardware, General: Provide stainless steel #4 satin finish, commercial quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Three knuckle, semi-concealed self-closing by Grass, Hafeale or Equal. Provide one pair for doors less than 48" high and 1-1/2 pair for doors over 48" high.

C. Pulls: 4" Stainless steel wire pulls for drawers and wing doors equal to Stanley 4484, mounted with 2 screws fastened from back. For sliding doors, provide recessed flush pulls. Provide 2 pulls for drawers over 24" wide.

D. Drawer Slides: Provide drawer slides as follows by Accuride, or equal by Kanpe, Vogt, or Grant:
   1. At Pencil Drawers: Accuride C2006
   2. At File Drawers : Accuride C4437
   3. At Drawers up to 24" wide: Accuride C3837
   4. At Drawers greater than 24" wide: Accuride C3025

E. Drawer Stops: Designed to permit easy removal, and yet prevent inadvertent drawer removal. Provide all drawers, located on the inside.

F. Label Holders: Provide where indicated, size to receive standard label cards approximately 1" x 2" nominal size, finished to match other exposed hardware.

G. Filler Strips: Provide where required for closing space between cabinets and walls and ceilings, of same material and finish as cabinets.

H. Drawer and Cupboard Locks: Half-mortise type, 5-pin tumbler and dead bolt, round cylinder only exposed, brass with US 26D finish.

I. Sliding Door Hardware Sets: Manufacturer's standard, to suit type and size of sliding door units.

J. Leg Shoes: Extruded rubber, as specified in related sections, open bottom type.

K. Internal Adjustable Shelf Supports: Drilled in hole system with K&V 346 supports, per AWI 400-S-3.

L. Locks: Shall be heavy duty cylinder type. Noses of each lock shall be satin chrome plated, with phosphor bronze spring and 14 disk tumblers allowing individually faced cabinets on a grand master key arrangement and two master keyed groups with each individual cabinet having cylinder locks keyed alike. Two keys shall be 3/32" thick minimum stamped brass. Equal to National Lock Co. #M4-7054C, Corbin No. 15750, or equal. Locks shall be provided on all cabinet doors and drawers unless noted otherwise.

M. Adjustable screw type levelers, four total, one at each corner.

2.11 FUME HOOD BASE CABINETS, WOOD (F-)

A. Materials, Wood Fume Hood Base Cabinets
   1. See Wood Laboratory Casework

B. Materials, Fabrication: Match Wood Laboratory Casework.

C. Color and Finish: match Wood Laboratory Casework

D. Acid Storage Cabinets:
1. One piece corrosion resistant interior liner, including the backside of doors and shelf surfaces.
2. One-piece corrosion resistant insert tray with 2 inch lip for containment of spills at bottom of cabinet.
3. One shelf with 1 inch lip, adjustable on 1 inch increments.
4. Provide louvered door for exhaust airflow.
5. Vented with a minimum 1-1/2 inch I.D. corrosion resistant vent pipe at rear of cabinet terminating inside of fume hood 2 inch above the work surface.
6. Vent pipe shall be close to rear of hood as possible. Seal opening between work surface and pipe with chemical resistant material.
7. Exhaust ports shall have fire screens.
8. Non-metal door catch or strike plate.
9. Front of cabinet labeled with minimum 1 inch high, 1/4 inch stroke red letters: "ACID".

E. Flammable Liquids Storage Cabinets:
1. Identified for flammable and combustible liquids shall be constructed in compliance with UL, OSHA, NFPA Standard No. 30, and UFC Article 79.
2. Self closing and self latching doors synchronized so that both doors will always fully close.
3. Bottom of the cabinet liquid tight to a height of 2 inches.
4. Cabinet shall not have vent outlet, or vent outlet shall be capped.
5. Front of cabinet labeled with minimum 1 inch high, 1/4 inch stroke red letters: "FLAMMABLE - KEEP FIRE AWAY".

F. Vacuum Pump Cabinets:
1. Provide louvered door for exhaust airflow.
2. Vented with a minimum 1-1/2 inch I.D. corrosion resistant vent pipe at rear of cabinet terminating inside of fume hood 2 inch above the work surface.
3. Provide 110V Duplex outlet in back of cabinet.
4. Provide ON/OFF switch on face of fume hood base cabinet apron rail, powering 110V duplex in back of vacuum pump base cabinet
5. Attach toe kick to door. Provide base cabinet without bottom - vacuum pump to rest on finished floor.
6. Provide 110V Duplex outlet on face of fume hood base cabinet apron rail where noted on Fume Hood Schedule.

G. General Purpose Fume Hood Base Cabinets:
1. Provide apron to match adjacent fume hood base cabinets.
2. Match adjacent fume hood base cabinet in material and means of construction.

## 2.12 UMBILIBAL

A. Closure panel material for wood casework:
1. Material: Wood to match adjacent casework species and grain.
2. Color and Finishes: Match adjacent casework color and finishes.

B. Closure panel material for metal casework:
   1. Material: Painted metal to match adjacent casework.

C. Construction
   1. Provide removable section on long axis of umbilical.
   2. Extend from floor or top of work surface to not less than 6 inch above ceiling.
   3. Fasteners: Concealed.

D. Collars:
   1. Provide collar at ceiling.
   2. Material: 16 gauge painted steel.

E. Supports: Steel channel or tube shape fastened to floor or counter top and building structure above.

## 2.13 ADJUSTABLE WALL SHELVES (SH-1)

A. Wood Shelves:
   1. Species: Match wood casework.
   2. Hardwood plywood with grade A veneer finish on top and bottom faces.
   3. Thickness:
      a. Thickness: 1 inch.
   4. Front Edge and Exposed Ends: Faced with 1/8 inch solid hardwood to match plywood veneer.
   5. Bracket interface: notch to accept bracket.
   6. Finish: Match casework finish.

B. Shelf Depth: Provide 12 inch shelf depths where indicated.

C. Shelf Lengths: Shall be available in 6 inch increments to 72 inch length.

D. Support System for Adjustable Shelves:
   1. Wall mounted shelf support: Double-slotted standards.
   2. Adjustable height: Adjustable on 1 inch increments.
   3. It shall be the responsibility of the casework manufacturer to provide a guideline for the location of wall blocking to Contractor prior to the installation of the casework.

E. Brackets: Painted steel; 11 gauge; mount to inner slot of double slotted support module upright.
   1. Fasten shelves to brackets with two stainless steel screws per bracket.

## 2.14 SUPPORT SYSTEM FOR SHELVING OVER FIXED CASEWORK PENINSULA (SH-2)

A. Product Characteristics:
   1. Upper carriers for support of shelving, power and data shall be a frame assembly of 1-5/8 inches by 3 inches by 12 gauge CRS channel, with top frame and mounting brackets for fastening to worksurface. Each upright carrier will form a structural module 12 inches deep by 48 inches in height.
   2. Upright carriers shall include vertical wire raceways with cable management tubes, this assembly shall snap into place between the vertical frame.

3. The inner, center shelf of each of three tiers shall be 12" deep, and discontinuous at each end at the junction of the frame assembly to allow cord pass-through to power and data connections below the lower tier of shelves.
4. Outer shelves of each of three tiers shall be supported by 11 gauge brackets which mount to the inner slot of the double slotted upright. They shall be adjustable in height on 1" increments; adjustment shall be accomplished without the use of tools. The top two tiers of outer shelves shall be 12" deep each, the lower tier shelf shall be 6" deep.
5. Task Lights: Provide fluorescent task lighting beneath lower tier shelf in widest available dimension that matches the structural module. Task lighting shall be UL listed, 120V/60 cycle operation, power cord prepared for hard-wiring, 'A' sound rated ballast, with ON/OFF rocker switch. These task lights shall be hard-wired.
6. Shelving at upper carriers shall be 1" hardwood plywood as outlines in 'Materials for Wood Casework'.
7. Provide G-4000 vertical wire raceway. All power and data devices as shown on plans are provided and installed per Division 16. The 4000 series raceway shall have no divider and shall have a two-gang cut-out for data.
8. Metal component finish: Acid-resistant, epoxy powder coated paint.
    a. Color: As selected by Architect from manufacturer standard.

## 2.15 CUSTOM FABRICATED SUPPORT SYSTEM FOR SHELVING OVER FIXED CASEWORK ISLAND BENCH (SH-3)

A. Product Characteristics:
1. Support system for shelving over island shall consist of a welded steel truss frame to be attached to endpost/end support frames. The support truss frame shall have a top cord, a bottom cord, intermediate vertical members if needed, and diagonal bracing members as required.
2. Configuration: refer to casework drawings for dimensions and length of the support truss assembly.
3. Design Loads: Per SEFA 8, with minimum of 50 pounds per square foot.
4. End Post/End Support: To be provided by building super structure.
    a. Casework manufacturer shall provide design load calculation and requirement for the fabrication of the end support frame.
    b. Support truss frame shall connect to end support frame by mean of mechanical connection.
5. Intermediate Attachment to structure: Casework manufacturer shall provide intermediate attachment to structure as required to maintain the stability of the shelving system.
6. Intermediate Vertical Members:
    a. Truss vertical member shall be double-faced, double-slotted steel tube member having appropriate cross section characteristic to form the support truss assembly spanning the length of peninsula assembly.
    b. The vertical member shall be capable of supporting 3 tiers of shelving, at 1 ft increment, with book-end type brackets.
7. Shelves:
    a. Three tiers of adjustable shelves shall be supported by 11 gauge brackets which mount to the inner slot of the double slotted upright. They shall be adjustable in height on 1" increments; adjustment shall be accomplished without the use of tools. The lower two tiers of shelves shall be 12" deep. The top tier of shelves shall be 18" deep.
    b. Shelves shall be interchangable with shelves described in Support System for Shelving Over Peninsula (SH-2).

c. Shelving at upper carriers shall be 1" hardwood plywood as outlines in 'Materials for Wood Casework'.

## 2.16 FREE STANDING, FIXED HEIGHT TABLES, WOOD (M-5)

A. Material:
1. Top: 1 inch thick cast epoxy resin to match epoxy resin work surfaces.
2. Aprons, legs and rails: Solid wood to match cabinets.

B. Table Frames: Not more than 4-1/2 inch front, back and side apron.

C. Side and Back Rails: Provide where required as manufacturer's standard.

D. Legs: 2-3/4 inch by 2-3/4 inch solid wood post with leg shoe.

E. Provide reinforcing as required. Reinforcement shall be concealed by wood elements.

F. Design Loads: Per SEFA 8, with a minimum of 600 lb rating for a 72 inch x 30 inch at 36 inch high movable freestanding table.

## 2.17 WORK SURFACES

A. General:
1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated.
2. Provide holes and cutouts for service fixtures, service fittings, and service outlets.
3. Fabrication tolerances:
   a. Size:
      1) Length: +/- 1/16 inch.
      2) Width: +/- 1/16 inch.
      3) Thickness: +/- 1/16 inch.
   b. Cutouts:
      1) Sinks: +/- 1/8 inch.
      2) Cup sinks: +/- 1/8 inch.
      3) Gem box: +/- 1/8 inch.
      4) Columns: + 1/8 inch, - 0 inch.
      5) Column cut-out, covered by applied curb: + 1/4 inch, - 0 inch.
      6) Service drilling: + 1/8 inch, - 0 inch.

B. Epoxy Resin Work Surface:

Note that special conditions may require stainless steel work surfaces.
1. Manufacturers:
   a. Durcon Laboratory Tops, Inc.; Taylor, TX, 512-595-8000: www.labtops.com.
   b. Epoxyn LLC; Mountain Home, AR. 870-425-4321. www.epoxyn.com.
   c. Kewaunee Scientific Corp.; Stateville, NC. 704-873-7202. www.kewaunee.com.
2. Material: Chemical and abrasion resistant, cast epoxy resins and inert products.
3. Thickness: 1 inch.
4. Color: Black.
5. Finish: Matte.
6. Back and Side Splash: Same material as top.

a. Height: 4 inches (102 mm).
b. Fabrication: Butt jointed and cemented to work surface.
c. Location: Where work surfaces abut walls. Include end curb where required.

## 2.18 LABORATORY SINKS AND CUPSINKS

A. General:
1. Sizes: See sink schedule on Laboratory Casework drawing.
2. Provide overflow, strainer and tailpiece with sink.

B. Cast Epoxy Resin Sinks:
1. Manufacturers: Same as epoxy resin surface.
2. Molded in one piece with smooth surfaces, coved corners, and bottom sloped to drain.
3. Material: Same as cast epoxy resin work surface.
4. Mounting: Underhung.

C. Cupsinks
1. Material:
a. Polyresin.
2. Size: 3 inch x 6 inch oval.
3. Locations:
a. Worksurface.

D. Outlets and Tailpiece:
1. Inlet: 1/2 inch diameter.
2. Tailpiece: Minimum 6 inch long with 1-1/2 inch NPT outlet.
3. Accessory: Strainer.
4. Material: Same material as sink.

E. Overflows (not for cup sinks):
1. Size: 2 inches less than sink depth.
2. Material: Polypropylene.
3. Configuration: Open top design.
4. Outlet: 2 inches below top of work surface. One per sink outlet.

F. Scullery Sink:
1. Manufacturer:
a. Just Manufacturing, basis of design
b. Elkay Manufacturing
c. Griffin Products
2. Model:
a. NSFB Series, basis of design.
3. Features:
a. Material: 14 gauge, stainless steel, Type 304; 18-8 stainbless steel, No. 4 satin finish.
b. Fabrication:
1) Double bowl with integral drain board right side, bowl depth: 12", backsplash height 12"
2) 16 gauge stainless steel tubular legs, adjustable feet.

3) Custom sized sinks: Continuous heliarc welded joints ground and polished smooth.
4) Corners: Rounded and coved, horizontal and vertical corners; minimum 5/8 inch radius.
5) Sink partitions: Double wall construction. Round top edge to minimum 1/2 inch diameter.
6) Continuous butt weld joints.
7) Overflows: Integral, side mounted, coordinate with Plumbing specification.
8) Factory punch for fittings. Coordinate locations with Drench Hose (DH). Punch holes so that Drench Hose is over partition center.

c. Weld sinks to stainless steel work surface. Finish to produce integral unit with imperceptible joint line.
d. Underseal: 1/8 inch thick heat resistant material to prevent condensation and deaden sound.

## 2.19 LABORATORY SERVICE FITTINGS

A. Manufacturers
1. WaterSaver Faucet Company: www.wsflab.com.
2. Broen Corporation: www.broen.com.
3. Chicago Faucet Company: www.chicagofaucets.com

B. General Requirements
1. Provide fittings comply with SEFA 7.
2. Provide fittings complete with washers, locknuts, wall flanges, deck flanges, escutcheons, and other installation accessories.

C. Materials
1. Water and Gas Fittings: Cast or forged red brass containing minimum 85 percent copper.
2. Pure Water Fittings: Brass body with pure tin interior lining.

D. Finishes: Clear epoxy over polished chrome.

E. Service Indexes Color and Identification Code: Per SEFA standard and as listed below:
1. Cold Water Color: Dark green Code: CW
2. Hot Water Color: Red Code: HW
3. Air (Compress air) Color: Orange Code: Air
4. Gas (Burning) Color: Dark blue Code: Gas
5. Vacuum Color: Yellow Code: Vac
6. Purified Water Color: White Color: DW, DI
7. Nitrogen Color: Gray Code: N, N2
8. Helium Color: Brown Code: He

F. Fabrication
1. Water Service Fittings (Faucets and valves):
a. Equipped with renewable compression valve unit or cartridge containing all working components subject to wear, including replaceable seat and integral volume control device.
b. Capable of being converted from compression to self-closing type.
c. Gooseneck: Separate brazed coupling outlet for attachment of aerator, serrated hose end and other outlet fittings.

d. Vacuum Breaker:
   1) Where required and indicated, shall be integral with gooseneck.
   2) Equipped with renewable seat and valve designed for fine flow control.
e. Meet requirements of ANSI/ASME A112.18.1M.

2. Dry Service Fittings (Air, Gas, Vacuum and Other Gas):
   a. Needle Control Valves:
      1) Valve: Shall have stainless steel or monel metal renewable, self-centering, floating cone and replaceable seat.
      2) Body: Shall have removable serrated hose end.
   b. Ball Valves:
      1) Valve: Chrome plated ball and PTFE seals.
      2) Body: Shall have removable serrated hose end
      3) Handle: Black nylon, lever type with colored service index button.

G. Service Fittings Schedule:
   1. IHCW: Hot/Cold Water Mixing Faucet, Deck Mounted.
      a. Model: WS-L412-8-VB
      b. Features: 8 inch spread, rigid/swing gooseneck, vacuum breaker; Aerator; Wrist blade handles.
   2. CW: Cold Water Faucet, Deck Mounted; 180 degree.
      a. Model: WS-L611-VB
      b. Features: 6 inch spread, rigid gooseneck, vacuum breaker;; Wrist blade handle, 180 degree, ten serration hose end. Mount so that water stream enters directly into center of cupsink drain.
   3. EW: Dual Purpose Eye Wash/Drench Hose, Deck Mounted.
      a. Model: WS-EW1022
      b. Features: 2 spray heads side by side, angled at 45 degrees. Squeeze handle with locking clip.
   4. PW: Pure Water Faucet, Deck Mounted.
      a. Model: WS-L691VB-BH
      b. Features: Tin-lined, 6 inch rigid gooseneck, vacuum breaker, wrist blade handle, left hand configuration, removable ten-serration hose end, manual control.
   5. DH: Hot/Cold Mixing Drench Hose, Panel Mounted
      a. Model: WS-PR511-110
      b. Features: Vacuum Breaker, Adjustable Wall Bracket Support with Valve Hook, Wrist Blades
   6. G(w), A(w), V(w): Compressed Air, Gas & Vacuum Ball Valves, Panel Mounted Turret.
      a. Model: WS-L4200-158
      b. Feature: Straight pattern with serrated hose end.
   7. G(1), A(1), V(1): Compressed Air, Gas & Vacuum, Ball Valves, Deck Mounted Turret.
      a. Model: WS-L4200-131
      b. Feature: straight pattern with serrated hose end.
   8. G(2), A(2), V(2): Compressed Air, Gas & Vacuum, Ball Valves at 180 degree, Deck Mounted Turret.
      a. Model: WS-L4200-132S
      b. Feature: straight pattern with serrated hose end. 2 valves at 180 degree.
   9. N2, He: Fine Control Needle Valve, Panel Mounted Turret.
      a. Model: WS-L2870-158
      b. Features: straight pattern
   10. CA(1)oh[]: Compressed Air Overhead Service Carrier Mounted Quick Disconnect Single Ball Valve.

a. Model: WS L4200FH-146WSA-MOD panel mounted flange, forged brass handle and mounting shank. Modification refers to short mounting shank with 90 degree elbow. Provide with B-QC6-F-6PM-K panel mounted keyed quick disconnect body, internal shut-off valve, 3/8 inch NPT male inlet, and index color insert for Compressed Air. Provide with B-QC6-D-6PM-K plug, internal shut-off valve, 3/8 inch male outlet, and B145 A-FM 72 inch length reinforced PVC hose assembly with swivel 3/8 inch NPT female end and 3/8 inch NPT male end.

11. CA(2)oh, V(2)oh: Compressed Air, Vacuum Overhead Service Carrier Mounted Quick Disconnect Double Ball Valves.
    a. Model: Model: WS L4200FH-146WSA-MOD panel mounted flange, forged brass handle and mounting shank. Modification refers to short mounting shank with 90 degree elbow. Provide with B-QC6-F-6PM-K panel mounted keyed quick disconnect body, internal shut-off valves, 3/8 inch NPT male inlet, and index color insert for Compressed Air or Vacuum. Provide with B-QC6-D-6PM-K plug, internal shut-off valve, 3/8 inch male outlet, and B145 A-FM 72 inch length reinforced PVC hose assembly with swivel 3/8 inch NPT female end and 3/8 inch NPT male end.
12. G(2)oh[]: Gas Overhead Service Carrier Mounted Quick Disconnect Double Ball Valves.
    a. Model
13. SG1(oh): Specialty Gas Overhead Service Carrier Mounted Swagelock Ball Valves, Tubing, Tee Fittings, Unions, Plugs.
    a. Model: 6L-T4-S-035-20-ES 1/4 inch stainless steel tubing, SS-43GS4-1466 stainless steel one-piece 40G series ball valve, 1.4CV, 1/4 inch swagelock tube, SS-400-3CS11 Tee, SS-400-6SC11 Union, SS-400-PBLBQ Plug.
    b. Features: Tubing to be electropolished, cleaned and bagged. All components to be 'no lube;, SC-11 cleaned to ASTM G93 Level 3 Standard.
14. ES: Emergency Shower: Concealed Stay-Open Ball Valve, Panic Bar Activation and Wall Mounted Exposed Shower Head
    a. Model: WS-ES672.
    b. Features: Polished chrome-plated cast brass shower head
15. Process Chilled Water Supply, Return Valve: Reference Division 15.

## 2.20 ELECTRICAL FITTINGS

A. Power and data receptacles that are a part of laboratory casework assemblies are specified in Division 16.

B. General:
1. All electrical fittings shall be UL labeled.
2. Provide ground-fault circuit interrupters (GFCI) for fittings where indicated and when located in units containing water supplies or sinks.
3. Provide:
    a. Standard Terminals:
        1) Device plates.
        2) Fittings and gaskets for mounting electrical fittings.
4. Finishes:
    a. Housings or boxes for pedestal-type and line-type fittings: Manufacturer's standard finish.
    b. Painted surfaces:
        1) Baked-on, chemical resistant enamel.
    c. Ferrous fittings: Galvanized finish.
    d. Receptacle and switch cores: Gray.

C. Cover Plates
   1. AC outlets and devices:
      a. Type 302 stainless steel, #4 satin finish, with formed, beveled edges.
   2. DC or combination AC/DC outlets and devices:
      a. Laminated plastic.
      b. Etch laminated plastic strips to provide white lettering on black background.
      c. Securely fasten to cover plate with non-corrosive fasteners or epoxy adhesive.

## 2.21 SOLVENT (ST-10), ACID (ST-11) TALL STORAGE CABINETS

A. Manufacturers:
   1. Eagle Manufacturing Co.; www.eagle-mfg.com.
   2. Justrite Manufacturing Co.; www.justritemfg.com.
   3. SciMatCo.; www.scimatco.com.

B. Flammable Liquids Storage Cabinets:
   1. Size: 60 gallon.
   2. Construction: 18 gauge cold rolled steel with double walls containing a 1-1/2 inch air space.
   3. Doors:
      a. Self-closing:
         1) 3-point lock, self-latching.
         2) Continuous piano hinge.
         3) Fusible link.
   4. Shelves: Five, adjustable shelves; 350 lb/shelf capacity.
   5. Feet: Adjustable, leveling type.
   6. Color: Safety yellow.
   7. Signage: Hazard warning sign on door in compliance with ANSI Z535.2 and ANSI Z535.3: “Flammable - Keep Fire Away”
   8. Fire resistance:
      a. Meet requirements of OSHA 29 CFR 1910.106D, NFPA 30, and shall have Factory Mutual approval and labels, or be certified by an independent testing laboratory.
      b. Grounding connection: Provide grounding connection point on the back of the cabinet for wiring to the building grounding system.

C. Acid Storage Cabinets:
   1. Size: 45 gallon.
   2. Construction: 18 gauge steel; double wall, top, bottom, and back construction, with 1/2 inch air space between faces.
   3. Doors:
      a. Swing:
         1) 3-point lock, self-latching.
         2) Continuous piano hinge.
   4. Shelves: Two, adjustable metal shelves; 500 lb/shelf capacity
      a. Shelf trays: High density polyethylene.
      b. Vents: 2 inch vent with fire baffle and cap.
      c. Feet: Adjustable leveling type.
      d. Color: Manufacturer's standard color.
      e. Sign: “Caution - Acids/Corrosives”
   5. Fabricate in accordance with requirements for steel casework specified herein.

6. Liner: Corrosion resistant liner.
7. Signage: Provide hazard warning sign on the door in compliance with ANSI Z 535.

## 2.22 ACCESSORIES

A. Snorkel Exhausts
   1. Manufacturer
      a. Lab Safety Supply, Inc.
      b. Nederman, Inc., basis of design
      c. Plymovent Corp.
   2. Model
      a. Three joints; 59"; No. 70502134, with mounting bracket 40 inch (762 mm); No. 70371626; white powder coated steel. Provide three-point anchoring to structure above ceiling.
   3. Features
      a. Ceiling mounted. Provide three-point attachment to structure above ceiling.
      b. Articulating extractor arm (length shall permit snorkel hood to be within 6” of work surface)
      c. Mechanical balancing valve: Locate above ceiling.
      d. Provide ceiling trim at suspended acoustical ceiling.
      e. Color: White.
      f. Exhaust:
         1) Airflow: balance to 75 cfm min.
         2) 3” diam. snorkel.
         3) Connection to exhaust system to be made above finish ceiling level.
         4) Extractor hood, polypropylene, 13.8" diameter, Model 70371642.

B. Reinforced Thermoset Resin Pegboards:
   1. Pegboard:
      a. Material: 1 inch thick Trespa.
      b. Sizes: 20" Long by 30 inch high by 1 inch thickness at SK-1, SK-2, SK-3, 36" Long by 30 inch high by 1 inch thickness at SK-4.
      c. Color: To match work surface.
      d. One-piece body with 4 inch stainless steel drip trough.
   2. Pegs: Removable 1/2 inch diameter, 6 inches long, white polypropylene. Mounted 30-degee.
   3. Drip trough shall have Tygon drain tube connector into sink.

C. Cylinder Racks:
   1. Manufacturer
      a. Air Systems , www.airsystems.cc
      b. Material Flow and Conveyor Systems, Inc. www.materialflow.com
      c. Northern Safety Company, Inc., www.northernsafety.com
   2. Model
      a. Air Systems Model BR-23, basis of design
   3. Features
      a. 6 cylinder capacity, 2 deep by 3 wide
      b. 2" square tubular steel welded construction
      c. Two heavy gauge chains with snap hooks per row of cylinders

D. Cylinder Restraints:
   1. Manufacturer
      a. Praxair, Basis of Design
      b. Air Systems
      c. Lab Safety Supply
   2. Model: FIRG-100 Single Cylinder Wall Bracket
   3. Size: 8 inch by 2 1/4 inch by 4 1/4 inch high.
   4. Components:
      a. All steel construction, 11 gauge powder-coated steel with edge guard at cylinder interface.
      b. 1 1/2 inch strap with cinch buckle.
      c. Supports cylinders from 4 to 12 inch diameter.
   5. Support cylinder from 4 to 12 inch diameter.
   6. Mount to side of fume hood per Lab Elevations.

E. Canopy Hood (CE):
   1. Steel, finish to match steel casework finish.
   2. Size: 72 inch by 36 inch.
   3. Provide four 48 inch rods with coupler for additional ceiling height.
   4. Provide exhaust collar 2 inch height with 12 inch diameter.
   5. Provide with baffles.
   6. Balance to 900 CFM each.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Floors shall be level to within 1/4 inch in 10 feet, noncumulative, in any one direction.

B. Final floor finish shall be completed prior to casework installation.

C. Wall systems shall be completely installed and be plumb for installation of wall cabinets. Install all blocking and supports for wall cabinets. Wall system finish shall be complete including final painting.

D. The ceiling system shall be in place including suspension grid and ceiling panels except at fume hoods and utility umbilical drops at island benches.

E. The ceiling system shall be in place including finishes of gypsum board.

F. Branch electrical circuits, including grounding conductors, shall be in place.

G. HVAC grilles, call systems, and sprinkler heads shall be installed.

H. Overhead electrical fixtures shall be installed and connected. Provide adequate lighting for installation of casework.

I. Overhead mechanical lines shall be tested for leaks before finished casework is installed in any area.

J. Where mechanical, electrical and HVAC service lines will be behind or under casework, service access or stubs shall have been installed at the appropriate rough-in point.

K. Service lines for water, gas, vacuum, and special gases shall be flushed clean of dirt and chips, capped and tested for leaks prior to the connection of service fittings.

L. No standing water shall be evident on the floor. Water producing operations such as masonry, terrazzo, and plaster shall be completed and cured prior to casework installation.

## 3.2 CASEWORK INSTALLATION

A. Install plumb, level, true and aligned with no distortions. Shim, using concealed shims. Where laboratory casework abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed. Fit scribe strips to irregularities of adjacent surfaces. Maximum gap opening shall be 0.025 inch.

B. Base Cabinets: Set cabinets straight, plumb, and level. Adjust sub-tops within 1/16 inch (1.6 mm) of a single plane. Bolt continuous cabinets together. Fasten continuous cabinets to floor at toe space, with fasteners spaced 48 inches o.c. Secure individual cabinets with not less than two fasteners into floor, where they do not adjoin other cabinets. Assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.

C. Wall Cabinets and Shelves: Fasten to solid supporting material, not plaster, lath, or wallboard. Anchor, adjust, and align wall cabinets as specified herein for base cabinets. Reinforcement of stud walls to support wall-mounted cabinets and shelves will be done during wall erection by trade involved, but responsibility for accurate location and sizing of reinforcement is part of this work.

D. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

E. Caulk between casework and wall.

## 3.3 WORK SURFACE INSTALLATION

A. Field Jointing: Make in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings, factory prepared so there is no job site processing of top and edge surfaces.

B. Alignment: Abut top and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in work surfaces.

C. Installation Tolerances:
   1. Level: +/- 1/8 inch in 10 feet, noncumulative.
   2. Joint widths: 1/16 inch maximum wide at any location, flush with abutting edges. Horizontal alignment of top surface of all joints for their entire length shall be 1/32 inch. Fill joints.
   3. Front edges of all abutting units shall align.
   4. Visible gaps at cutouts with escutcheon or grommet: None.

D. Cast Epoxy Resin Tops:
   1. Fastening: Secure to cabinets with silicone adhesive applied at each corner and along perimeter edges at not more than 48" o.c. Adhesive, rather than epoxy cement, allows for future disassembly and relocation.
   2. Workmanship: Abut top and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices.
   3. Tolerances: Provide joint widths not more than 1/16" wide at any location, filled and flush with abutting edges. Horizontal alignment of top surface of all joints for their entire length shall be within 1/32". Front edges of all abutting pieces shall align.
   4. Surface Finish: After installation, dress joints smooth, remove any surface scratches, clean and polish entire surface.
   5. Verify field dimensions and squareness of adjacent walls prior to installation.

3.4

## 3.5 SERVICE FIXTURES AND FITTINGS INSTALLATION

A. Refer to Division 15 for final connection of plumbing fixtures and fittings.

B. Sinks and Cup Sinks:
   1. Install sinks with integral rim or sink ring, set in mastic or sealant to form a positive seal with the work surface.
   2. Remove excess mastic and sealant after sink is set.
   3. Apply 1/8 inch thick, heat resistant underseal to undersink surfaces to prevent condensation and provide sound deadening.
   4. Cast epoxy resin sink installation in cast epoxy resin work surface:
      a. Underslung installation:
         1) Supports: Steel channels attached to ends of sink cabinet, adjustable by screw type rods.
         2) Set top edge of sink tight to underside of work surface, in chemical resistant sealing compound, for a tight and leak proof joint.
         3) Adjust sink and support to prevent movement.
         4) Remove excess sealing compound after sink is set.
   5. Surface mounted stainless steel sink installation:
      a. Semi-flush installation:
         1) Frame, if integral rim seal not provided: Stainless steel, with clamping lugs and pads.
         2) Apply continuous coat of sealant under lip of rim and along edge of opening in work surface.

C. Fume Extractor:
   1. Modify installation of ceiling bracket to conceal duct tie-in above ceiling.
   2. Provide ceiling trim at suspended acoustical ceiling.

D. Utility Chase Closure (Umbilicals)
   1. Fasten to work surface and building structure.
   2. Seal edges of collars at work surface and ceiling.

3.6 ACCESSORY INSTALLATION

A. Install in a precise manner in accordance with manufacturer's directions.

B. Turn screws to a flat seat; do not drive.

C. Adjust moving parts to operate freely without excessive bind.

3.7 INTERFACE WITH OTHER WORK

A. Where access is required through items of laboratory casework, remove access panels, drawers, and other components, where they occur; make connections; and replace components.

B. Perform field inspection and testing in accordance with Section 01400.

3.8 ADJUSTING

A. Adjust hardware and fittings for smooth operation.

3.9 CLEANING and PROTECTION

A. Clean shop-finished surfaces, touch-up and remove or refinish damaged or soiled areas, as acceptable to Architect.

B. Clean and polish epoxy resin countertops.

C. Protection: Protect materials and installed laboratory casework and fixtures from subsequent construction operations.

D. Laboratory casework and counters are not to be used as workbenches or work platforms for any portion of the work by any trade. Furniture and casework, as installed, is considered to be finished equipment and shall be protected from damage.

E. Repair or remove and replace defective work as directed by the Architect upon completion of installation.

END OF SECTION 12 30 00