

LABORATORY CASEWORK

GENERAL INFORMATION

- 1.1 Furnishing and installation of laboratory cabinets and furniture for use in laboratory and research facilities at the University including:
- a. Base and wall cabinets, tall storage cabinets, counter tops, reagent shelves, slotted reagent shelf supports, wall shelves and standards in laboratories.
 - b. Adjustable height tables, overhead service carriers, service fixtures and wall plates, sinks, cylinder strap holders.
 - c. Filler panels, scribes, knee space panels, and other items of trim and enclosure.
 - d. Other miscellaneous items of laboratory casework and furniture as listed in these specifications and as shown on drawings.
 - e. Delivery to the building, unpacking, setting in place, leveling and scribing to walls and floors as required.
- 1.2 Reference Standards:
- a. Scientific Equipment & Furniture Association (SEFA)
 1. SEFA 2.3 Scientific Laboratory Furniture And Equipment
 2. SEFA 3 Work surfaces
 3. SEFA 7 Laboratory And Hospital Fixtures
 - b. American Society for Testing and Materials (ASTM)
 1. A240 Heat Resistant Chromium and Chromium - Nickel Stainless Steel Plate, Sheet, and Strip for pressure Vessels
 2. A312 Seamless and Welded Austenitic Stainless Steel Pipe
 3. D260 Boiled Linseed Oil

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4. D570 Water Adsorption of Plastics
5. D695 Compressive Properties of Rigid Plastics
6. D790 Fluctural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
7. E84 Test Method for Surface Burning Characteristics of Building Materials
- c. Builders Hardware Manufacturers Association (BHMA)
- d. National Electrical Manufacturers Association (NEMA)
- e. American National Standards Institute (ANSI)
 1. A135.4 Basic Hardboard
 2. A208.1 Wood Products
- f. American Plywood Association (APA)
- g. National Particleboard Association (NPA) 8-Voluntary Standard for Formaldehyde Emission from Particleboard
- h. United States Department of Commerce, Product Standard (PS)
 1. PS 1-Construction and Industrial Plywood
 2. PS 51-Hardwood and Decorative Plywood
- i. Architectural Woodwork Institute (AWI) Architectural Woodwork Quality Standards, Guide Specifications, and Quality Certification Program, 6th Edition, as modified by the Drawings and Specifications

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- 2.1 Specify submission of metal and wood finish samples, countertop samples, etc.
- 2.2 Specify submission of shop drawings showing each assembly, identifying each item, details of construction, thickness of materials, and adjacent construction. Clearly identify any deviations in dimension, material, detail, etc. from conditions shown on the contract

documents. Any deviation not clearly identified will be considered disapproved, even if not specifically noted by the Architect.

- 2.3 Specify that lab casework contractor verify field dimensions, and that products of this section will fit through entryways, corridors and door openings enabling a smooth flow of equipment to its proper location in the building. Wall-to-wall counter tops to be installed with a maximum 1/8" gap.
- 2.4 Specify that wood and metal finishes be smooth, hard, chemically resistant, and specifically intended for use in the laboratory environment. Finishes shall show no noticeable affect when subjected to brief exposure by common reagents such as sulfuric acid, hydrochloric acid and acetone.
- 2.5 Laboratory casework shall have heavy-duty full extension drawer slides, stainless steel concealed hinges, stainless steel pulls, removable back panels at base cabinet cupboard units, tempered safety glass, half-depth base cabinet shelves.
- 2.6 Epoxy resin countertops (1" thick) are standard for use in wet laboratories. Confirm this with user representatives and Facilities.
- 2.7 Materials used in the construction of laboratory casework and equipment shall be the best of their respective kinds and shall be selected for their specific applications. Methods of construction shall be of proven designs and conform to the latest and best practices for production of durable, rugged corrosion-resistant laboratory casework and equipment.
- 2.8 Sheet steel shall be cold rolled, prime furniture steel. Steel sheets shall be prime quality, stretcher leveled, three pass cold rolled, patent beveled, resquared, and free of scales, buckles, or other defects; ASTM A 366, Class I (matte) finish. Gauges shall be U.S. standard, shall be selected to develop structurally the required strength and rigidity for each component part, in the following minimums:
 - a. 20-gauge: Back panels, inner door pans, drawer pans and body, and shelves.
 - b. 18-gauge: Sides, ends, fixed backs, bottoms, tops, soffits, and outer door pans. Provide 18-gauge for other items where gauge is not specifically noted and for shelves over 36-inches long.
 - c. 16-gauge: Intermediate horizontal rails, table frame aprons and cross rails, center posts, top gussets.
 - d. 14-gauge: Sink supports, door and case hinge reinforcements.

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- e. 11-gauge: Leveling and corner gussets.
 - f. Sink base cabinets shall be galvanized prior to painting.
- 2.9 Stainless steel: Counter tops, sinks, shelves and shelf supports noted on drawings as "stainless steel" shall be AISI type 304 stainless steel, constructed as described above for cold rolled steel. Exposed surfaces shall receive a #4 finish. Where improved corrosion resistance is required, and where specifically noted AISI type 316 stainless steel shall be used.
- 2.10 Hardwood lumber for transparent finish: PS 58; clear and free from defects; graded in accordance with AWI requirements; maximum moisture content of 6 percent; of the following grades for transparent finish:
- a. Exposed exterior parts: [specify species and cut], AWI Lumber Grade I.
 - b. Semi-exposed parts: [specify species and cut], AWI Lumber Grade II.
- 2.11 Hardwood Lumber Core Plywood: Balanced 5-ply construction consisting of a solid hardwood stave core, hardwood cross plies, and hardwood face veneers, glued with water-resistant resin adhesives. Lumber core shall comply with product standards of PS 51 and ANSI/HPMA HP 1983; with veneers of the following species, grade and face veneer cuts for transparent finish:
- a. Exposed exterior parts: [specify species and cut], AWI face grade AA, with parts of an assembly or space appearance matched for consistency of color, grain and other characteristics. Grain shall run vertically through all parts of the assembly.
 - b. Semi-exposed parts: [specify species and cut], AWI face grade A.
- 2.12 Hardwood Veneer Core Plywood: Balanced 7-ply (min.) construction consisting of 5-ply (min.) hardwood veneer core plywood and hardwood face veneers, glued with water resistant resin adhesives. Veneer core shall comply with product standards of PS 51 and ANSI/HPMA HP 1983; with veneers of the species, grade and face veneer cuts as described above for hardwood lumber core plywood.
- 2.13 Particleboard Core Plywood: Balanced 3-ply construction consisting of 45-pound density particleboard core and hardwood face veneers glued with water resistant resin adhesives. Particleboard core shall comply with product standards of PS 51 and ANSI/HPMA HP 1983; with veneers of the species, grade and face veneer cuts as described above for hardwood lumber core plywood.

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- 2.14 Fire-Retardant Treated Medium Density Fiberboard Core (FR MDF) for use at corridors, lobbies, and public assembly spaces only: UL listed wood fiberboard with 20 Flame Spread and 25 Smoke Developed surface burning characteristics. At the woodworker's option, UL listed Fire-Retardant Particleboard Core may be used at these locations.
- 2.15 Hardboard: Pressed wood fibers with resin binder, tempered grade.
- 2.16 High Pressure Plastic Laminate: FS L-P-508H, .050 inch thick, matte finish, [specify colors].
- a. Backing Sheets: .020 inch thick high pressure paper base laminate without decorative finish.
- 2.17 Glass: ASTM C1048, Kind FT, Condition A-Uncoated, Type I-Clear, 1/4-inch thick (or as indicated on drawings) Clear Tempered Float Glass, complying with ANSI Z97.1 performance requirements for safety glass.
- 2.18 Metal Laboratory Casework Fabrication: Factory-assemble and finish all products of this section. Make units square, fully reinforced, integrally framed and welded to form a dirt and vermin retardant enclosure. Maintain uniform clearance around door and drawer fronts, not exceeding 3/32-inch. Casework shall be fabricated as sectional units, ready for placement in the laboratory as a complete integral rigid unit permitting future relocation.
- a. Flush Doors: $\frac{3}{4}$ " thick, double wall, with channel reinforcements full height and center of each pan. Paint door interiors and fill doors solid with fire-resistive, sound-deadening material.
 - b. Glazed Doors: Metal stiles and rails of similar construction as flush doors, with glass retained in channels or gaskets. Glass shall be replaceable from the inside of doors.
 - c. Hinged Doors: Reinforce doors and cabinet bodies at hinge locations with 14-gauge steel, welded to adjacent construction. Provide nylon roller catches, rubber bumpers, runners and positive stops to prevent metal-to-metal contact or accidental removal.
 - d. Adjustable Shelves: Sides and ends formed down, and returned to front and back. Reinforce with full width welded channels.
 - e. Fillers: Provide where required at walls and ceilings. Factory fabricate fillers of same material and finish as cabinets. Exposed edges shall be hemmed. Do not field-fabricate fillers, or use fillers between casework elements.

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- f. Provide access space, cut-outs, and holes for pipes, conduits and fittings in cabinet bodies to accommodate services and supports.
 - g. Toe Spaces: 4" high by 3" deep, fully enclosed.
 - h. Metal Finish: All steel components of the laboratory casework and equipment shall have a baked-on acid, alkali and solvent resistant finish. Metal parts shall pass through a paint chamber in which an epoxy or urethane powder coating is applied to all metal items. The coating shall be baked to insure complete polymerization. The dry-film thickness on all parts shall be a minimum of 0.75-1 mil. without "orange-peel", sags, runs or over spray.
- 2.19 Wood Laboratory Casework Fabrication: Fabricate all items in accordance with AWI Quality Standards for Premium Grade, transparent finish, as amended in this Section.
- a. Transparent-Finished Wood: Select wood for uniform appearance in each assembly and among all assemblies in the same space. Distribute to best advantage the characteristics and defects allowed by specified AWI Quality Grade.
 - b. Matched Lumber and Veneer: Where required appearance match (after finishing) cannot be obtained with the same species, obtain the Architect's approval to change lumber species or to substitute veneered solid core assembly for lumber.
 - c. Scribing Trim: Where not otherwise shown or specified, match species, cut, and finish of work scribing trim is used with.
 - d. Panel Products: 3-ply construction with 3/4" thick core where not otherwise specified, with face veneers specified for each category of work. Use FX MDF core for all wall paneling, and for any cabinets to be installed in corridors or lobbies. Use MDF core where core edges are to be sanded and finished; use MDF or particleboard core elsewhere.
 - e. Fit plywood and particleboard shelf, drawer front, fin and door edges with 3/16-inch matching hardwood edge-bands, unless otherwise noted. Use full-length pieces only.
 - f. Use concealed fasteners wherever possible. Obtain prior approval for exposed fasteners.
 - g. Provide access to electrical junction boxes and plumbing valves. Coordinate with other trades and indicate locations and means of access on shop drawings.
 - h. Provide concealed continuous stiffeners to the underside of any countertop spanning 4'-0" or more.

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- i. No particleboard or plywood shall be in contact with flooring. Cabinet bases shall be 4-inch (min.) high solid American Cherry lumber.
 - j. Factory-install cabinet hardware. Remove it as required for shipping. Package field-installed hardware with the assembly to which it is fitted.
 - k. Built-ins: Cut/drill openings for fixtures, specialties, accessories, and other built-ins per template/instructions furnished by the manufacturer. Cut/drill openings necessary to accommodate conduit, cable, wiring, and wiring devices. Provide wire access grommets for wire holes in exposed surfaces.
 - l. Trial-assemble all work. Permanently assemble work in the largest units that meet shipping and Project conditions. Make counters in one-piece for-length where possible. Where field joints are unavoidable, prepare work for assembly with Flush Joint Fasteners.
 - m. Shop Applied Woodwork Sealing and Finishing: Transparent finish for exposed and semi-exposed surfaces: AWI Finish System TR-5, catalyzed vinyl, dull rubbed effect. Seal unfinished wood surfaces to prevent moisture gain. Seal immediately all bare wood that is exposed by field fabrication and fitting.
- 2.20 Service Fixtures: Heavy-duty, specially designed and manufactured for laboratory use with provisions for index coding. Fixtures for liquids and gaseous mixtures shall have lettered and colored indexes for each service.
- a. Plumbing fixtures, except for drain fixtures and fittings, shall be a brass. Reagent grade water fixture to be brass gooseneck type with an internal polypropylene lining that permits recirculation to the manual outlet.
 - b. Large needle valves shall contain a replaceable valve seat and floating cone made of stainless steel for fine control. Valves shall be provided with a removable serrated hose end.
 - c. Compression water valves shall be provided with a replaceable seat and valve disc, and a removable serrated hose end (unless otherwise noted). Valves shall be rated for 125 psi operating pressure. Hot and cold water combination sink faucets shall be provided with aerator tips (unless otherwise noted). Reagent grade water faucets shall be provided with serrated hose ends. Hot and cold water goosenecks shall be swivel type, Reagent grade water goosenecks shall be fixed.

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- d. Vacuum breakers shall be supplied on hot and cold water fixtures. The vacuum breaker for the eye wash fixture shall be located within the sink cabinet, and shall be visible when the cabinet doors are open
- e. Service Identification. Index buttons mounted in fixture handles shall be color-coded and lettered as follows:

1.	Hot Water	HW	Red
2.	Cold Water	CW	Green
3.	Gas	Gas	Blue
4.	Air	Air	Orange
5.	Vacuum	Vac	Yellow
6.	Reagent Grade Water	RG	White
7.	Steam (not used)	STM	Black
8.	Nitrogen (not used)	N ₂	Brown
9.	Carbon Dioxide	CO ₂	Pink
- f. Fixtures are to be supplied with necessary hardware to attach to counter top, curb or panel.
- g. Service Fixture Finish: Fixtures shall have a satin chrome plated finish with a clear epoxy coating. Units shall be assembled before coating and pressure tested before shipment.
- h. Hand Held Eye Wash: Where indicated with designation "EW" on drawings, provide a unit that consists of a dual head eye wash assembly, 6ft length of rubber hose, counter top mounting stand, slip ring mechanism to allow for hands free operation and in-line vacuum breaker. Unit's finish shall match that of other service fittings.

CONSTRUCTION REQUIREMENTS

- 3.1 Metal Casework Installation: Casework items shall be located in designated positions, leveled, and plumbed true and straight by means of an adjustment device located in each bottom corner of each cabinet.

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- 3.2 Install filler panels and scribes as required for a continuous tight and accurate fit, without gaps or spaces between cabinets or counters and adjoining surfaces. All backsplashes shall be sealed at wall surfaces with corrosion resistant sealants.
- 3.3 Adjust hardware so doors and drawers operate smoothly without warp or binding. Lubricate operating hardware as recommend by manufacturer.
- 3.4 Wood casework Installation: Comply with AWI requirements for Installation of Architectural Woodwork (Interior), as amended by the following.
- a. Install work plumb, level and true to line and plane as measured from established lines and levels. Provide blocking, grounds, shims, supports, and rough hardware necessary for installation. Anchor work securely in place.
 - b. Cutting, Fitting, and Placement: Do all cutting, drilling, and fitting required for installation of the work.
 - c. Cut and fit scribing trim closely and accurately to building surfaces. Use one-piece-for-length scribing trim wherever possible. Make joints tight; back end joints with splicers/splines. Secure scribes with concealed fasteners.
 - d. Anchors and Fasteners: Confine face nailing to inconspicuous locations. Set nails. Fill holes in exposed and semi-exposed surfaces to conceal nail locations.
 - e. Anchorage to Drywall Construction: Anchor work to framing/anchor plates with toggle bolts or tapping sheet metal screws; space screws to limit loads to 50 pounds withdrawal or 80 pounds shear per anchor. Where fastening to unreinforced gypsum board is necessary, limit loads to 20 pounds withdrawal or 40 pounds shear per anchor.
 - f. Anchorage to Concrete: Anchor work with bolts and expansion shields.
- 3.5 Counter top lengths shall be fabricated as specified and indicated on the drawings with ends butted tightly, and sealed with corrosion resistant sealants. The horizontal surface shall be smooth and level with no raised edges at joints. Tops shall be anchored to base cabinets.
- a. Provide holes and cutouts in countertops as required for service fittings and fixtures. Verify actual size of item to be used prior to making openings. Form inside corners to a radius of not less than 1/8". 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.

3.6 Adjusting, Cleaning and Protection:

- a. Repair or remove and replace defective or damaged work as acceptable to the Owner's Representative at no change in contract amount.
- b. Clean units, including wiping out of drawers and cabinet shelves.
- c. Clean counter tops with diluted dishwashing liquid and water, leaving tops free of grease and streaks. Use no wax or oils.
- d. Protect laboratory casework against soiling and deterioration during remainder of construction period.
- e. Protect counter tops for the remainder of construction with 1/4" corrugated cardboard completely covering tops and securely taped to edges. Mark in large lettering "No Standing".

REFERENCE

- 4.1 The applicable CSI Specification Section is 12 25 53.