

SECTION 12 35 53 - LABORATORY 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.

1.2 SUMMARY

- A. Section Includes:

1. Wood laboratory casework.
2. Plastic-laminate laboratory casework including fixed and adjustable shelves.
3. Vertical and horizontal service assemblies of plastic laminate or epoxy resin, including reagent shelving.
4. Utility-space framing between backs of base cabinets.
5. Filler and closure panels.
6. Laboratory casework system that includes support and utility-space framing, filler and closure panels, wall panels, undercabinet lighting, and modular countertops.
7. Laboratory countertops.
8. Tables.
9. Shelves.
10. Integral sinks
11. Laboratory sinks and troughs.
12. Laboratory accessories.
13. Water, laboratory gas, and electrical service fittings.
14. Provide end, side and miscellaneous filler panels to close off inaccessible spaces and complete the assemblies. Provide rear panels at all knee spaces unless shown otherwise.

- B. Related Sections:

1. Division 01 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 09 Section "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring laboratory casework.
3. Divisions 22 and 26 Sections for installing service fittings specified in this Section, including connecting service utilities.

1.3 DEFINITIONS

- A. **MDF: Medium-density fiberboard.**
- B. **Exposed Surfaces of Casework:** Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and visible surfaces in open cabinets or behind glass doors.
 - 1. Cabinet sides.
 - 2. Filler strips and panels
 - 3. Tops of cases less than 6'6" above the floor
 - 4. Visible front edges of web frames, ends, divisions, tops, shelves and hanging stiles.
 - 5. Visible members in open cases or behind glazed doors
 - 6. Visible portions of bottoms, tops, and ends in front of sliding doors
 - 7. Visible portion of back panel in knee spaces.
 - 8. Ends of cabinets, including those installed directly against walls or other cabinets, are defined as "exposed."
 - 9. Ends of cabinets indicated to be installed directly against and completely concealed by walls or other cabinets are defined as "concealed."
- C. **Semiexposed Surfaces of Casework:** Surfaces behind opaque doors, such as cabinet interiors, shelves, and dividers; interiors and sides of drawers; and interior faces of doors. Tops of cabinets 78 inches or more above floor are defined as "semiexposed."
 - 1. Surfaces which become visible when opaque doors/drawers are extended.
 - 2. Underside of casework less than 4'0" and more than 2'6" above the floor.
 - 3. interior face of ends, backs and bottoms.
- D. **Concealed Surfaces of Casework:** Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.
 - 1. Undersides of casework less than 2'6" above the floor.
 - 2. undersides of work surfaces, knee spaces and drawer aprons
 - 3. flat tops of cabinets 6'6" or more above the finished floor, except those visible from an upper building level.
- E. **Hardwood Plywood:** A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive and faced both front and back with hardwood veneers.

1.4 PERFORMANCE REQUIREMENTS

- A. **System Structural Performance:** Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
 - 1. Support Framing System: 600 lb/ft..
 - 2. Suspended Base Cabinets (Internal Load): 160 lb/ft..
 - 3. Work Surfaces (Including Tops of Suspended Base Cabinets): 160 lb/ft..

4. Wall Cabinets (Upper Cabinets): 160 lb/ft..
 5. Shelves: 40 lb/sq. ft, acting concurrently on all shelves in shelving unit.
- B. Delegated Design: Design laboratory casework, including comprehensive engineering analysis by a qualified professional engineer, using seismic performance requirements and design criteria indicated.
- C. Seismic Performance: Laboratory casework and support framing system, including attachments to other work, shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
1. Design earthquake spectral response acceleration, short period (Sds) for Project is **<Insert value>**.
 2. Component Importance Factor is 1.5.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that cabinets, countertops, and shelves comply with forest certification requirements.
 - a. Include evidence that casework manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - b. Include statement indicating costs for products containing certified wood.
 2. Product Data for Credit EQ 4.4:
 - a. For composite wood products, indicating that bonding agents contain no urea formaldehyde.
 - b. For adhesives used, indicating that products contain no urea formaldehyde.
- C. Shop Drawings: For laboratory casework. Include plans, elevations, sections, details, and attachments to other work.
1. Indicate locations of hardware and keying of locks.
 2. Indicate locations and types of service fittings.
 3. Indicate locations of blocking and reinforcements required for installing laboratory casework.
 4. Include details of utility spaces showing supports for conduits and piping.
 5. Include details of support framing system.
 6. Include details of exposed conduits, if required, for service fittings.
 7. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
 8. Include coordinated dimensions for laboratory equipment specified in other Sections.
 9. Submit full catalog of manufacturer's systems.

- D. Samples for Initial Selection: For factory-applied finishes and other materials requiring color selection.
- E. Samples for Verification: For each type of cabinet finish and each type of countertop material indicated, in manufacturer's standard sizes.
- F. Samples for Verification: Unless otherwise directed, approved full-size Samples may become part of the completed Work, if in an undisturbed condition at time of Substantial Completion. Notify Owner of their exact locations. If not incorporated into the Work, retain acceptable full-size Samples at Project site and remove when directed by Owner.
 - 1. One full-size, finished base cabinet complete with hardware, doors, and drawers.
 - 2. One full-size, finished wall cabinet complete with hardware, doors, and adjustable shelves.
 - 3. One Sample each of hinged and sliding doors.
 - 4. 6-inch- square Samples for each type of countertop material.
 - 5. One of each service fitting specified, complete with accessories and specified finish.
 - 6. One of each type of sink and accessory item specified.
 - 7. One of each type of hardware item specified.
 - 8. One full sized doors finished as specified will be used by the University of Washington to chemical-test the finish and will not be returned.
- G. Delegated-Design Submittal: For laboratory casework indicated to comply with seismic performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- H. Qualification Data: For qualified manufacturer.
- I. Product Test Reports for Casework: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard and system structural performance specified in "Performance Requirements" Article.
- J. Product Test Reports for Countertop Surface Material: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory countertop surface materials with requirements specified for chemical and physical resistance.
- K. Mockup
 - 1. When required for the project, provide a mockup made in accordance with the specifications, detail drawings and approved shop drawings. Provide one full size laboratory casework assembly, which contains a minimum of the following:
 - a. A combination base cabinet with doors and drawers.
 - b. Mockup shall contain all materials, finishes, hardware and construction details required.

- c. The mockup will be tested independently by the Owner for quality assurance and adherence to the specifications. IF THE MOCKUP IS FOUND TO BE OF INFERIOR QUALITY OR NOT IN CONFORMANCE WITH THE SPECIFICATIONS, OR CONTINUED FAILURE INDICATES NONCONFORMANCE OF PROJECT DOCUMENTS, CASEWORK IS SUBJECT TO REJECTION ON THE PROJECT.

1.6 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA 8 **[and] [is certified for chain of custody by an FSC-accredited certification body]**.
- B. **Source Limitations:** Obtain laboratory casework from single source from single manufacturer unless otherwise indicated.
 1. Obtain fumehoods, countertops, sinks, accessories, and service fittings from the same supplier for single responsibility.
 2. Manufacturer's catalog model numbers may be indicated for convenience in identifying certain work and to establish design and quality standards. The use of catalog numbers is not intended to preclude the use of other acceptable manufacturer's products or procedures which may be equivalent. In the case of listing various manufacturers, the design and standard of quality is based on the manufacturer and model is first listed. If other listed or non-listed items are accepted by the Owner and utilized, modifications to the design and quality may be necessary at no additional cost to the Owner.
 3. Laboratory casework installation shall be performed under the continual supervision of a Foreman who is thoroughly trained in the manufacturer's recommended methods of installation and who has a minimum of three year's experience in the successful completion of comparable sized projects.
- C. **Product Designations:** Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers. Other manufacturers' laboratory casework of similar sizes and similar door and drawer configurations and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."
- D. **Submit written certification** stating that the work is installed per the specifications, applicable codes and standards.
 1. Submit structural calculations showing conformance to the current building code, including seismic and shelf loading.
 2. submit independent laboratory testing report on chemical resistance and physical requirements.
 3. Submit location, facility, owner, city and state where casework finish is being applied.
 4. Submit qualifications of casework Foreman.
 5. Submit for Owner's review and use, three complete operations and maintenance manuals that describe proper maintenance and replacement schedules, components and parts list. Provide point of contact for factory representative.

- E. Casework Product Standard: Comply with SEFA 8, "Laboratory Furniture - Casework, Shelving and Tables - Recommended Practices."
- F. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements in NFPA 30 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying requirements.
- I. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.8 WARRANTY

- A. Furnish a written warranty covering the work of this section for a period of 2 years from the date of substantial completion against defects or non-conforming materials and/or workmanship. Defects include, but are not limited to:
 - 1. Ruptured, cracked or stained coating.
 - 2. Weld or structural failure.
 - 3. Slippage, shifts or failures or connected components, including attachments to wall, floor, ceiling or building structure.
 - 4. Warping or unloaded deflection of components.
 - 5. Discoloration or lack of finish integrity.
 - 6. Cracking or peeling of finish.
 - 7. Delamination of plastic laminate or edge banding
 - 8. Visible weld marks
 - 9. Sealant deterioration, shrinkage or failure.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, utility roughing-in and wet work are complete and dry, and temporary HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.10 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.
- B. Coordinate installation of laboratory casework with installation of fume hoods and other laboratory equipment.

1.11 EXTRA MATERIALS

- A. Furnish complete touchup kit for each type and color of metal laboratory casework provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.
- B. Furnish complete touchup kit for each type and color of wood laboratory casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.
- C. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.
 - 2. Modular Countertop Units: Two extra units of each length and material installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1. Subject to compliance with requirements of this section, manufacturers offering products that may be incorporated in the work include the following:
- 2. Kewaunee Scientific Equipment Corporation
PO Box 5400
Statesville NC 28687-1842
Contact: George Goddard
PO Box 937
Kirkland WA 98083-1937
- 3. Fisher Hamilton Inc
1316 18th Street
Two Rivers, WI 54241
Approved finishes: #886-NA and #2 CL62 Fine OR the University of Washington finish
Contact: Greg Timmerman
ISEC, Inc.
11807 N. Creek Parkway South
Suite 103
Bothell, WA 98011

2.2 WOOD CABINET AND TABLE MATERIALS

A. General:

1. Certified Wood Materials: Provide cabinets with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
2. Adhesives: Do not use adhesives that contain urea formaldehyde.
3. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
4. Hardwood Plywood: HPVA HP-1, either veneer core or particleboard core, unless otherwise indicated, made without urea formaldehyde.
5. MDF: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
6. Hardboard: AHA A135.4, Class 1 Tempered.
7. Edgebanding for Wood-Veneered Construction: Minimum 1/8-inch- thick, solid wood of same species as face veneer.
 - a. Colors: As selected by Owner from manufacturer's full range.

B. Exposed Materials:

1. General: Provide materials that are selected and arranged for compatible grain and color. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings.
2. Wood Species: **[Red oak] [White maple]**. Plain sliced, grade AA, random matched veneers. Provide minimum 5" to maximum 6" wide flitch. Apply veneer to hardwood plywood or other specified substrate as required for transparent finish. **Particleboard and MDF are not permitted substrates.**
 - a. 5 or 7-ply veneer core plywood or solid core is permitted for doors and drawer fronts.
 - b. 5 or 7 -ply veneer core plywood is required for main box construction. No particleboard or MDF substrate is allowed in the box.
3. 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 or filler strips which are noticeably dissimilar in grain, figure, and natural character markings.
4. Solid Wood: Clear hardwood lumber of species indicated and selected for grain and color compatible with exposed hardwood plywood.

C. Semiexposed Materials:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects, of any species similar in color and grain to exposed solid wood. Dry, sound per AWI grade II rules selected to eliminate appearance defects. Any species of hardwood, or softwood of similar color and grain to exposed portions.
2. Plywood: Hardwood plywood of same species as exposed plywood. 5 and 7 ply veneer core plywood, per AWI grade II.
3. Provide solid wood or hardwood plywood for semiexposed surfaces unless otherwise indicated.
4. **Particleboard/plywood composites will not be allowed.**

D. Concealed Materials:

1. Solid Wood: Any species, with no defects affecting strength or utility.
2. Plywood: Hardwood plywood. Provide backs of same species as faces.
3. Hardboard: ANSI A135.4, Class I, tempered, 1/8" minimum thickness
4. Not permitted: particleboard or composite particleboard/plywood is not permitted.

2.3 WOOD LABORATORY CASEWORK FINISH

A. Work Surface Preparation:

Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks and abrasions, with all dust thoroughly removed by compressed air.

B. Wood Finish Application:

Finishes shall be applied under controlled atmospheric conditions, and shall be cured after application in a modern humidified oven at 140°F and 30% relative humidity.

1. Exterior and interior finish to be applied after all holes and cutouts have been made, to ensure all surfaces, are covered.
2. Hardware to be installed after finish is applied, so that no unfinished surface exists on the casework.

C. Interior Wood Casework Finish:

Interior surfaces and unexposed exteriors shall receive a double-pass coat of resinous wood sealer.

D. Exterior Wood Casework Finish:

Case and cabinet exposed exterior surfaces, including interiors of glazed cases and open shelving, shall be provided with a smooth, semi-gloss acid, alkali, solvent, water and abrasion resistant finish. Surfaces shall be first double-coated with a non-fiber lifting stain, or toner to secure the desired color. The color coats shall be thoroughly dried. The first sealer coat shall be applied, thoroughly dried, sanded and carefully dusted. A second sealer coat shall be applied and thoroughly dried. A double pass coat of chemical resistant synthetic finish shall then be applied and thoroughly dried, providing a semi-gloss finish. The completed case and cabinet exterior finish shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS. The finish and its test results should correspond to the TR-6 Finish System, custom or premium grade, as noted in Section 1500-6-11 of the AWI standards.

E. Performance Test Rating:

Terms referred to in PERFORMANCE TEST RESULTS are as follows:

1. "A" (Excellent) - NO CHANGE TO CASEWORK FINISH.

2. "B" (Good) - Indicates good to very good integrity of finish film. Allows change of gloss or discoloration. Any effect can be removed from the tested area by abrading with 325-mesh silica powder and water, indicating that the discoloration is only superficial and that the finish film is good below the surface.

F. Performance Test Results (Chemical Spot Tests):

Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide-mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 73° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area.

	<u>REAGENT*</u>	<u>RATINGS</u>	<u>TEST TIME</u>
1.	Acetone**	Excellent	60 minutes
2.	Ammonium Hydroxide 28%	Excellent	60 minutes
3.	Benzene**	Excellent	60 minutes
4.	Carbon Tetrachloride**	Excellent	60 minutes
5.	Ethyl Acetate**	Excellent	60 minutes
6.	Ethyl Alcohol**	Excellent	60 minutes
7.	Ethyl Ether**	Excellent	60 minutes
8.	Glacial Acetic Acid, 99%	Excellent	60 minutes
9.	Hydrochloric Acid, 37%	Excellent	60 minutes
10.	Methanol**	Excellent	60 minutes
11.	Methyl Ethyl Keytone**	Excellent	60 minutes
12.	Naphtha**	Excellent	60 minutes
13.	Nitric Acid, 30%	Excellent	60 minutes
14.	Phosphoric Acid, 75%	Excellent	60 minutes
15.	Potassium Hydroxide, 40%	Excellent	60 minutes
16.	Sodium Hydroxide, 40%	Excellent	60 minutes
17.	Sodium Hydroxide, 10%	Excellent	60 minutes
18.	Sulfuric Acid, 70%	Excellent	60 minutes
19.	Toluene**	Excellent	60 minutes

* Where concentrations are indicated, percentages are by weight

** Indicates that these solvents are tested with cotton and jar method

G. Performance Test Results (Heat Resistance):

Hot water (190° F - 205° F) shall be allowed to trickle on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of ONE HOUR. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.

H. Performance Test Results (Moisture Resistance):

A cellulose sponge (2" x 3" x 1") shall be soaked with water and placed on the finished surface for a period of 100 hours. The sponge shall be maintained in a wet condition throughout the entire test period. At the end of the test period, the surface shall be dried and no visible effect shall be shown on the finish.

I. Performance Test Results (Impact Resistance):

A 1-LB. Ball (approximately 2" diameter) shall be dropped from a distance of 1-ft. onto the finished surface of a 3/4" thick plywood panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.

2.4 WOOD CASEWORK HARDWARE AND ACCESSORIES

- A. Provide manufacturer's standard, modified as noted, satin finish hardware units.
- B. All hardware is installed **after** box, box drawer, or door has final chemical-resistant finish coats, to ensure a complete finish seal for all parts.
- C. Hinges: Institutional grade, 5 knuckle stainless steel, examples of manufacturers – A.L. Liebhan or Dortec. Provide one pair for doors less than 4 feet high and 1-1/2 pair for doors over 4 feet.
- D. Pulls: Chemical resistant (clear coating or anodizing of aluminum is acceptable) solid stainless steel or aluminum, surface mounted or recessed (not machined nor attached to the edge of drawers or doors) for drawers and swing doors, through-bolt from back face. For sliding doors, provide recessed flush pulls, harmonizing with other pulls. Provide 2 pulls for drawers 24 inches and over in width. Use of plastic pulls or other types subject to breakage will not be accepted. Pulls shall meet State and Federal Handicapped Accessibility Regulations.
- E. Door Catches: Roller spring actuated or self-aligning magnet type, minimum seven pound pull, with metal strike plates. Provide 2 catches on doors over five feet high. Catches permitting rebound opening, not acceptable.
- F. Drawer Roller Slides: Provide a quiet smooth operation of corrosion-resistant 100 pound capacity, full-extension ball bearing roller slides on drawers, 150-pound capacity on drawers over 30 inches wide. Standard of quality to be Accuride No. 3832-SC (full extension and self-closing), Accuride No. 3640 for drawers over 36" wide at 100 LB. Rating. Use corresponding quality on other slide applications. Drawer shall self-close

when opened a nominal 5 inches. Incorporate drawer stop to prevent drawer contact with back of cabinet. The slide shall permit easy removal of drawer without the use of tools and yet prevent inadvertent drawer removal. Hardwood keels and guides are not acceptable.

- G. Adjustable Shelf Supports: Stainless steel, mortise mounted or pin and socket type with four 1/4" diameter x 3/8" long pins in a shelf clip with shelf notched for clip, to provide horizontal and vertical restraint. Similar to TMI universal shelf clip #1990.
- H. Hasps: Chemical resistant coated steel or stainless steel. Surface mount with opening for insertion of owner supplied lock.
- I. Locks: Only where shown or specified, shall be Master Key System.
 - 1. 5-tumbler, heavy-duty cylinder type with 225 primary key changes in master keyed groups. Exposed nose shall be stain nickel-plated and stamped with identifying numbers. Two keys shall be furnished with each keyed different lock or lock series. Supply two master keys with each system. Key shall be 3/32 inch-thick minimum, stamped brass. Keys easily distorted or broken are not acceptable. Keys shall be available from manufacturer or registered locksmiths only. Coordinate with Owner's keying requirements.
- J. Cabinet Base Molding: Refer to Division 9.
- K. Leg Shoes: Provide on table legs, unless otherwise noted. To be extruded vinyl rubber, black to conceal leveling device.
- L. File Followers: Letter size, minimum mounted plate size of 7-1/2 " x 10-1/2 " track may be recessed. Plastic components not acceptable. Provide in drawers indicated as "file".
- M. Floor Glides: Movable legged tables shall have non-marking material at least 1-1/2 " diameter integral with a 5/8" leveling device. Metal buttons are not acceptable.
- N. Tracks: Tracks for sliding doors to be corrosion resistant. Hangers shall be adjustable. Bottom track to have clean out opening at each end. Nylon guides to be provided as necessary.
- O. Liner: Where noted, liner shall be chemically resistant, inorganic, and non-asbestos with high structural stability, non-combustible, and high impact resistance. Seal between all panels or provide a single piece insert.

2.5 FABRICATION OF LABORATORY WOOD CASEWORK

- A. Casework Style: [If to match existing; list style number.]
- B. Casework Type: Plant fabricate to dimension, profiles, and details in individual units of the widths indicated, as independent and removable units. Each unit shall be complete such that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.

C. Joinery: All cabinet members shall be securely fastened together, by methods listed below. All joints shall be securely glued. Casework shall be assembled square and true, with a tolerance not to exceed 1/32" difference in measurement at top versus bottom, and 1/16" in diagonal measurement. For Laboratory Grades at option of the manufacturer, construction joinery shall be as follows:

1. Dadoes, or lock joints, plows or rabbets.
2. Doweled joints, a minimum of (2)-dowels per joint, 32MM on center. All dowel-construction shall be glued and clamped.
3. "Confirmat" type screws: Maximum of 37MM from each end with subsequent screws being spaced 128MM on center. Glue is not required with this system.
4. "Lamello" type jointing plates: The plate shall be a maximum of (2)-inches from the edge or end to the center of the plate. Subsequent plates shall be spaced a maximum of (6)-inches on center. All joints shall be glued and clamped.
5. "Mod-eez" type fastening systems: The fasteners shall be a maximum of 16" on center and 4" from any edge or end. They shall be fastened with number 10 full thread sheet metal screws for cabinet body construction. Glue is not required with this system.
6. No exposed fastening is permitted except for access panels.
7. Edges of exposed Portions: Blind or stop dadoes are required.
8. Ends, Divisions and Compartment Separations: Cabinet ends are required. Exposed ends shall be rabbeted or plowed to receive backs if used. Drawer compartments shall be separated from shelf or open compartments by a solid vertical division unless design or usage prevents. A solid division shall occur behind all vertical face frame members or hanging files.

D. Standard Construction

1. Base Cabinets:

All cabinet end panels shall be 3/4" thick, 7-ply [Insert Wood Type] plywood and 3/4" x 1/8" thick [Insert Wood Type] facing. End panels shall be multiple doweled, glued and/or screwed to top frame members, intermediate rails and bottoms. Cabinet backs shall be 1/4" thick tempered hardboard dadoed into end panels and bottoms and securely fastened. Cupboard bottoms shall be 3/4" thick, 7-ply [Insert Wood Type] plywood with 3/4" x 1/8" [Insert Wood Type] facing on front edge. All cupboard base units shall have full-width adjustable shelves, 3/4" thick, 7-ply [Insert Wood type] plywood with [Insert Wood Type] facing on exposed edge, use 1" thick shelves if over 36" in width. Integrally joined parts shall result in a totally enclosed cabinet. The following frame sizes and material shall be considered a basic construction:

- a. Furnish security panels between all lockable doors and drawers as required.
- b. All cabinet end panels to be finished for purpose of future relocation.
- c. Intermediate rails shall be 3-1/4" x 3/4", 7-ply [Insert Wood Type] with 3/4" x 1/8" thick [Insert Wood Type] facing on exposed edge. Rails shall

- be multiple doweled and glued to end panels. Intermediate rails will be mounted at the front between the drawers and between all drawers and doors.
- d. Adjustable stainless steel leveling glides shall be provided on all corners of base cabinets. All glides to be easily accessible.
 - e. Top Horizontal Frame:
Front top rail shall be two pieces of hardwood grooved and glued together. The exposed member will be 1-1/4" x 7/16" [Insert Wood Type]. The unexposed member shall be 2-1/2" x 3/4" hardwood. Slide member shall be 1-3/4" x 3/4" hardwood and shall be mortised and glued into front and back rails and screwed into sides. Rear member shall be 2-1/2" x 3/4" hardwood.
 - f. Drawers:
Drawer sides shall be 1/2" thick, 7 or 9-ply [Insert Wood Type] plywood. Drawer heads shall be 3/4" thick, 5-ply solid core plywood. A glue and dovetailed joint shall be used to attach the drawer head to the sides on all drawers over 3" in depth. A mortise and tenon joint shall be used for shallow drawers. The drawer back shall be dadoed, glued and nailed into the sides. Drawer bottoms shall be 1/4" thick tempered hardboard, set and glued into 1/4" grooves, four sides.
2. Special Purpose Base Cabinets:
- a. Sliding Door Base Cabinet:
Construction and material shall be the same as for base cabinets except top frame and bottom shall be designed for sliding doors.
3. Full Height Sliding Door Cases:
- a. Cases shall be designed and integrally constructed for full enclosure to assure dust proofing of the case interior. All exposed woods shall be [Insert Wood Type]. All end panels shall be 3/4" thick [Insert Wood Type] with a 3/4" x 1/8" [Insert Wood Type] hardwood facing. Tops for open or glazed doors shall be 3/4" thick [Insert Wood Type] plywood, multiple doweled into end panels, secured with glue and countersunk screws. The top in solid door cases shall be 3/4" thick [Insert Wood Type]. A 2'1/4" x 3/4" [Insert Wood Type] hardwood fascia is applied to conceal the overhead sliding-door suspension system. A double extruded aluminum track shall be attached to the case top for the sliding door suspension system. All doors shall be suspended from an adjustable hanger and glide on nylon roller wheels. An aluminum U-channel is located on the case bottom to guide the bottom of the doors. Panel doors shall be 1" thick, solid hardwood core plywood. Glazed doors shall have 3'-3'16" x 1" thick [Insert Wood Type] framing, mortised, tenoned, and glued. Glass shall be set into door frame and secured with a plastic retainer. Doors shall be removable without use of tools, and so designed to prevent by-passing. Shelves, exposed to view, shall be 3/4" thick [Insert Wood Type] plywood with an [Insert Wood Type] banding on exposed edge, use 1" thick over 36" in width; unexposed shelves shall be

3/4" thick [Insert Wood Type] plywood with an [Insert Wood Type] banding, use 1" thick over 36" in width. To assure a completely rigid case, the center shelf is structurally joined to the end panels and glued. All other shelves are adjustable on 32MM centers utilizing support system described under 2.01 H.10.

- b. Case bottoms shall be 3/4" thick [Insert Wood Type] plywood, exposed to view, or 3/4" thick [Insert Wood Type] plywood, unexposed, multiple doweled and glued securely to end panels. Glue blocks, 3" long, shall further support and strengthen all joints. All cases 22" in depth shall have 3/4" thick [Insert Wood Type] plywood bottom with a 3/4" x 1/8" thick [Insert Wood Type] hardwood facing, and a 3/4" x 4" hardwood plywood toe space rail to form a 2-1/2 " deep x 4" high totally enclosed toe space. Twelve inch (12") and 16" deep cases will use a 1" x 4-3/4" solid [Insert Wood Type] base rail mounted flush with the face of the case. The backs in open and glazed door cases shall be 1/4" [Insert Wood Type] plywood while the back not exposed to view shall be 1/4" tempered hardboard. Case interior shall be flush. A 2-1/2 " x 4" high totally enclosed toe space shall be same as for base units.

4. Full Height Swinging Door Cases:

General construction features shall be the same as for sliding door cases except for the following: Doors shall either be solid hardwood core panel or glass framed, hung on 1-1/2 pair of 2-1/2 " long offset type institutional hinges. Swinging doors shall overlap opening four sides; astragal applied to left hand door shall provide further dust proofing.

5. Counter-Mounted or Wall-Hung Sliding Door Cases:

Construction and materials shall be the same as for full height type cases with the following exceptions. Panel doors shall be 3/4" thick, solid hardwood core, under 48" in height, and 1" solid hardwood core, hardwood framed for 48" high cases. Glass framed doors shall be 3/4" thick with 3-3/16" wide solid [Insert Wood Type] framing under 48" in height, and 1" thick by 3-3/16" solid [Insert Wood type] framing for 48" high cases. Solid glass doors shall be 1/4" thick float glass with polished edges and ground finger groove. Doors shall set in an aluminum bottom framing containing roller bearings and held in position with an aluminum guide at the top of the case.

6. Counter Mounted or Wall-Hung Swinging Door Cases:

Construction and materials shall be the same as for sliding door cases with the following exception: Panel or glass framed doors shall be hung on 1 pair of offset, institutional type hinges under 48" in height. Doors on cases 48" high shall have 1-1/2 pair of offset, institutional type hinges. All doors shall overlap opening four sides, with an astragal applied to left hand door providing additional dust proofing.

2.6 PLASTIC LAMINATE WORKSURFACES

A. Definitions

1. Work surfaces: Horizontal countertop panels supported by base cabinets or other separate support system and include built-up curbs and bridges, service pedestals, and back splashes. When specified, integral sinks shall form a continuous part of the worksurface.

B. Standard of Quality: Conform with WIC Premium Laboratory Grade Section 17, and AWI Section 1600, as modified herein.

C. Plastic laminate worksurfaces consist of panels of MDF or hardwood plywood material covered with chemical resistant high-pressure plastic laminate bonded to substrate uniformly plane and free of defects. Exposed edge; and corners to be uniformly chamfered. Provide in continuous sheets, to the greatest length possible. If joints are necessary, provide at junction of casework units. Sheet sections shall be joined end to end without fasteners, forming a hairline seam. No joints will be allowed within 24" of sink edges.

D. Panel Construction: Horizontal substrate shall be exterior grade 5 or 7-ply, hardwood, plywood or marine grade MDF or 60 LB medium density fiberboard, 1-1/8 inch thick for work surfaces and 3/4 inch thick for all other applications. Substrate must be sealed for waterproofing at all cutouts for sinks or other equipment. Panels shall be pre-edged with matching laminate, or polyvinylchloride (PVC) 3 MM thick solid color edge banding if indicated, typical for exposed and semi-exposed edges. Premium edge required: vertical edge-banding applied before horizontal plastic laminate. For worksurfaces provide front and end panel overhang of 1 inch relative to outer cabinet face (beyond face of doors or drawers in flush construction), formed with continuous 1/8 inch by 1/8 inch drip kerf, 3/8 inch in from panel front edge and coated with chemical resistant sealer. All tops to have a sealed drip groove added to the bottom front edge.

E. Supports: Worksurfaces shall be supported by base cabinets, modular steel component support systems, separate end support panels or combinations of all types. Where base cabinet or workbench-jointing forms a "box" void, such as at wall junctions, provide additional floor supported panels the full end width or remaining length of unsupported sections. Where base cabinet unit terminates with knee space and apron, provide continuous full width end supports. Steel angle wall shelf-type supports attached to steel stud or concrete partitions are not acceptable unless indicated. In situations where the opening exceeds 48", provide leg supports.

E. Back splashes, built-up curbs and bridges: Provide worksurfaces with continuous 4-inch high back splashes at all backs, and sides adjoining building walls unless indicated otherwise. Back splashes shall be butt-joined to worksurfaces unless indicated to be coved. Built-up curbs shall match back splash height. Horizontal bridge pieces spanning back-to-back curbs shall overhang curbs uniformly by at least 3 inches.

G. Laminate color and pattern selection shall be by Architect. Architect shall have full discretion to make selection from either of manufacturer's full range of standard product lines complying with chemical resistance requirements.

- H. Provide flexible chemical resistant sealant and sealer per work surface manufacturer's recommendations.
- I. Chemical Resistant Plastic Laminate: Provide Wilsonart (Chemsurf), Formica, Laminart, or equal, meeting NEMA LD 3 requirements. Laminate will show essentially no effect when the following chemicals are left in contact for a period of 16-hours using the same testing methods as used on the Casework finish:

Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

ACIDS

Acetic Acid	98%
Citric Acid	10%
Hydrochloric Acid	37%
Formic Acid	90%
Nitric Acid	30%
Sulfuric Acid	77%
Perchloric Acid	60%
Phosphoric Acid	85%
Phenol Acid	85%

SOLVENTS

Acetone
Amyl Alcohol
Benzene
Carbon Tetrachloride
Chloroform
Dioxane
Ethyl Acetate
Ethyl Alcohol
Ethyl Ether
Ethylacetoacetate
Formaldehyde
Furfural
Gasoline
Kerosene
Naphtha
Toluene

Trichlorethylene
Xylene

ALKALIES

Ammonium Hydroxide 28%
Sodium Carbonate, Saturated

SALTS

Calcium Hypochlorite, Saturated
Potassium Permanganate
Sodium Bisulfate
Sodium Chloride
Zinc Chloride
Silver Nitrate 1%

OTHER REAGENTS

Cresol
Chlorobenzene
Detergent
Hydrogen Peroxide
Iodine, 1% in Alcohol
Mercurochrome
Mineral Oil
Urea 6.6%

J. Plastic Thickness and Grade: Meet requirements of NEMA LD3.

1. Typical Horizontal Surfaces: 0.050-inch, GP 50.
2. Typical Vertical Surfaces: 0.030-inch, GP 28.
3. Typical Post-forming Surfaces: 0.043-inch, PF 42.
4. Edges: Same as Horizontal surface, or 3nr
PVC Edge where indicated.
5. Backing Sheets: 0.020-inch, BK 20.

K. Adhesive for Plastic Laminate: As recommended by plastic laminate manufacture,
chemical resistant.

2.7 STAINLESS STEEL WORKSURFACES

A. Definitions

1. See PLASTIC LAMINATE WORKSURFACES, above, for definitions.

B. Materials

1. Stainless steel shall be type 316L per ASTM A240.

2. Exposed surfaces shall be a No. 4 satin finish. Stainless steel nuts, screws, bolts, and rivets, etc., shall be of equivalent stainless steel as in the sheet material and shall have a tumbled finish closely resembling that of the worksurface.

C. Construction

1. Stainless steel welding material shall be of type similar to the sheet material or a richer quality. Joints in stainless steel tops shall be welded. Welds shall be made without discoloration and shall be ground, polished, and blended harmoniously with the worksurface finish.
2. Worksurface shall be 16-gauge minimum. Stainless steel sides and back-splashes, where indicated, shall be integrally welded work-surface top and finished as indicated. Edges shall be flanged down the same dimension as adjacent non-stainless worksurface with 1 inch being minimum and returned minimum 72 inch over wood core to simplify securing top material to cabinet or structural frame. Under-surface shall be reinforced with 16-gauge steel channels as required to ensure rigidity and prevent bucking, warping, or oil canning. Underside of top shall have a heavy mastic agent coating and/or exterior grade plywood providing sound deadening. The backside of exposed backsplashes shall be finished to match front and sides.
3. Worksurface shall be fabricated with a marine edge at sink units and shall be pitched to sink bowl for proper drainage. Marine edges shall be seamless die-formed. Other work-surfaces shall have a plain edge, unless otherwise noted.
4. Sink bowls shall be integral within work-surface, minimum 16-gauge Stainless steel, unless otherwise noted. Sink units shall be designed and fabricated with sufficient reinforcement to prevent oil canning. Sink joints shall be butt-welded ground smooth, and polished to the same finish as work-surface. Inside radii shall be 1 inch. Bottoms shall be pitched to the drain indent. No soldering will be permitted in connection with sink construction. Sink bowl dimensions given are inside dimensions.

2.8 EPOXY RESIN WORKSURFACES

A. Definitions

1. See PLASTIC LAMINATE WORKSURFACES, above, for definitions.

B. General

1. Modified epoxy resin shall be a uniform mixture throughout, non-glaring and uniform in color. Worksurface shall be 1 inch thick with drip grooves provided on the underside at exposed edges. Exposed edges, except as indicated, shall be rounded to a 1/8 inch radius. Curbs may be one inch thickness or greater, epoxy bonded to the surface of the top to form a square joint, separate cove piece not acceptable. Sink cutouts shall be smooth and uniform without saw marks with the top and bottom edge having a uniform radius of approximately 1/8-inch. Corners of sink cutouts shall be radiused not less than 1 inch.

2. Marine Edges; unless indicated otherwise, provide marine edges for all worksurfaces containing sinks. Indented worksurfaces shall be 1 inch thick at outer edge, indented 1/8" inch to provide a raised rim 1-inch wide around exposed edges. The front top edge of the raised rim and exposed vertical corners of the top shall be rounded to a 1/8-inch radius. The juncture between the raised rim and the top surface shall be coved to a 1/4 inch radius.
3. Joints shall be made with fastening devices and cement having the same properties as the bench-top.
4. Integral epoxy resin sinks, where indicated, shall be fabricated of the same material and performance qualities as worksurface. Color shall be black or match worksurface, as indicated. Sinks shall be recessed into worksurface sink cutout by routing a rabbeted edge such that the sink edge is contiguous and smooth with worksurface. Liquids shall drain freely from worksurface into sink. Sink interior corners shall be coved and sink bottom shall be warped to positively drain to outlet. Support sinks by a minimum of two 11-gauge stainless steel channels 1" x 2", extending across width of cabinet and attached to 3/8" diameter threaded hanger rods. Supports shall have a chemical resistant finish.

C. Physical Properties

Flexural Strength (ASTM Method D790)	14,900 PSI
Compressive Strength (ASTM Method D695)	34,500 PSI
Hardness, Rockwell M (ASTM Method D78)	100
Water Absorption (ASTM Method D570) % by weight, 25 hours	0.03
Specific Gravity	1.97
Tensile Strength	8,500 PSI

D. Submit an independent testing laboratory report certifying that the countertop is capable of meeting the performance and physical test criteria.

1. No Effect: No detectable change in working surface material.
2. Excellent: Slight detectable change in color or gloss, but no change to the function or life of the working surface material.
3. Good: A clearly discernible change in color or gloss, but no significant impairment of working surface function or life.
4. Objectionable: Change in appearance due to surface discoloration or etch possibly resulting in deterioration of function over an extended period of time.
5. Not Acceptable: Pitting, cratering or erosion of working surface material. Obvious and significant deterioration.

E. Physical Test. A high form porcelain crucible, size 0, 15 ml capacity, shall be heated over a Bunsen burner until the crucible bottom attains an incipient red heat. Immediately, the hot crucible shall be transferred to the top surface and allowed to cool to room temperature. Upon removal of the cooled crucible, there shall be no blisters, cracks or any breakdown of the worksurface.

F. Performance Test Procedure: Tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent shall be covered by an inverted watch glass (bubble side up) to totally cover the reagent, 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 24 hours, 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 naphtha, detergent, and water, rinsed and dried before examination and evaluation. Do not mix reagents.

Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" diameter inverted watch glass, (bubble side up) to totally confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

G. Performance Test:

<u>REAGENT</u>		<u>RATING</u>
Hydrochloric Acid	37%	Excellent
Sulfuric Acid	33%	Excellent
Sulfuric Acid	77%	Excellent
Sulfuric Acid	96%	Non Acceptable
Formic Acid	90%	Excellent
Nitric Acid	20%	Excellent
Nitric Acid	30%	Excellent
Nitric Acid	70%	Good
Hydrofluoric Acid	48%	Objectionable
Phosphoric Acid	85%	No Effect
Chromic Acid	60%	Not Acceptable
Acetic Acid	98%	Excellent
Ammonium Hydroxide	28%	No Effect
Sodium Hydroxide	40%	Excellent
Sodium Sulfide		Excellent
Methylene Chloride		Excellent
Zinc Chloride		No Effect
Tincture of Iodine		Excellent
Silver Nitrate	10%	Good
Methyl Alcohol		No Effect
Ethyl Alcohol		No Effect
Butyl Alcohol		No Effect
Benzene		Excellent
Xylene		No Effect
Toluene		Excellent
Gasoline		No Effect
Dichlor Acetic Acid		Good

Dichlormethane		Good
Di Methyl Formamide		Excellent
Ethyl Acetate		Excellent
Amyl Acetate		Excellent
Acetone		Excellent
Chloroform		Excellent
Carbon Tetrachloride		No Effect
Phenol		Excellent
Cresol		Excellent
Formaldehyde		No Effect
Trichlorethylene		Excellent
Ethyl Ether		Excellent
Furfura		Good
Methylene Chloride		Excellent
Mono Chlor Benzene		Good
Dioxene		Excellent
Methyl Ethyl Ketone		Excellent
Acid Dichromate		Objectionable
Hydrogen Peroxide	3%	Excellent
Naphthalene		Excellent

2.9 SERVICE ASSEMBLIES

A. Definitions

1. Service Assemblies: Include vertical plumbing columns (also referred to as "umbilicals") and horizontal panel bulkheads. Service units generally occur above worksurfaces supported by wall cabinets or other separate support structure. Service units provide locations for plumbing and electrical fixtures and reagent shelving. Single sided at wall, or double-sided island/peninsula units as indicated.

B. General: Service assemblies shall be balanced construction.

C. Service assemblies noted to be chemical resistant plastic laminate shall be, as per other portions of this section. Color and pattern, as selected by Architect, to be from manufacturer's standard color line, complying with chemical resistance requirements. Exposed sides shall be covered by chemical resistant plastic laminate. Semi-exposed edges and edges concealed by intersections of panels shall be covered in chemical resistant plastic laminate. Exposed edges shall be covered in color matched 3MM PVC edge-banding.

D. Service assemblies noted to be epoxy shall be as described.

E. Provide adjustable shelf supports of corrosion resistant or chemical resistant coated steel, mortise mounted or pin and socket type with a minimum of four 1/4" diameter x 3/8" long pins in a shelf clip with shelf notched for clip or fastened to shelf to provide horizontal and vertical restraint, similar to TMI Universal Shelf Clip #1990.

- F. Fasteners to be concealed prior to application of facing as much as possible. Where exposed use slotted, flat head zinc or stainless steel.
- G. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Lip to be same as for SHELVING as specified elsewhere in this Section.
- H. Provide fasteners to secure to supporting structure to meet seismic requirements.

2.10 SHELVING, STANDARDS, AND BRACKETS

- A. Manufacturers: Knappe-Vogt (KV), Spur, Republic, or approved equal. Product based on Knappe-Vogt, for convenience purposes only.
- B. Product characteristics:
 - 1. Design Loads: System shall support a minimum of 100 pounds per square foot. Space supports to achieve design loads, with a maximum spacing of supports to be 32 inches.
 - 2. Standards: KV 85 Series (double slot). Spaced to achieve design loading.
 - 3. Brackets: KV 185, with KV 106 shelf rest. Where two shelves abut, use two brackets and standards. Do not splice on the bracket. Shelf side bracket, where noted to consist of 16 gauge, furniture steel, painted to match shelf with epoxy paint, unless otherwise noted. May be sized for shelf support in lieu of shelf bracket.
 - 4. Finish: Brackets and standards shall be pre-finished epoxy paint, color as selected by Architect.
 - 5. Shelves: Maximum shelf length without a separation joint shall be eight (8) feet unless otherwise noted.
 - a. Plastic Laminate: Both sides and all edges covered by chemical resistant plastic laminate, as per other portions of this section. Color and pattern as selected by Architect from manufacturer's standard color line.
 - b. Wood: Minimum 1-inch thick 7-ply hardwood, with APA rated Grade B face veneers, both faces and edges to be edge banded. Chemical resistant finish as per other portions of this section.
 - 6. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Restraining lip shall consist of a continuous strip of 1/4" solid clear acrylic sheet material with all edges polished smooth. Height shall be as necessary to extend 1/8" below shelf bottom and 1-1/2 " above shelf top. Fasteners shall be flat head stainless steel screws countersunk flush into surface of acrylic
OR
A 1/4" OD aluminum rod and post design, with the bottom of the horizontal rod running 1-1/2 " above the shelf top. Vertical posts located in shelf corners and every 18" to support rod.
 - 7. Provide Fasteners to meet seismic requirements.

2.11 UNISTRUT

- A. Approved Manufacturer's: Unistrut, Power Strut, or approved equal.
- B. Design Loads: System shall support a minimum of 100 pounds per square foot and be sufficiently anchored to floor and ceiling structure to resist seismic forces. Space supports to achieve design loads, with a maximum spacing of supports to be 32".
- C. Standards: Unistrut P 1000 or approved equal, unless otherwise noted.
- D. Brackets: Unistrut P 2491 through P 2503, or approved equal, as required, unless otherwise noted.
- E. Finish: Brackets and standards shall be pre-finished epoxy paint, color as selected by Architect.
- F. Configuration of support members: Unless indicated otherwise, freestanding support structures for peninsula assemblies shall extend from floor structure to floor structure (above) and anchored at both ends. Back-to-back Unistrut P 5501 (2-1/2 inch depth) for primary vertical supports and single P 1000 for secondary supports. Vertical supports shall be a minimum of six feet on center.
- G. Shelves: Maximum shelf length without a separation joint shall be eight (8) feet, unless otherwise noted.
 - 1. Plastic Laminate: Shall have both sides and all edges covered by chemical resistant plastic laminate, as per other portions of this section. Color and pattern as selected by Architect from manufacturer's standard color line.
 - 2. Epoxy resin: Shall be a uniform mixture throughout, non-glaring, color selected by Architect, per other portions of this Section. Supplier to verify thickness with spans of support.
 - 3. Support spacing for open shelving shall be not less than 32" o.c. the lateral spacing of the primary countertop support system.
- H. Provide seismic restraining lip on open shelves and on top of assemblies that are 5'-0" or more above finished floor. Restraining lip shall be consisting of a continuous strip of 1/4" solid clear acrylic sheet material with all edges polished smooth. Height shall be as necessary to extend 1/8" below shelf bottom and 1-1/2 " above shelf top. Fasteners shall be flat head stainless screws countersunk flush into surface of acrylic
OR
A 1/4" OD aluminum rod and post design, with the bottom of the horizontal rod running 1-1/2 " above the shelf top. Vertical posts located in shelf corners and every 18" to support rod.
- I. Provide fasteners to comply with seismic requirements.
- J. Provide end-caps on both ends of all vertical tube supports.

2.12 PEGBOARDS

- A. Pegboards shall be of size noted, or if not noted shall be at least 2 feet by 2 feet. Board shall be of epoxy resin or stainless steel coated with chemical resistant finish, color to match worksurface, on all faces and edges. Pegs shall be of coated stainless steel or polypropylene, protruding 6 inches at 45° angle. Base of peg shall be inserted into pegboard. Pegs shall not be bonded into the board but shall be held in by mechanical design with easy removal and replacement by hand. Pegs shall be in pattern as accepted in mock-up and/or submittal, but no less than six pegs per square foot.
- B. Drip Trough shall be fastened to pegboard with stainless steel fasteners and be 20- gauge type 304 stainless steel. The design shall provide for pitch to the front to assure full drainage. A 3/8-inch stainless steel tube outlet and flexible drain tube extending to the sink shall be provided.
- C. Where noted, Peg Extenders shall be same material as pegs and shall slip over the end of a peg to extend the length by 2-3/4 inches.
- D. Where noted, Support Pegs shall be same material as pegs and shall protrude at 90 degrees for 4 inches and the upward for 1 inch.
- E. Graduated and funnel rack shall be 20-gauge stainless steel, same length as pegboard, by 12" deep with an integral shelf above rack.

2.13 ACCESSORIES

- A. Towel Dispenser: Bobrick #B-262 (surface mounted), #B-3190 (recessed) or approved equal.
- B. Soap Dispenser: Bobrick #B-111 or approved equal.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Prior to installation of the work of this section, carefully examine the installed work of others and verify that such work is complete to the point where this installation may properly commence.
- B. Proceed with work when conditions will permit work to be installed in complete accordance with the original design, accepted submittals, and the manufacturer's printed instruction.
- C. In the event of discrepancy, immediately notify the Architect in writing. Do not proceed with installation in areas of discrepancy until such discrepancies have been resolved.

3.2 INSTALLATION

- A. Install, plumb, level, true and straight with no distortions. Shim as required, using non-corrosive concealed shims. Scribe work as necessary for close and accurate fit. Provide closure strips where necessary of same material and finish as casework, hem or ease edges. Utilize concealed fasteners, unless other fastening is acceptable to Architect in writing. Install wood casework per WIC Section 26 as modified herein.
- B. Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining units to a tolerance of 1/16 inch.
- C. Installation to meet seismic requirements.
- D. Set base cabinets straight, plumb, and level. Adjust sub-tops within 1/16 inch of a single plane. DO NOT screw continuous cabinets together.
- E. Wall Units:
 - 1. Verify that required backing and reinforcement necessary to support wall-mounted units is in place, secure and accurately located.
 - 2. Securely fasten to solid supporting material, not plaster, lath, or wallboard. Anchor, adjust, and align wall cabinets as specified for base cabinets.
- F. Adjust units and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 WORKSURFACE INSTALLATION

- A. Where applicable, make field joining in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted drawings, factory prepared so that there is no job-site processing of top and edge surfaces.
- B. Abut top and edge surface in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices. Where worksurface is intended to be movable, use a clamping device that is removable.
- C. Secure tops to support with concealed "Z" type, angel-type or equal fastening devices spaced no more than 2 feet on center, with one located within 5" of front and back edge.
- D. Countersink exposed heads, approximately 1/8 inch and plug flush with material equal in chemical resistance, color, hardness, and texture to adjoining surface.
- E. Provide holes and cutouts as required for equipment and mechanical and electric service fittings and fixtures. Verify size of opening with actual size of item to be used, prior to making openings. Form inside corners to a radius of not less than 1/8 inch. After cutting rout and file cutouts to ensure smooth, crack-free edges. Seal exposed edges after cutting with a chemical resistant sealer recommended by the manufacturer.

3.4 INSTALLATION OF ACCESSORIES

- A. Install in a precise manner in accordance with manufacturer's directions. Turn screws to a flat seat; do not drive. Adjust moving parts to operate freely without excessive bind.

3.5 CLEANING

- A. Repair or remove and replace defective or damages work as acceptable to the Architect at no change in contract amount.
- B. Clean finished units, including wiping out of drawers and cabinets shelves.
- C. Clean counter tops with diluted dishwashing liquid and water, leaving tops free of grease and streaks. Use no wax or oils.

3.6 PROTECTION

- A. Protect against soiling and deterioration during remainder of construction period.
- B. Protect work-surfaces throughout construction period with corrugated cardboard or equal completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing or Loading".
- C. Advise Contractor of Procedures and precautions for protection of materials and installed laboratory casework from damage by work of other trades.

END OF SECTION 12 35 53