

SECTION 12361 - METAL LABORATORY CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Metal laboratory casework.
 2. Utility-space framing between backs of base cabinets.
 3. Utility-space closure panels between base cabinets and at exposed ends of utility spaces.
 4. Laboratory countertops.
 5. Shelves.
 6. Metal laboratory casework system that includes support framing, filler and closure panels, wall panels, and modular countertops.
 7. Laboratory sinks.
 8. Accessories.
 9. Water, laboratory gas, and electrical service fittings.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal laboratory casework and support framing capable of withstanding the effects of the following gravity loads and stresses per support framing module without permanent deformation, excessive deflection, or binding of drawers and doors:
1. Top of Support Framing System: 180 lb (81 kg).
 2. Wall Cabinets: 300 lb (136 kg).
 3. Shelves (Up to 12 Inches (300 mm) Deep): 180 lb (81 kg).
 4. Reagent Shelf: 180 lb (81 kg).
 5. Work Surface (Including Suspended Base Cabinets): 600 lb (272 kg).
 6. Suspended Base Cabinets: 300 lb (136 kg).
 7. Total for Island Unit: 2820 lb (1279 kg).
 8. Total for Wall Unit: 1680 lb (762 kg).
- B. Seismic Performance: Provide metal laboratory casework and support framing capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For metal laboratory casework. Include plans, elevations, sections, details, and attachments to other work.
1. Indicate locations of blocking and reinforcements required for installing laboratory casework.
 2. Indicate locations and types of service fittings, together with associated service supply connection required.
 3. Include details of utility spaces showing supports for conduits and piping.
 4. Include details of support framing system.
 5. Include details of exposed conduits, if required, for service fittings.
 6. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
 7. Include coordinated dimensions for laboratory equipment specified in other Sections.
- C. Samples for Initial Selection: For factory-applied finishes, epoxy countertops.
- D. Samples for Verification: For each type of finish, including countertop material, in manufacturer's standard sizes.

- E. Qualification Data: For testing agency.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework finishes and countertops with requirements specified for chemical and physical resistance.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations: Obtain laboratory casework, including countertops, sinks, service fittings, and accessories, through one source from a single manufacturer.
- 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, similar door and drawer configurations, and complying with the Specifications may be considered. Refer to Division 1 Section "Product Requirements."
- D. Product Standard: Comply with SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

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

1.8 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 extra materials described below 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

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Metal Laboratory Casework:
 - a. Fisher Hamilton L.L.C.
 - b. **Advanced Lab Concepts "Sigma Frame System" for metal laboratory casework, epoxy resin tops, and fixtures. [Add3-13]**
 - c. **Case Systems - E-Lab as manufactured by Insight, Inc. contingent on providing a lifetime warranty on fully laminated cabinets. [Add4-19]**
 - d. **Modular Steel Laboratory Casework, by Jamestown [Add7-18.b]**
 - 2. Epoxy Countertops and Sinks:
 - a. Laboratory Tops, Inc.

2.2 CABINET MATERIALS

- A. Metal: Cold-rolled commercial steel sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.
- B. Minimum Metal Thickness:
 - 1. Sides, Ends, Fixed Backs, Bottoms, Tops, Soffits, and Items Not Otherwise Indicated: 0.0428 inch (1.1 mm). Except for flammable liquid-storage cabinets, bottoms may be 0.0329 inch (0.85 mm) if reinforced.
 - 2. Back Panels, Doors, Drawer Fronts and Bodies, and Shelves: 0.0329 inch (0.85 mm) except 0.0428 inch (1.1 mm) for back panels and doors of flammable liquid-storage cabinets and for unreinforced shelves more than 36 inches (900 mm) long.
 - 3. Intermediate Horizontal Rails, Table Aprons and Cross Rails, Center Posts, and Top Gussets: 0.0528 inch (1.35 mm).
 - 4. Drawer Runners, Sink Supports, and Hinge Reinforcements: 0.0677 inch (1.7 mm).
 - 5. Leveling and Corner Gussets: 0.0966 inch (2.5 mm).
- C. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q³; not less than 5.5 mm thick.

2.3 CABINET FABRICATION

- A. General: Assemble and finish units at point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Integrally frame and weld to form a dirt and vermin-resistant enclosure. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).
- B. Flush Doors: Outer and inner pans that nest into box formation, with full-height channel reinforcements at center of door. Fill doors with noncombustible, sound-deadening material.
- C. Glazed Doors: Hollow-metal stiles and rails of similar construction as flush doors, with glass held in resilient channels or gasket material.
- D. Hinged Doors: Mortise for hinges and reinforce with angles welded inside inner pans at hinge edge.
- E. Drawers: Fronts made from outer and inner pans that nest into box formation, with no raw metal edges at top. Sides, back, and bottom fabricated in one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Weld drawer front to sides and bottom to form a single, integral unit. Provide drawers with rubber bumpers, ball-bearing slides, and positive stops to prevent metal-to-metal contact or accidental removal.
- F. Adjustable Shelves: Front, back, and ends formed down, with edges returned horizontally at front and back to form reinforcing channels.

- G. Toe Space: Fully enclosed, 4 inches (100 mm) high by 3 inches (75 mm) deep, with no open gaps or pockets.
- H. Table Legs: Welded tubing, not less than 2 inches (50 mm) square with stretchers where needed to comply with product standard. Weld or bolt leg stretchers to legs and cross-stretchers and bolt legs to table aprons. Provide leveling device welded to bottom of each leg.
 - 1. Leg Shoes: Satin-finished stainless steel, open-bottom, slip-on type.
- I. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate utility services and their support-strut assemblies.
- J. Utility-Space Framing: Laboratory casework manufacturer's standard steel framing units consisting of 2 steel slotted channels complying with MFMA-2, not less than 1-5/8 inches (41 mm) square by 0.0966 inch (2.5 mm) thick, and connected together at top and bottom by U-shaped brackets made from 1-1/4-by-1/4-inch (32-by-6-mm) steel flat bars. Framing units may be made by welding specified channel material into rectangular frames instead of using U-shaped brackets.
- K. Filler Strips and Utility-Space Closure Panels: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets and with hemmed or flanged edges.

2.4 CASEWORK SYSTEM

- A. General: Provide casework manufacturer's standard integrated system that includes support framing, suspended modular cabinets, filler and closure panels, wall panels, countertops, and fittings needed to assemble system. System includes hardware and fasteners for securing support framing to permanent construction.
 - 1. Cabinets can be removed and reinstalled without use of special tools for relocation within system.
 - 2. Base cabinets can be removed without removing or providing temporary support for countertops.
 - 3. Sinks are supported independent of base cabinets.
 - 4. Support framing has provision for fastening pipe supports at utility space in not more than 1-inch (25-mm) increments.
 - 5. System includes filler and closure panels to close spaces between support framing, cabinets, shelves, countertops, floors, and walls, unless otherwise indicated. Fabricate panels from same material and with same finish as cabinets and with hemmed or flanged edges.
- B. Support Framing: Casework manufacturer's standard system consisting of vertical supports and connecting braces and rails as follows:
 - 1. Cabinets, shelves, and countertops are supported from vertical supports. Vertical positioning of supported cabinets, shelves, and countertops can be varied in 1-inch (25-mm) increments through full height of supports.
 - 2. Vertical supports rest on adjustable leveling bases and are secured to floor with metal clips fastened to floor.
 - 3. Vertical supports are installed with braces and rails connecting them to each other and to permanent building walls to create a stable, rigid structure with framed utility spaces where indicated.
 - 4. Vertical supports are braced at floor with cantilevered horizontal leg members where indicated.
- C. Countertops: Provide in modular lengths indicated, without seams.
- D. Basis-of-Design Product: The design for casework system is based on Fisher-Hamilton "C-Frame" system.
 - 1. ***Design Intent: As the facility is being designed for non-specific tenants, casework must accommodate differing laboratory setups with changing of tenants. Systems approved must allow for easy user reconfiguration of upper and lower cabinet modules within the support frame system without the use of hand tools. [Add7-18.a]***

2.5 METAL CABINET FINISH

- A. Preparation: After assembly, clean surfaces of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
 - 1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
 - 2. Colors for Metal Laboratory Casework Finish: As selected by Architect from manufacturer's full range.

2.6 CABINET HARDWARE

- A. General: Provide laboratory casework manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.
- B. Hinges: Stainless-steel, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide 2 for doors 48 inches (1200 mm) or less in height and 3 for doors more than 48 inches (1200 mm) in height.
- C. Pulls: Solid aluminum, stainless steel, or chrome-plated brass; fastened from back with two screws. For sliding doors, provide stainless-steel or chrome-plated recessed flush pulls. Provide 2 pulls for drawers more than 24 inches (600 mm) in width.
- D. Pulls: Recessed aluminum pulls. Provide 2 pulls for drawers more than 24 inches (600 mm) in width.
- E. Door Catches: Nylon-roller spring catch or dual, self-aligning, permanent magnet catch. Provide 2 catches on doors more than 48 inches (1200 mm) in height.
- F. Drawer Slides: Powder-coated, full-extension, self-closing, heavy-duty drawer slides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; complying with BHMA A156.9, Type B05091, and rated for 150 lbf (670 N).
- G. Label Holders: Stainless steel, aluminum, or chrome plated; sized to receive standard label cards approximately 1 by 2 inches (25 by 50 mm), attached with screws or rivets. Provide on all drawers.
- H. Locks: Cam or half-mortise type with 5-pin tumbler, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281, E07261, E07111, or E07021.
 - 1. Provide minimum of two keys per lock and two master keys.
 - 2. Provide on all drawers and doors.
- I. Sliding-Door Hardware Sets: Laboratory casework manufacturer's standard, to suit type and size of sliding-door units.

2.7 COUNTERTOPS, SHELVES AND SINKS

- A. Countertops, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch (25 mm), with continuous drip groove on underside 1/2 inch (13 mm) from edge.
- B. Sinks, General: Provide sizes indicated or laboratory casework manufacturer's closest standard size of equal or greater volume, as approved by Architect.
 - 1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2 (DN 40), unless otherwise indicated.
- C. Epoxy Countertops: Factory molded of modified epoxy-resin formulation with smooth, nonspecular finish.
 - 1. Physical Properties:
 - a. Flexural Strength: Not less than 10,000 psi (70 MPa).
 - b. Modulus of Elasticity: Not less than 2,000,000 psi (1400 MPa).

- c. Hardness (Rockwell M): Not less than 100.
 - d. Water Absorption (24 Hours): Not more than 0.02 percent.
 - e. Heat Distortion Point: Not less than 260 deg F (127 deg C).
 - 2. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
 - a. No Effect: Acetic acid (98 percent), acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
 - b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).
 - 3. Color: As selected by Architect from manufacturer's full range.
 - 4. Countertop Fabrication: Fabricate with factory cutouts for sinks and with butt joints assembled with epoxy adhesive and prefitted, concealed metal splines.
 - a. Countertop Configuration: Raised (marine) edge, 1 inch (25 mm) thick at raised edge, with rounded edge and corners, and with integral coved backsplash.
 - b. Countertop Construction: Epoxy composition not less than 1/4 inch (6 mm) thick, laminated to backing.
- D. Stainless-Steel Shelves: Made from stainless-steel sheet, ASTM A 666, Type 316, not less than 0.050-inch (1.3-mm) nominal thickness, with No. 4 satin finish. Weld shop-made joints, grind smooth, and finish. Fold down front edge 3/4 inch (19 mm); fold up back edge 3 inches (75 mm). Provide integral stiffening brackets, formed by folding up ends 3/4 inch (19 mm) and welding to upturned back edge.

2.8 ACCESSORIES

- A. Reagent Shelves: Provide as indicated, fabricated from same material as adjacent countertop, unless otherwise indicated.
- B. Adjustable Wall Shelf Supports: Surface-type steel standards and steel shelf brackets, with epoxy powder-coated finish, complying with BHMA A156.9, Types B04102 and B04112.
- C. Upright Rod Assembly and Metal Crossbar: Aluminum or stainless steel. Two vertical rods and 1 horizontal crossbar, 3/4 inch (19 mm) in diameter and 36 inches (900 mm) long, unless otherwise indicated; 2 flush socket receptacles and 2 crossbar clamps. Ends of vertical rods are tapered to fit receptacles; all other rod ends are rounded.
- D. Burette Rods: Aluminum or stainless-steel rods, 1/2 inch (13 mm) in diameter and 18 inches (450 mm) long, threaded on 1 end to fit tapered plug adapter for flush socket receptacle. Provide with tapered plug adapter and receptacle.
- E. Greenlaw Arm Assembly: Aluminum or stainless-steel vertical rod, tapered on one end to fit flush socket receptacle. Adjustable crossbar of hardwood with black, acid-resistant finish, secured to upright with adjustable clamp. Provide with receptacle.
- F. Lattice Assembly: Aluminum or stainless-steel, vertical and horizontal rod lattice assembly with 3/4-inch-(19-mm-) diameter rods at approximately 12 inches (300 mm) o.c. with 2 flush socket receptacles for mounting.
 - 1. Size: 36 inches (900 mm) wide by 24 inches (600 mm) high.
- G. Pegboards: Polypropylene, epoxy, or phenolic-composite pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet.

2.9 WATER AND LABORATORY GAS SERVICE FITTINGS

- A. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures--Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.
 - 1. Provide units that comply with recommendations in SEFA 7, Section 11, "Vandal-Resistant Faucets and Fixtures."

- B. Materials: Fabricated from cast or forged red brass, unless otherwise indicated.
 1. Reagent-Grade Water Service Fittings: Polypropylene, PVC, or PVDF for parts in contact with water.
- C. Finish: Corrosion resistant.
 1. Provide corrosion-resistant finish in laboratory casework manufacturer's standard color as approved by Architect.
- D. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig (550 kPa).
 1. Vacuum Breakers: Provide ASSE 1035 vacuum breakers on water fittings with serrated outlets.
 2. Aerators: Provide aerators on water fittings that do not have serrated outlets.
 3. Self-Closing Valves: Provide self-closing valves where indicated.
- E. Ground-Key Cocks: Tapered core and handle of one-piece forged brass, ground and lapped, and held in place under constant spring pressure. Provide units designed for working pressure up to 40 psig (280 kPa), with serrated outlets.
- F. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf (22 N) to operate. Provide units designed for working pressure up to 75 psig (520 kPa), with serrated outlets.
- G. Steam Valves: Stainless-steel seat and PTFE seat disc. Provide units designed for steam working pressure up to 20 psig (140 kPa), with serrated outlets.
- H. Needle Valves: Provide units with renewable, self-centering, floating cones and renewable seats of stainless steel or Monel metal, with removable serrated outlets.
 1. Provide units designed for working pressure up to 125 psig (860 kPa).
- I. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."
- J. Remote-Control Valves: Provide needle valves, straight-through or angle type as indicated for fume hoods and where indicated.
- K. Handles: Provide three- or four-arm, forged-brass handles for valves, unless otherwise indicated.
 1. Provide lever-type handles for ground-key cocks.
 2. Provide lever-type handles for ball valves.
 3. Provide heat-resistant plastic handles for steam valves.
 4. Provide knurled nylon handles for needle valves.
- L. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant.

2.10 ELECTRICAL SERVICE FITTINGS

- A. Service Fittings, General: Provide units complete with metal housings, receptacles, terminals, switches, pilot lights, device plates, accessories, and gaskets required for mounting on laboratory casework.
- B. Receptacles: Comply with NEMA WD 1, NEMA WD 6, FS W-C-596, and UL 498. Duplex type, Configuration 5 20R.
 1. Receptacle Grade: Hospital grade, unless otherwise indicated.
 2. GFCI Receptacles: Comply with UL 943, Hospital grade.
 3. TVSS Receptacles: Units with integral TVSS in line to ground, line to neutral, and neutral to ground.
 - a. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp level rating of 500 V and minimum single transient pulse energy dissipation of 140 J line to neutral, and 70 J line to ground and neutral to ground.
 - b. Active TVSS Indication: Visual and audible with light visible in face of device to indicate device is "active" or "no longer in service."
 - c. Receptacle Type: Hospital grade, with isolated-ground terminal.
 - d. Identification: Distinctive marking on face of device to denote TVSS-type unit.

- C. Switches: Comply with FS W-C-896 and UL 20. Provide single-pole, double-pole, or 3-way switches as required; rated 120 to 277-V ac; and in amperage capacities to suit units served.
 - 1. Provide pilot lights adjacent to toggle switches where noted as "PL" next to switch identification.
 - 2. Provide thermal-overload switches, single or double pole, as required, with maximum overcurrent trip setting to suit particular motor controlled.
- D. Pedestal-Type Fittings: Cast-aluminum housings with sloped single face or two faces, as indicated, with neoprene gasket under base and with concealed mounting holes in base for attaching to laboratory casework. Provide holes tapped for conduits.
- E. Line-Type Fittings: Provide with cast-metal boxes with threaded holes for mounting on rigid steel conduit. Provide cover plates the same size as boxes.
- F. Recessed-Type Fittings: Provide with galvanized steel boxes.
- G. Finishes for Service-Fitting Components: Provide housings or boxes for pedestal- and line-type fittings with manufacturer's standard baked-on, chemical-resistant enamel in color as selected by Architect from manufacturer's full range.
 - 1. Color of Receptacles and Switches: As selected by Architect, unless otherwise indicated or required by NFPA 70.
 - 2. Color of TVSS Receptacles: Blue.
- H. Cover Plates: Provide satin finish, Type 304, stainless-steel cover plates with formed, beveled edges.
- I. Cover-Plate Identification: Use 1/4-inch- (6-mm-) high letters, unless otherwise indicated. On stainless steel or chrome-plated metal, stamp or etch plate and fill in letters with black enamel. Provide on cover plates at the following locations:
 - 1. Receptacles other than standard 125-V duplex, grounding type. Indicate voltage and phase.
 - 2. Switches and thermal-overload switches. Indicate equipment being controlled.
 - 3. Pilot lights when located remotely from associated equipment or switch, where function is not obvious. Indicate equipment being controlled.
 - 4. Receptacles, switches, and other locations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of metal laboratory casework.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

- A. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.
- C. Base Cabinets: Adjust top rails and subtops within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm).
 - 1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than 2 fasteners per side.
- D. Wall Cabinets: Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through

back, near top, at not less than 24 inches (600 mm) o.c. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

- E. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- F. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

- A. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
- B. Field Jointing: Where possible, make in the same manner as shop jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop.
- C. Fastening:
 - 1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
 - 2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches (1200 mm) o.c.
 - 3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch (3 mm) and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
- D. Provide required holes and cutouts for service fittings.
- E. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF ACCESSORIES

- A. Install accessories according to Shop Drawings and manufacturer's written instructions.
- B. Securely fasten adjustable shelving supports, stainless-steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.
- C. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

3.5 INSTALLATION OF SERVICE FITTINGS

- A. Comply with requirements in Divisions 15 and 16 Sections for installing water and laboratory gas service fittings, piping, electrical devices, and wiring.
- B. Install fittings according to Shop Drawings and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings, piping, and conduit to laboratory casework, unless otherwise indicated.

3.6 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

- B. Protect countertop surfaces during construction with 6-mil (0.15-mm) plastic or other suitable water-resistant covering. Tape to underside of countertop at minimum of 48 inches (1200 mm) o.c.

3.7 SERVICE-FITTING SCHEDULE

- A. Water Service-Fitting Type WF:
 - 1. Type of Fitting: Rigid, gooseneck mixing faucet.
 - 2. Outlet: Aerator.
 - 3. Mounting: Deck mounted.

- B. Laboratory Gas Service-Fitting Type GF:
 - 1. Service: Vacuum.
 - 2. Type of Fitting: Turret.
 - 3. Outlets: One.
 - 4. Outlet Type: Straight.
 - 5. Valve Type: Needle valve.

- C. Electrical Service-Fitting Type EF:
 - 1. Type of Fitting: Pedestal, double faced.
 - 2. Device: Two duplex receptacles.
 - 3. Additional Requirements: GFCI receptacles.

END OF SECTION 12361