

SECTION 12 35 54
METAL LABORATORY CASEWORK V1.1

PART 1: DESCRIPTION OF WORK

1.00 SUMMARY AND SCOPE

- A. Section Includes:
Based on **Provincial Lab Systems MI [MO] Series** metal casework design, furnish and install all casework and work tops. Furnishing and installing all filler panels, knee space panels and scribes as shown on drawings.
- B. Accessorization:
 - 1. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings
- C. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the metal casework to an on-site container provided by others, leaving the premises clean and orderly.
- D. Related Divisions:
 - 1. Division 11: Laboratory Fume Hoods
 - 2. Division 15: Plumbing and Exhaust Ducting
 - 3. Division 16: Electrical Fittings and Connections

1.01 BASIS OF WORK

- A. It is the intent of this specification to use **Provincial Lab Systems**, as the standard of construction for metal casework. The construction standards of the **Provincial Lab Systems MI [MO] Series** product line shall provide the basis for quality and functional installation.
- B. Supply all equipment in accordance with this specification. The offering of a product differing in materials and construction from this specification requires written approval. This approval must be obtained seven (7) days before the proposal deadline.
- C. General Contractors should secure a list of approved casework manufacturers from the architect as a protection against non-conformance to these specifications.
- D. The owner/architect reserves the right to reject qualified or alternate proposals and to award based on product value where such action assures the owner greater integrity of product.
- E. Shop Drawings: For metal laboratory casework. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate locations of blocking and other supports required for install 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. Show adjacent walls, doors, windows, other building components, and other laboratory equipment. Indicate clearances from above items.
 - 5. Include coordinated dimensions for laboratory equipment specified in other Sections.

1.02 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated without delaying the Work, as documented according to ASTM # 548.
- B. Source Limitations: Obtain laboratory casework, including tops, sinks, service fittings, and accessories, through one source from a single manufacturer.
 - 1. Obtain through same source from the same manufacturer as fume hoods specified in Division 11 Section "Laboratory Fume Hoods"
- C. Product Designations: Drawings indicate sizes and configurations of casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes, similar door and drawer configurations, and complying with the Specifications may be considered.
- D. Product Standard: Comply with SEFA 8, "Laboratory Furniture-Casework, Shelving and Tables-Recommended Practices"
- E. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with the requirements of NFPA 30 for design, construction, and capacity of storage cabinets by UL, Warnock Hersey, or another testing and inspection agency acceptable to authorities having jurisdiction.
- F. Manufacturers shall have at least (5) years experience manufacturing projects of similar size and complexity.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver laboratory casework until painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in "Project Conditions" Article below.
- B. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

1.04 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install laboratory casework until building is enclosed, wet-work is completed, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels through remainder of construction period.

1.05 COORDINATION

- A. Coordinate layout and installation of metal framing and reinforcement in gypsum board assemblies for support of metal laboratory casework.

PART 2 – PRODUCTS

2.00 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the one of the following:
 - 1. Metal Laboratory Casework:
 - a. Provincial Lab Systems
 - b. Jamestown Metal Products
 - c. Kewaunee Scientific Corp
 - 2. Epoxy Tops, Sinks, and Troughs:
 - a. Durcon Company, Inc.
 - b. Laboratory Tops, Inc.

2.01 MATERIALS

- A. Metal: Commercial-quality, cold-rolled, carbon-steel sheet, complying with ASTM A 366; matte finish; suitable for exposed applications; and stretcher leveled or roller leveled to stretcher-leveled flatness.
- B. Minimum Metal Thickness: Provide metal laboratory furniture components of the following minimum thicknesses:
 - 1. Sides, ends, fixed backs, bottoms, tops, soffits, and items not otherwise indicated: 0.0478 inch. Except for flammable liquid storage cabinets, bottoms may be 0.0359 inch if reinforced.
 - 2. Back side panels, doors, drawer fronts and bodies, and shelves: 0.0359 inch. For back panels and doors for flammable storage cabinets, use 0.0478 inch thick metal. For shelves more than 36 inches long, use 0.0478 inch thick metal or provide suitable reinforcement.
 - 3. Intermediate horizontal rails, table aprons and cross rails, center posts, and top gussets: 0.0598 inch.
 - 4. Drawer runners, sink supports, and hinge reinforcements: 0.0747 inch.
 - 5. Leveling and corner gussets: 0.1046 inch.
- C. Acid Storage-Cabinet Lining: ¼ inch thick, polyresin, or phenolic-composite lining material.

2.02 FABRICATION

- A. General: Complete assembly and finish work at point of manufacture. Perform assembly on precision jigs to provide units which are square; fully reinforced with angles, gussets, and channels; and integrally framed and welded to form a dirt and vermin-retardant enclosure. Where applicable, reinforce base cabinets for sink support. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch.
- B. Fabricate units on precision dies for interchangeability of like-size drawers, doors, and similar parts.

- C. Flush Inset [Overlay] Doors: Outer and inner pans formed and telescoped into box formation, with channel reinforcements full height on center of each pan. Fill doors solid with noncombustible, sound-deadening material.
- D. Hinged Doors: Mortise at flanges for hinges and reinforce with angles, welded inside inner pans at hinge edge.
- E. Flush Inset [Overlay] Drawers: Assemble fronts from telescoping outer and inner pans, designed to eliminate raw edge of steel at top. Fabricate sides, back, and bottom of one piece with rolled or formed top of sides for stiffening and comfortable grasp for drawer removal. Weld drawer front to sides, back, and bottom to form a single, integral unit. Provide drawers with rubber bumpers, runners, and positive stops to prevent metal-to-metal contact or accidental removal.
- F. Adjustable Shelves: Front, back, and ends formed down with returned lip at front and back.
- G. Toe Space: Provide metal toe space, fully enclosed, 4 inches high by 3 inches deep, with no open gaps or pockets.
- H. Table Legs: Not less than 2 inch square, electrically welded tubing. Provide leg stretchers where necessary to comply with structural performance requirements. Weld or bolt leg stretchers to legs and cross-stretchers. Securely bolt legs to table aprons. Provide leveling device welded to bottom of each leg.
- I. Leg Shoes: Vinyl or rubber, black, open-bottom type.
- J. Utilities: Provide space, cutouts, and holes for pipes, conduits, and fitting in cabinet bodies to accommodate utility services and their support-strut assemblies.
- K. Utility-Space Framing: Manufacturer's standard steel framing units consisting of 2 cold-rolled C-channel uprights, not less than 1-5/8 inches square by 0.10 inch thick, connected together at the top and bottom by U-shaped brackets made from 1-1/4-by-1/4-inch flat bars. Framing units may be made by welding C-channel material specified for uprights into rectangular frames instead of using U-shaped brackets.
- L. Base Molding: Extruded vinyl or rubber, black, 4 inches high. Provide on fronts and exposed ends and backs of floor-mounted casework.
- M. Filler Strips: Provide as needed to close space between cabinets and walls, ceilings, and indicated equipment. Fabricate from the same material and with the same finish as cabinets. Hem exposed edges.

2.03 FINISH FOR METAL LABORATORY CASEWORK

- A. All Steel Laboratory Products shall utilize a dry powder coat paint process by means of electrostatically spray, providing high-transfer efficiency low waste generation. Liquid-applied coatings shall not be acceptable. Manufacturer shall supply documentation that waste generated during the painting process, is a solid, non-hazardous material.
 - 1. Pretreatment: Finish process shall incorporate a phosphate conversion coating during the pretreatment/cleaning operation. Electrostatic application of dry powder shall follow. Coated parts shall pass through curing ovens, which shall cause the powder to melt, flow, gel, cure and bond onto the phosphatized steel substrate.

2. Chemical Resistant Finish: Only highly chemically resistant, dry powder coated finishes that passes the SEFA 8 casework specifications for chemical and durability resistance, will be acceptable.
 3. Overspray Powder Paint: Shall be captured and re-sprayed. Efficiency shall be 99% effective in coating usage, reducing waste generation. A closed collection system shall be utilized for overspray that is not reused. Powder overspray, which can not escape the facility, is collected in bulk, eliminating the need for daily replacement/disposal of filter media.
 4. VOC Emissions: Powder paint shall be sprayed and baked with a near zero (.29 lbs per gallon maximum) VOC (Volatile Organic Compounds) emissions.
 5. Off-gassing: After all steel powder coated parts have cooled from the curing ovens, the coating shall be firm and stable. No further emissions of "Off-gassing/Decomposition" vapors shall occur at room temperature.
- B. Chemical-Resistant Powder Coat Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard 2-coat, chemical-resistant, baked-enamel finish consisting of prime coat and thermosetting topcoat with a minimum dry film thickness of 1 mil for topcoat and 2 mils for system.
- C. Chemical and Physical Resistance of Finish System: Provide metal laboratory casework with finish system complying with the following requirements for chemical and physical resistance:
1. Chemical and Physical Resistance: capable of withstanding application of not less than 5 drops (0.25 ml) of the following reagents applied to finish surface; covered with a watch glass for 60 minutes, rinsed, and dried; with no permanent change in gloss, color, film hardness, adhesion, or film protection.
 - a. Acetic acid (98 percent).
 - b. Hydrochloric acid (37 percent).
 - c. Nitric acid (25 percent).
 - d. Phosphoric acid (75 percent).
 - e. Sulfuric acid (85 percent).
 - f. Acetone.
 - g. Benzene.
 - h. Carbon tetrachloride.
 - i. Ethyl acetate.
 - j. Ethyl alcohol.
 - k. Formaldehyde (37 percent).
 - l. Furfural.
 - m. Methyl ethyl ketone.
 - n. Phenol (85 percent).
 - o. Toluene.
 - p. Xylene.
 - q. Ammonium hydroxide (28 percent).
 - r. Potassium hydroxide (25 percent).
 - s. Potassium hydroxide (40 percent).
 - t. Sodium carbonate (saturated).
 - u. Sodium chloride (saturated).
 - v. Sodium hydroxide (25 percent).
 - w. Sodium sulfide (saturated).
 - x. Zinc chloride (saturated).
 2. Moisture Resistance: No visible effect when exposed to the following:
 - a. Hot water at a temperature of 190 to 205 deg F, trickled down the surface at a 45-degree angle for 5 minutes.
 - b. Constant moisture using a 2-by-3-by-1-inch cellulose sponge, soaked with water, in contact with surface for 100 hours.

3. Cold Crack: No effect when subjected to 10 cycles of temperature change from 20 deg F for 60 minutes to 125 deg F for 60 minutes.
 4. Adhesion and Flexibility: No peeling or cracking or exposure of metal when metal is bent 180 degrees over a ½ inch diameter mandrel.
- D. Colors: Comply with the following requirements for colors of metal laboratory casework finish:
1. Colors: As indicated by manufacturer's color designations.

2.04 CASEWORK HARDWARE

- A. Hardware, General: Provide manufacturer's standard satin-finish, commercial quality, heavy-duty complying with requirements indicated for each type.
- B. Hinges: Stainless-steel, 5-knuckle hinges complying with BHMA 156.9, Grade 1, with antifriction bearings and rounded tips. Provide 2 for doors less than 48 inches high and 3 for doors more than 48 inches high.
- C. Pulls: Solid aluminum, stainless-steel, or chrome-plated brass, fastened from back with 2 screws. For sliding doors, provide stainless-steel or chrome-plated recessed flush pulls. Provide 2 pulls for drawers more than 24 inches wide.
- D. Door Catches: Nylon-roller spring catch or dual, self-aligning, permanent magnet catch. Provide 2 catches on doors more than 48 inches high.
- E. Drawer Guides: Metal-channel, self-closing drawer guides, designed to prevent rebound when drawers are closed, with nylon-tired, ball-bearing rollers, and complying with BHMA A156.9, Type B05091.
- F. Label Holders: Stainless-steel or chrome-plated, sized to receive standard label cards approximately 1 by 2 inches, attached with screws or rivets.
 1. Provide on all drawers.
- G. Drawer and Cupboard Locks: Half-mortise or cylindrical type, 5-pin tumbler and dead bolt or cam, only cylinder exposed, brass with chrome-plated finish, complying with BHMA A156.11, Grade 1.
 1. Provide minimum of 2 keys per lock and 6 master keys.
 2. Provide as indicated on drawings

2.05 TOPS, SINKS, AND TROUGHS

- A. Tops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Make exposed edges and corners uniformly beveled. Provide front and end overhang of 1 inch over base cabinets, formed with continuous drip groove on underside ½ inch from edge.
- B. Sinks, General: Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
 1. Outlets: 1-1/2-inch NPS outlets with strainers and tailpieces a minimum of 6 inches long, of the same material as sink, or as otherwise approved by CM.
 2. Overflows: For each sink, except cup sinks, provide overflow of standard beehive or open-top design and with separate strainer. Height 2 inches less than sink depth. Provide in the same material as sink.

- C. Epoxy Tops, Sinks and Troughs: Factory molded of modified epoxy-resin formulation, uniform mixture throughout full-thickness with smooth, nonspecular finish.
1. Physical Properties: Comply with the following minimum requirements:
 - a. Flexural strength: 15,000 psi.
 - b. Compressive strength: 30,000 psi.
 - c. Hardness (Rockwell M): 100
 - d. Water absorption (24 hours): 0.02 percent (maximum).
 - e. Heat distortion point: 350 deg. F
 - f. Thermal-shock resistance: Highly resistant.
 2. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, test procedure 3.9.5:
 - a. Acetone: Moderate effect.
 - b. Acetic acid (98 percent): No effect.
 - c. Hydrochloric acid (37 percent): No effect.
 - d. Nitric acid (70 percent): No effect.
 - e. Phosphoric acid (85 percent): No effect.
 - f. Sulfuric acid (33 percent): No effect.
 - g. Benzene: No effect.
 - h. Butyl alcohol: No effect.
 - i. Carbon tetrachloride: No effect.
 - j. Ethyl acetate: No effect.
 - k. Ethyl ether: No effect.
 - l. Formaldehyde: No effect.
 - m. Phenol (85 percent): No effect.
 - n. Xylene: No effect.
 - o. Ammonium hydroxide (28 percent): No effect.
 - p. Sodium hydroxide (50 percent): Moderate effect.
 - q. Zinc chloride: No effect.
 3. Colors: Provide products that result in colors complying with the following requirements:
 - a. Color: Black.
 4. Top Fabrication Fabricate with factory cutouts for sinks and with plain butt-type joints assembled with epoxy adhesive and pre-fitted, concealed metal splines.
 - a. Top Configuration: Square edge with drip groove and integral coved backsplash.
 - b. Top thick: 1-1/4-inches.
 5. Sink Fabrication: Molded in one piece with surfaces smooth, corners coved and bottom sloped to outlet; ½-inch minimum thickness.
 - a. Provide sinks with ¼-inch-thick lip around perimeter of sink for drop-in installation.
 - b. Bond epoxy sinks installed in epoxy tops to tops and finish to produce an integral unit with invisible joint line.
- D. Cup Sinks: Epoxy, 3-by-6-inch nominal size.
- E. Cup Sinks: Epoxy, polypropylene, glass, or stainless-steel as indicated on Drawings.
- F. Troughs: Epoxy or stainless-steel, as indicated. Comply with requirements for materials and construction as specified for tops or sinks. Pitch to drain not less than 1/8 inch/foot.

2.06 SOLVENT STORAGE CABINETS

- A. Top, bottom and sides: 18 gauge steel, double wall construction with 1-1/2" air space, removable access and back panels; all joints welded. Set bottom of door two inches above bottom of cabinet to create a two inch deep well to contain spillage of liquids.
 - 1. Provide non-venting cabinets.
- B. Hardware:
 - 1. 3 point latching device and lock.
 - 2. Full length piano hinge.
 - 3. Door operation: Manual.
- C. Cabinet grounding attachment: Screw at base of cabinet for firm attachment of grounding wire.
 - 1. Mark with Factory Mutual approval and storage capacity.
 - 2. Warning signs: Label cabinet: "FLAMMABLE – KEEP FIRE AWAY".

2.07 ACCESSORIES

- A. Reagent Racks: Single- or double-faced units as indicated, fabricated to suit type and composition of top.
- B. Wall Shelving: Provide wall shelving of materials indicated and as follows:
 - 1. Plastic-Laminate Shelving: Plastic-laminate sheet complying with NEMA LD 3, Grade GP 28, shop bonded with fully waterproof glue to both sides and both edges of 3/4-inch-thick particleboard. Sand surfaces to which plastic laminate is to be bonded.
 - 2. Color, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed shelf surfaces complying with the following requirements:
 - a. Provide selections from manufacturer's full range of colors and finishes.
 - 3. Adjustable Shelf Supports: Surface-type steel standard 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 diameter and 36 inches long, unless otherwise indicated; 2 flush socket receptacles and 2 crossbar clamps. Taper ends of vertical rods to fit receptacles; all other rod ends are rounded.
- D. Burette Rods: Aluminum or stainless-steel rods, 1/2 inch diameter and 18 inches long, threaded on 1 end to fit tapered plug adapter for flush socket receptacle. Provide with tapered plug adapter and receptacle.
- E. Lattice Assembly: Aluminum or stainless-steel, vertical and horizontal rod lattice assembly with 3/4 inch diameter rods at approximately 12 inches o.c. with 2 flush socket receptacles for mounting.
 - 1. Size: 36 inches wide by 36 inches high.
- F. Pegboards: Polypropylene, epoxy, phenolic-composite, stainless-steel pegboards with polypropylene pegs and stainless-steel drip troughs.

2.08 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal laboratory casework capable of withstanding the following loads without permanent deformation, excessive deflection, or binding of drawers and doors.
 - 1. Shelves of Base, Wall, and Storage Cabinets: 200 lbs.
 - 2. Drawers: 150 lbs.
 - 3. Wall Cabinets: 150lbs/ft.
 - 4. Floor-Supported Base Cabinets: 100 lbs/ft/ within cabinets, 75-lbs/ft. countertop.

2.09 CASEWORK INSTALLATION - OTHER

- A. Install plumb, level, and true; shim as required, using concealed shims. Where laboratory case work abuts other finished work, apply filler strips and scribes for accurate fit, with fasteners concealed where practical.
- B. Utility-Space Framing: Secure to floor with 2 fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.
- C. Base Cabinets: Set cabinets straight, plumb, and level. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to utility-space framing, partition framing, wood blocking or reinforcements in partitions with fasteners spaced 24 inches 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. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 24 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than 2 fasteners.
- D. Wall Cabinets: Hang cabinets straight, plumb, and level. Adjust fronts and bottoms within 1/16 inch 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 o.c. Align similar adjoining doors to a tolerance of 1/16 inch.
- E. Install hardware uniformly and precisely. Set hinges snug and flat in mortises, unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- F. Adjust casework and hardware so doors and drawers operate smoothly with out warp or bind. Lubricate operating hardware as recommended by manufacturer.

2.10 INSTALLATION OF TOPS

- A. 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 so Project site processing of top and edge surfaces is not required. Locate field joints where shown on approved Shop Drawings.
- B. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection. Provided flush hairline joints in tops using clamping devices.
 - 1. Where necessary to penetrate tops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to top in chemical resistance, hardness, and appearance.

- C. Provide required holes and cutouts for service fittings.
- D. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Provide scribe moldings for closures at junctures of top, curb, and splash, with wall sas recommended by manufacturer for materials involved. Match materials and finish to adjacent casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.

2.11 INSTALLATION OF SINKS

- A. Underside Installation: Use manufacturer's recommended adjustable support system for table-and cabinet-type installations.
- B. Set top edge of sink unit in sink and top manufacturers' recommended chemical-resistant sealing compound and firmly secure to produce a tight and fully leak proof joint. Adjust sink and securely support to prevent movement.
- C. Semi-flush installation: Use stainless-steel sink frame, complete with clamping lugs and pads. Before setting, apply a full coat of sink and top manufacturers; recommended sealant under rim lip and along top. Omit sink frame if sink is fabricated with an integral rim seal.
- D. Drop-in Installation: Rout groove in top to receive sink rim if not prepared in shop. Set sink in adhesive and fill remained of groove with sealant or adhesive. Use procedures and products recommended by sink and top manufacturers. Remove excess adhesive and sealant while stills wet and finish joint for neat appearance.

2.12 INSTALLATION OF ACCESSORIES

- A. Install accessories according to approved 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.

2.13 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Construction Manager,
- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at minimum of 48 inches o.c.