1 General

1.1.1 Provide cut-outs and holes in casework necessary for installation of service fittings.

1.2 REFERENCES

1.2.1 SEFA 8: Laboratory Furniture – Casework, Shelving and Tables Guidelines Science Equipment and Furniture Association (SEFA)

1.2.2 ISO 9001:2008 – Quality Management International Standards Organization (ISO)

1.3 SUBMITTALS

1.3.1 Product data sheets:

1.3.1.1 Submit Manufacturer's Product data sheets for Products proposed for use in the work of this section.

1.3.2 Samples:

1.3.2.1 Three (3) sets of 200 mm x 200 mm samples, or 200 mm long as applicable, of each specified Product, material and finish.
1.3.2.2 Prefinished metal.
1.3.2.3 Shelf Bracket
1.3.2.4 One complete set of color chips representing the manufacturer’s full range of available colors. Minimum sample 50 mm. x 76 mm.

1.3.3 Hardware, one unit of each type and finish.

1.3.4 Shop Drawings:

1.3.4.1 Clearly indicate materials being supplied and finishes, connections, attachments, reinforcing, locations or exposed fastening, colours, gloss intensities and coating types by name.
1.3.4.2 Completely detailed Shop Drawings including plans, elevations, sections and details shall clearly indicate:

1.3.4.2.1 Laboratory casework, leg frame assembly, countertops, plumbing/mechanical service fittings, sinks, and miscellaneous items.
1.3.4.2.2 Location of each furniture unit in plan and elevation for each assembly.
1.3.4.2.3 Location for roughing-in of plumbing and electrical services.

1.3.4.2.4 Coordinate elevations with floor plan for each room and indicate locations and dimensions required for services.

1.3.5 Mock-up:

1.3.5.1 Provide mock-up of one complete unit comprising of a cross section of wall storage and base units as directed by Departmental Representative.

1.3.5.2 Mock-up shall demonstrate construction and finishes.

1.3.5.3 Reviewed mock-up may remain as part of the final installation, subject to approval by the Departmental Representative.

1.3.6 Closeout Submittals:

1.3.6.1 Operation and maintenance instructions:

1.3.6.1.1 Submit data for operation and maintenance of Products included in work of this section, for incorporation into operation and maintenance manuals.

1.4 COORDINATION

1.4.1 Work of this section is closely integrated with laboratory work of other sections. Coordinate work of this section with work of:

1.4.1.1 Laboratory counter tops under Section - 12 36 53 and Section - 12 36 54

1.4.2 Coordinate with mechanical, electrical, and other Subtrades for installation and connections.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery, storage, and handling of Products in accordance with Manufacturer's written instructions.

1.5.2 Package or crate, and brace Products to prevent damage or distortion during shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Utilize temporary skids under large or heavy units.

1.5.3 Deliver Products to location at building site designated by Departmental Representative.

1.5.4 Do not deliver Products to site until conditions are such that no damage will occur to them while in storage.

1.5.5 General Conntractor shall be jointly responsible to make certain that casework is not delivered until building and storage areas are sufficiently dry so that casework will not be damaged by excessive changes in moisture content.

1.5.6 Do not deliver casework until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas.

1.6 SITE CONDITIONS, SCHEDULING

1.6.1 Scheduling: Deliver equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed.

1.6.2 Coordinate scheduling and requirements with Divisions 22 and 26.

1.6.3 Field measurements: Accurate field measurements to be completed before manufacturing. Show recorded measurements on final Shop Drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

1.7 PERFORMANCE REQUIREMENTS

1.7.1 For flexible laboratory furniture system:

1.7.1.1 Support systems shall be core and panel style support structure.
1.7.1.2 Modular components shall be suitable for single faced wall cores or double-faced peninsula or island configuration.
1.7.1.3 Core assemblies shall have removable panels on all sides.

1.7.2 Static load performance of furniture units:

1.7.2.1 Furniture units shall withstand the following maximum static loads without causing deformation, drawer, or door malfunction, or tipping of the unit.
1.7.2.2 Floor supported base cabinets shall carry 227 kg per linear feet of width evenly distributed over the full width and depth.
1.7.2.3 Suspended cabinets shall carry 136 kg evenly distributed inside the cabinet on the lower surface and shelves or drawers with the cabinet suspended.
1.7.2.4 Post-supported shelves shall carry 23 kg per linear foot evenly distributed over the full width and depth of shelf or 114 kg applied on front edge of shelf at width midpoint.
1.7.2.5 Cabinet levelling device shall carry 227 kg and capable of adjustment after load is removed.
1.7.2.6 Cabinet door shall withstand 69 kg applied at outer edge of cabinet door that is swung 180 degrees.
1.7.2.7 Wall cabinets: Each shelf and cabinet bottom shall carry 23 kg per linear foot of width with load evenly distributed on shelves and cabinet bottom over full width and depth.
1.7.2.8 Base cabinet shelves shall carry 46 kg evenly distributed over full width and depth.

1.7.3 Dynamic load performance of furniture components:

1.7.3.1 Furniture components shall withstand following performance requirements without deformation of malfunction.

1.7.3.2 Cabinet drawers: shall perform to 150,000 opening and closing cycles with evenly distributed 46 kg load in the drawer.
1.7.3.3 Positive door catches: shall perform 300,000 opening and closing cycles without breakdown.
1.7.3.4 Door hinges: shall perform 300,000 opening and closing cycles with no static load added to the door.
1.7.3.5 Self-closing drawers: Drawers shall close when 152 mm open and have no static interior load.
1.7.3.6 Drawers 1219 mm wide: fully operable from either front corner with an interior 46 kg static load without racking or bending.
1.7.3.7 Drawer opening: operate with maximum opening force to fully open drawer with interior static load of 69 kg in properly levelled cabinet at 2.3 kg.

1.7.4 Physical performance of coatings:

1.7.4.1 Pencil hardness: 4H minimum
1.7.4.2 Abrasion resistance: 3.5 mg maximum weight loss per 100 cycles when tested on a calibrated E401 01 Taber Abrasion Tester using 1000 gm wheel pressure from a CD10 wheel
1.7.4.3 Humidity resistance: No visible effect after a 1000 hour exposure in saturated humidity at 100°F
1.7.4.4 Moisture resistance: No visible effect caused by 200°F +/- 5°F water trickles for 5 minutes over a test panel inclined at 45 degrees. No visible effect caused by a 1 00 hour continuous application of a 70°F water soaked 25 mm x 76 mm 25 mm cellulose sponge that remains wet throughout the entire test period.
1.7.4.5 Salt spray resistance: No visible effect after a 250 hour salt spray test
1.7.4.6 Adhesion: Minimum of 100 squares retain finish after a test panel is scored into 100 squares 1.6 mm x 1.6 mm by a razor blade that cuts completely through the finish with a minimum of substrate penetration and any loose particles are removed by a soft brush
1.7.4.7 Cold crack: No effect cause by 10 cycles of temperature change from 20°F for 60 minutes to 125°F for 60 minutes.
1.7.4.8 Adhesion and flexibility: no peeling or cracking of finish or no metal exposure when a test sample is bent 180 degree once over a 6 mm mandrel per ASTM 0522.
1.7.4.9 Impact resistance: No cracking of finish or metal exposure when a steel ball is dropped from a calibrated stand to deliver 11.30 Newton meter of impact.
1.7.4.10 Gloss: 50 +I- 5 gloss when finish surface is measured at 60° reflectance

1.7.5 Chemical resistance performance:

1.7.5.1 Test Procedure:

1.7.6 Test panels shall withstand the following tests with no loss of adhesion or film protection, no discolouration or change in gloss, or no film softening. Concentrations identified as (*) can have slight discolouration or change in gloss, or temporary file softening. Concentrations are noted as percent by weight.

1.7.6.1 Test results:

1.7.6.1.1 Acids: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried.

- Hydrochloric Acid: 37%*, 30%, 20%, 10%
- Sulphuric Acid: 70%*, 60%, 25%
- Nitric Acid: 50%*, 30%, 10%
- Phosphoric Acid: 75%, 25%
- Acetic Acid: 98%, 50%
- Formic Acid: 60%
- Perchloric Acid: 60%
- Phenol 85%

1.7.6.1.2 Solvents: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried. Volatile solvents shall be applied by a saturate cotton ball method.

- Ethyl Alcohol
- Methyl Alcohol
- Ethyl Ether
- Toluene
- Benzene
- Formaldehyde
- Naphtha
- Xylene
- Furfural
- Xylol
- Butyl Alcohol
- Ethyl Acetate
- Methylethyl Ketone
- Acetone
- Carbon Tetrachloride
- (37%) Gasoline
- Kerosene
- Glycerine
- Ether
- Chloroform

1.7.6.1.3 Bases and Salts: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried.

- Sodium Hydroxide 40%, 10%
- Ammonium Hydroxide 28%
- Potassium Hydroxide 40%, 10%
- Hydrogen Peroxide 5%
- Zinc Chloride Saturated
- Sodium Sulphide Saturated
- Sodium Carbonate Saturated
- Sodium Chloride Saturated

1.8 DEFECTS

1.8.1 Warrant work of this section for defects.

1.8.1.1 Defects include, but are not limited to:

1.8.1.1.1 Ruptured, cracked, or stained coating.
1.8.1.1.2 Discoloration or lack of finish integrity.
1.8.1.1.3 Cracking or peeling of finish.
1.8.1.1.4 Slippage, shift, or failure of attachment to wall, floor, or ceiling.
1.8.1.1.5 Weld or structural failure.
1.8.1.1.6 Warping or unloaded deflection of components.
1.8.1.1.7 Failure of hardware.

2 Products

2.1 MATERIALS

2.1.1 Sheet steel:

2.1.1.1 Mild steel, cold rolled furniture grade, Drawing Steel OS Type B or higher, exposed, with smooth surfaces to furniture quality.

2.1.2 Galvanized steel:

2.1.2.1 Commercial quality galvanised sheet steel to ASTM 653, Designation Z275.

2.1.3 Stainless steel:

2.1.3.1 Sheet: Type 316 alloy, weldable.
2.1.3.2 Finish: AISI No. 4 Brushed finish, unless otherwise indicated.

2.1.4 Glass:

2.1.4.1 Clear Float, 6 mm and 3 mm thick, conforming to CAN2 12.3-M76, Glazing Quality. Laminated Glass: CAN/CGSB-12.1-M90, Type 1 with clear PVB interlayer. Total nominal thickness of laminated glass: 6 mm.

2.1.5 Clear Acrylic

2.1.5.1 Types: Perspex, clear acrylic: 5 mm thick.

2.1.6 Sealant: One component, clear silicone sealant, chemical curing, antifungus composition.

2.1.7 Solid Phenolic: in accordance with Section 12 36 53

2.1.8 Cabinet hardware:

2.1.8.1 Pulls: Handles for drawers and hinged doors in 101 mm satin finish stainless steel.

2.1.8.2 Door catches: Adjustable zinc-plated, spring-loaded, nylon roller..

2.1.8.3 Strike plates: Strike plates fabricated of stainless steel, deigned to be secured to cabinet stile without twisting, fixed with a single self-tapping stainless steel screw.

2.1.8.4 Door hinges: Five knuckle-type barrel door hinges of 14 gauge steel screwed into door and fastened to cabinet side stile with 2 counter sunk 8 - 32 cadmium-plated machine bolts & self-locking kep nuts, , nickel plated.

2.1.8.5 Locks; base and mobile cabinets: Locks for doors and drawers on cabinets, hinged doors on wall and floor-standing cabinets. File cabinets and mobile cabinets all have locks.

2.1.8.5.1 Keys shall be removable in locked or unlocked positions.

2.1.8.5.2 Provide locks on each cabinet and each mobile cabinet is required to be keyed differently. All file cabinets are keyed alike.

2.1.8.5.3 Master keyed and 27 subgroup masters keyed by department.

2.1.8.5.4 Provide locks on all cabinets:

- All mobile cabinets are keyed differently.
- All other cabinets are keyed alike.

2.1.8.6 Drawer and hinged door bumpers: Two tongue-type white rubber, press-fit bumpers per door or drawer.

2.1.8.7 Press plugs: Plugs for cabinet levelling device holes in floors in black PVC,.

2.1.8.8 Shelf clips:

2.1.8.8.1 Clips for base cabinets, wall hung and tall storage cabinets; zinc-finished steel.

2.1.8.8.2 Clip for solvent storage.

2.1.8.9 Leg leveller bolt: 10 mm diameter hex-head leg leveller bolt,.

2.1.8.10 Split pin for door handle, 16 mm.

2.1.8.11 Casters, levelling and locking: to suit loading requirements.

2.1.8.12 Levelling casters; mobile benches:

2.1.8.12.1 Total four caster loads up to 598.8 kg.

2.1.8.13 Drawer slides: 508 mm full-extension, load capacity 46 kg,.

2.1.8.14 Grommet: Plastic grommet, 75 mm diameter, unless otherwise indicated.

2.2 DESIGN REQUIREMENTS

2.2.1 Support systems shall be a core and panel style support structure.

2.2.2 Core structure can be supported by anchoring to suitable flooring material or may be supported by structural end gables (outrigger legs).

2.2.3 Modular components shall be suitable for single faced wall cores or double-faced peninsula or island configuration.

2.2.4 Core assemblies shall have removable panels on all sides.

2.3 CONSTRUCTION

.1 Suspended Base/Wall Cabinets:

.1 Design and construction shall be as in section 12 35 53.13 – Steel Laboratory Casework.

.2 Suspended cabinets shall be supported using hook shaped rails attached near the front and rear of the cabinets. It shall be possible to remove and relocate a fully loaded cabinet to any position between legs.

.3 Suspended wall cases: Provide a system of cold-rolled steel hanger rails attached to the casework frames, to be vertically adjustable on 25 mm. increments. Installation and removal to be accomplished without the use of tools.

.2 Service Core and Bench Frame:

.1 Materials and Thicknesses: Use following minimum U.S. standard steel thicknesses for furniture manufacturing:

- .1 11 Ga -"U" brackets, box brackets.
- .2 14 Ga - Front cabinet support rails, rear cabinet support rails
- .3 16 Ga - Vertical service core post, vertical island and wall posts, fixed bench frames, adjustable bench frames
- .4 18 Ga - Upper service cover panels, lower service cover panels, end close off panels, service drops, adjustable service cover support rail, service cover support rails.

.2 The bench frame system shall provide complete independent rigid support for work surfaces, under counter suspended cabinets, overhead shelving. Service cover panels, sinks and all mechanical and electrical line work as necessary to make the assembly operation.

.3 The framing system shall accommodate the following design concepts:

.1 Separate service strip consisting of a flat counter top 600 mm deep with a 150 mm. deep service strip top, and a 100 mm. back splash.

.4 The system shall allow the addition, relocation or removal of suspended base cabinets, the removal of the entire leg frame module including base cabinets and work surfaces, leaving intact the separate service strip with all its service fittings, service lines and cover panels as a finished operational component.

.5 The Standard Bench module shall be based on a standard 1524 mm nominal inside dimension to accommodate any combination of cabinets up to 1524 mm in width. It shall be possible to make 600 mm., 900 mm., 1200 or custom length modules where necessary to suit room dimensions.

.3 Leg Frames:

.1 Each leg frame shall be fabricated from die-formed components. All welds are to be ground smooth ready for painting. Each leg frame shall have a 9.5 mm. diameter levelling bolt, a slip on wrap around black PVC shoe and two welded studs for securing to service strip.

.2 Adjustable height leg frames shall be constructed as specified in 2.3.3.1 with the following additions. The front leg shall be constructed of two telescoping frames on 13 mm centres with a total height adjustment of 152 mm telescoping frames are to be locked in position with a spring loaded pin. Accessible from underside of the leg frame.

.4 Cabinet Support Front Rail:

.1 Front cabinet support rail shall be fabricated in a channel formation to be secured to the adjacent leg frames. The bottom edge of the rail shall be designed to engage with the front rail of the suspended base cabinet. The outer rail shall fit flush with the face of the cabinet. Flat ledges above the cabinet that will collect dust are not acceptable.

.5 Cabinet Support Rear Rail:

.1 Rear cabinet support rail shall be fabricated in a channel formation to over lapped the adjacent leg frames. The bottom edge of the rail shall be designed to engage with the rear rail of the suspended base cabinet.

.6 Service Cover Support Rails:

.1 Service cover support rail shall be fabricated in a "Z" channel formation to be secured to the service strip. The bottom edge of the rail shall be designed to suspend the top edge of the service cover panel.

.7 End Closure Panels:

.1 End closure panels shall be used to close off the ends of the service strip. End closure panels for wall benches shall be flanged on one edge, the other unformed edge shall slide in to a slip joint angle secured to the wall. Island assemblies shall have both edges flanged for securing to the service strip.

.8 Peninsula Vertical Post Structure:

.1 Provide a two-piece telescoping upper vertical slotted post 41 mm by 41 mm sleeved into a 48 mm by 48 mm lower post. Upper and lower section shall be through bolted with 9.5 mm diameter zinc plated bolts to allow for field levelling.

.2 The vertical post system shall be attached with an upper horizontal "u" bracket, lateral "u" strut, 9.5 mm zinc plated bolts and spring nut. The lower horizontal box bracket shall be lagged to the floor, and attached to the furniture system with 9.5 mm zinc plated bolts and spring nuts.

.3 The vertical post system shall be slotted on 25 mm. centres to except a notched shelf bracket. Shelves shall be fully adjustable without the use of tools.

.4 The shelf bracket shall be notched to fit in to the slotted post, and positively lock when weight is applied. The bottom shall be flanged to support the horizontal shelf, and will be tabbed and pre punched to mount the shelf.

.5 Shelves shall be of high pressure plastic laminate, painted steel, epoxy or similar material to support the desired weight. The rear of the shelf shall be blocked off with a painted steel angle running the open width of the shelf.

.9 Wall Vertical Post Structure:

.1 Provide a one piece vertical slotted post 41 mm. by 20.5 mm. by 915 mm. or 1220 mm. as required.

.2 The vertical post system shall be through secured to the wall material with appropriate fasteners to suit wall conditions.

.3 The vertical post system shall be same as above.

.4 The shelf bracket shall be the same as above.

.5 Shelves shall be the same as above.

.10 Service Drop Structure:

.1 Provide die-formed enclosed structure flange at the bottom to mount to the counter top. The front shall be formed and notched, and similar in construction to the base cabinets, and will except a removable door, Upper and lower Panel. The front of drop shall be open to allow for existing services to access the interior of the structure.

.2 The service drop shall be painted on all surfaces to match cabinet.

.3 No exposed fasteners are allowed. Upper and lower panels shall be fixed to the drop with zinc plated screws through the side flanges of the opening, the door shall be notched and formed to fit securely into the upper panel, and drop securely into the lower panel. Door shall sit flush with face of service drop, and will be removable without the use of special tools.

.11 Vertical Service Chases (Umbilical)

.1 Fabricate 3-sided, 4-cornered, full height from countertop backsplash to ceiling, chase from 16mm thick solid phenolic panel material.

.1 Colour: as selected by Departmental Representative from Manufacturer's full range of colours.

.2 Internal reinforcement channels as required to carry loads imposed by shelving, piping, conduits, and pegboards.

.3 Internal hat channels for concealed screw attachment of any pipe and conduit clamping devices.

.4 Fourth side of chase facing sink shall be a 1-piece access panel from counter backsplash to ceiling, with exposed stainless steel fasteners.

.5 Laser cut opening for electrical and telecom services must be provided. Electrical plugs must be flush mounted with no back box. Refer to details on the electrical package for quantities and elevations.

.12 Core and Support Panel Structure

.1 Core and panel support structure is provided at peninsula bench configurations in order to provide seismic support to modular table frame assemblies, support adjustable shelving, and for distribution of power, data, and specialty gas piping.

.2 Top of panel section shall be finished with a 25.4 mm. continuous (flush) solid phenolic resin cap secured to metal stud framing top track. Refer to 12 36 53.

.13 Painted Steel Furniture Finish:

.1 Preparation and painting:

.1 Prepare surfaces, make free of defects with welds ground smooth and indistinguishable from surrounding metal.

.2 Components shall be cleaned in 4-stage chemical spray process that produces iron phosphate coating bonded to steel surfaces, concluding with a final deionized water rinse. Components shall be thoroughly oven-dried before.

.3 Components shall be sprayed in an electro-static three-stage process with high temperature, high-solids (60% minimum), semi-gloss (50%), epoxy/urethane baking enamel. Paint coating shall provide uniform coating on surfaces of each component with minimum thickness of 1.2 mils, and components properly baked and cured.

.4 Colours:

.1 Manufacturer's colour range, including custom colour as approved by Departmental Representative.

.2 A 1-colour scheme will be used: Off-white shades

3 Execution

3.1 INSTALLATION

.1 Install casework within system, align and set level with levelling devices, in accordance with Shop Drawings. Installation is not to proceed until completion of floor finishes so that flooring is continuous below floor supported casework, unless otherwise specified.

.2 At wall locations secure wall cabinets to face of finished walls and partitions, applying self-tapping countersunk screws through wall finish material into each concealed stud flange and steel backer plates where provided, complete with button washers and finished to match cabinet interiors.

.3 Flooring installation to be complete prior to commencement of laboratory casework and equipment installation.

.4 Install components to effect a secure, neat and complete installation.

.5 Casework shall be set with components plumb, straight and square, securely anchored to building structure with no distortion. Concealed shims shall be used as required.

.6 Cabinets in continuous runs shall be fastened together with joints flush, uniform and tight with misalignment of adjacent units not to exceed 1.5 mm.

.7 Wall casework shall be secured to solid material, not lath, plastic or gypsum board.

.8 Top edge surfaces shall be abutted in one true plane. Joints are to be flush and gap shall not exceed 3 mm between tops units.

.9 Casework and hardware shall be adjusted and aligned to allow for accurate connection of contact points and efficient operation of doors and drawers without any warping or binding.

3.2 COUNTERTOP INSTALLATION:

.1 Countertops are to have been fabricated in lengths according to drawings, with ends abutting tightly and sealed with corrosion resistant sealant.

.2 Tops will be anchored to base casework in a single true plane with ends abutting at hairline joints with no raised edges at joints.

.3 Joints shall be factory prepared having no need for in-field processing of top and edge surfaces.

.4 Joints shall be dressed smoothly, surface scratches removed and entire surface cleaned thoroughly.

3.3 CLEANING

.1 Ensure all products are unsoiled and match factory finish. Remove or repair damaged or defective units.

.2 Clean all finished surfaces, including drawers and cabinet shelves, and touch up as necessary.

.3 Countertops shall be cleaned and free of grease or streaks.

3.4 PROTECTION:

.1 Counter tops and ledges shall be protected with 6 mm ribbed cardboard for the remainder of the construction process.

.2 Examine casework for damaged or soiled areas; replace, repair, and touch-up as required.

.3 Touch-up, repair or replace damaged products before Substantial Completion.

3.5 TOLERANCES

.1 Installation tolerances:

.1 Plumb between cabinet joints: 0.794 mm.
.2 Counters; level: 3.18 mm in 3048 mm.
.3 Base cabinets:

.1 Adjust top rails and sub tops to a single plane within: 1.588 mm.
.2 Align similar adjoining doors and drawers within: 1.588 mm.

.4 Wall cabinets:

.1 Adjust fronts and bottoms to a single plane within: 1.588 mm.
.2 Align similar adjoining doors within: 1.588 mm.

END OF SECTION

1 General

1.1 RELATED SECTIONS

1.1.1 Section 12 35 53.13 – Metal Laboratory Casework

1.1.2 Section 12 35 54 – Laboratory Stainless Steel Counter Tops

1.2 REFERENCES

1.2.1 Scientific Equipment and Furniture Association (SEFA):

1.2.1.1 SEFA 3 Work Surfaces

1.2.2 ASTM International (ASTM):

1.2.2.1 EN 438-2:25 - Standard Test Method for Resistance to Scratch.
1.2.2.2 EN 438-2:16 - Standard Test Method for Resistance to Dry Heat.
1.2.2.3 EN 12721 - Standard Test Method for Resistance to Wet Heat
1.2.2.4 EN 438-2:17 - Standard Test Method for Dimensional Stability in Elevated Temperature.
1.2.2.5 5. EN ISO 178/ASTM 790-08 - Standard Test Method for Flexural Strength
1.2.2.6 EN ISO 1183/ASTM 792-08 - Standard Test Method for Density
7. ASTM E-84/UL 723 - Standard Test Method for Surface Burning Characteristics

1.2.3 International Organization for Standardization (ISO) 9001 - Quality Management Systems

1.3 SUBMITTALS

1.3.1 Product data sheets:

1.3.1.1 Submit Manufacturer's Product data sheets for Products proposed for use in the work of this section. Information shall include as a minimum:

1.3.1.1.1 Preparation instructions and recommendations.
1.3.1.1.2 Storage and handling requirements and recommendations.
1.3.1.1.3 Installation methods.

1.3.2 Samples:

1.3.2.1 450 mm. x 450 mm. solid phenolic, counter top including edge condition,
1.3.2.2 For each finish product specified, submit complete set of color chips representing manufacturer's full range of standard colors.

1.3.3 **Shop Drawings:**

1.3.3.1 Submit plan, section, elevation and perspective drawings necessary to describe and convey layout, profiles, and product components, including edge conditions, joints, fitting and fixture locations, anchorage, accessories, and finish colors.

1.3.3.2 Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on Shop Drawings.

1.3.3.3 Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.3.4 Closeout Submittals:

1.3.4.1 Maintenance instructions:

1.3.4.1.1 Submit data for maintenance, cleaning, and life cycle of Products included in work of this section, for incorporation into operation and maintenance manuals.

1.3.4.1.2 Include recommended cleaning materials and procedures, and list of materials detrimental to Solid Phenolic Compact.

1.4 COORDINATION

1.4.1 Work of this section is closely integrated with laboratory work of other sections. Coordinate work of this section with work of:

1.4.1.1 Laboratory casework under Sections 12 35 53.13 and 12 36 64.

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Delivery, storage, and handling of Products in accordance with Manufacturer's written instructions.

1.5.2 Package or crate, and brace Products to prevent damage or distortion during shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Utilize temporary skids under large or heavy units.

1.5.3 Deliver Products to location at building site designated by Departmental Representative.

1.5.4 Do not deliver Products to site until conditions are such that no damage will occur to them while in storage.

1.5.5 Avoid direct exposure of products to sunlight.

1.5.6 Do not use work surfaces as bench, ladder, or seating.

2 Products

2.1 GENERAL

2.1.1 Provide return splash sides where ends of tops butt against wall, blank side of cupboard, sides of fume hoods, or service enclosures.

2.1.2 For mobile units: Provide 4 edges polished.

2.2 MATERIALS.

2.2.1 SOLID PHENOLIC -Solid phenolic compact laboratory work surface

2.2.2 Chemical Resistant: self-supporting flat panel based on thermosetting resins, homogeneously reinforced with cellulose fibers and manufactured under high pressure. The panels have a pigmented resin core with a decorative surface that is electron-beam (EB) cured.

2.2.3 MATERIAL PROPERTIES

2.2.3.1 Work surfaces shall be constructed of solid phenolic composite Chemical Resistant panels with black core. Thickness shall be as specified on drawings and shall be 25.4 mm. unless noted otherwise.

2.2.3.2 Colors: Dark Gray

2.2.3.3 Finish: Matte sheen (non-shinny)

2.2.3.4 Physical Properties: (CONTINUE NEXT PAGE)

Test	Test Method	Unit		Chemical Resistant SPC	
Resistance to Surface Wear	EN 438-2:10	Revolutions (Initial Point)	IP + FP/2	≤ 350	400
		Revolutions (Final Point)		≤ 500	
Resistance to Impact	EN 438-2:21	Indention Diameter (mm)		0.4	
		Cracks or Scoring		No	
Resistance to Scratch	EN 438-2:25	Rating (Based on Load)		5	
Resistance to Dry Heat (160°C/320°F)	EN 438-2:16	Appearance (Rating)		5	
Resistance to Wet Heat (100°C/212°F)	EN 12721	Appearance (Rating)		5	
Resistance to Immersion in Boiling Water	EN 438-2:12	Appearance (Rating)		5	
		Percentage	Mass Increase	0.4	
			Thickness Increase	1.9	
Dimensional Stability in Elevated Temperature	EN 438-2:17	Percentage	Longitudinal (parallel)	0.05	
			Transversal (perpendicular)	0.05	
Resistance to Staining	EN 438-2:26	Appearance (Rating)	Acetone	5	
			NaOH	5	
			Hydrogen Peroxide (H_2O_2 3%)	5	
Resistance to Color Change	ASTM G53/EN 438-2:27	Rating (Grey Wool Scale)		5	
		Rating (Blue Wool Scale)		> 6	
Resistance to Crazing	EN 438-2:24	Appearance (Rating)		5	
Porosity	N/A	Appearance		Nonporous Surface and Edges	
Modulus of Elasticity	ASTM 638-08 /EN ISO 178	psi		≥ 1.85e6	
Flexural Strength	ASTM 790-08 /EN ISO 178	psi		≥ 2.87e4	
Tensile Strength	ASTM 638-08 /EN ISO 527-2	psi		≥ 2.71e4	
Density	ASTM 792-08 /EN ISO 1183	lbs/ft^3		≥ 86.15	

2.2.3.5 Chemical resistance: Evaluation of chemical resistance is based on SEFA's (Scientific Equipment and Fixture Association) standard list of 49 chemicals/concentrations, their required methods of testing and their minimum acceptable results as a means of establishing a minimum acceptable level of performance for all exposed and semi-exposed surfaces.

2.2.3.6 Panels to have screw pull-out strength minimums per following chart (lb):

Screw Dept:	#6	#8	#10	#12	1/4"	5/16"	3/8"	7/16"	1/2"
12.7mm. Panels:	250	308	340	350	450	570	685	790	900
15.9mm. Panels:	310	370	435	492	560	710	855	990	1,100
19 mm.	518	590	680	850	1,000		1,200		1,400

2.2.3.7 Uniform load to cause no more than 6 mm deflection at center of the span:

Thickness	304x610	304x914	304x1220	610x914
12.7mm.panels:	370	110	45	220
15.9mm.panels:	690	210	85	410
19mm.panels:	1,400	401	172	800
25.4mm.panels:	2,605	785	335	1,500

2.2.3.8 Chemical resistance

Chemical Reagent	Black	Chemical Reagent	Black
Amyl Acetate	0	Tincture of Iodine	0
Ethyl Acetate	0	Methyl Ethyl Ketone	1
Acetic Acid, 98%	0	Methylene Chloride	0
Acetone	0	Monochlorobenzene	0
Acid Dichromate, 5%	0	Napthaline	0
Butyl Alcohol	0	Nitric Acid, 20%	0
Ethyl Alcohol	0	Nitric Acid, 30%	0
Ammonium Hyroxide, 28%		Phenol, 90%	0
Benzene	0	Phosphoric Acid, 85%	0
Carbon Tetrachloride	0	Silver Nitrate	0
Chloroform	0	Sodium Hydroxide, 10%	3
Chromic Acid, 60%	2	Sodium Hydroxide, 20%	3
Cresol	0	Sodium Hydroxide, 40%	3
Dichloroacetic Acid	0	Sodium Hydroxide Flakes	0
Dimethylformamide	0	Sodiium Sulfide,	
Saturated Solution	0		
Dioxane	0	Sulfuric Acid, 33%	0
Ethyl Ether	0	Sulfuric Acid, 77%	0
Formaldehyde	0	Sulfuric Acid, 96%	0
Formic Acid	0	50% Sulfuric Acid (77%)	
Furfural	0	+50% Nitric Acid (70%)	2
Gasoline	0	Toulene	0
Hydrochloric Acid, 37%		Trichlorethylene	0
Hydrochloric Acid, 48%		Xylene	0
Hydrogen Peroxide	0	Saturated Zinc Chloride	0

2.2.3.9 Fabrication A.

2.2.3.9.1 Fabricated tops and accessories in accordance with manufacturer's recommendations, approved Shop Drawings, and SEFA 8.

2.2.3.9.2 Solid Phenolic Compact Work surfaces:

- Thickness:
  - * 25.4 mm countertops
  - * 16 mm mobile cabinetry tops
  - * Check each sheet at factory for required thickness.
  - * Maximum variation in thickness: plus or minus 1.6 mm from corner to corner.
- Warpage:
  - * Inspect tops for warpage prior to fabrication by placing on true flat surface.
  - * Maximum allowable warpage: 1.5 mm in 900 mm span or 4.5 mm in 2400 mm span.
- Fabrication:
  - * Shop fabricate in longest practical lengths.
  - * Bond joints with highly chemical resistant cement with properties and color similar to base material.
  - * Provide 3 mm drip groove at underside of exposed edges, set back 13 mm from face.
  - * Finish exposed edges.
- Edge treatment:
  - * Standard 6 mm radius edge with drip groove.
- Fabricate tops flat without marine edge
- Corner treatment: exposed corners shall be eased slightly for safety.
- Back and end splashes:
  - * Supplied loose for field installation.
  - * Same material and thickness as work surfaces.
  - * 100 mm high unless otherwise indicated.
  - * Back and end splashes: Furnish loose end splashes where work surfaces abut adjacent construction and locations indicated on Drawings.
  - * Joints: Maximum 3 mm, bonded with epoxy grout.
  - * Make joints between two benches level.
  - * Locate joints away from sinks and over or near supports.

3 Execution

3.1 EXAMINATION

3.1.1 Install tops in accordance with reviewed Shop Drawings, securing them in position by rigid, concealed fixing methods allowing no movement or rocking.

3.1.2 Installation is not to proceed until completion of floor finishes have been installed so that flooring is continuous below floor supported assemblies, unless otherwise specified.

3.1.3 Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 6 mm. in 6 m.

3.2 PREPARATION

3.2.1 Prepare surfaces using methods recommended by manufacturer.

3.3 INSTALLATION

3.3.1 Install tops in accordance with reviewed Shop Drawings, securing them in position by rigid, concealed fixing methods allowing no movement or rocking. Installation is not to proceed until completion of floor finishes have been installed so that flooring is continuous below floor supported assemblies, unless otherwise specified.

3.3.2 Joints between 2 lengths of tops of either similar or dissimilar materials shall be level, flush and shall form a 1.6 mm joint. Fill joints with sealant. Install same types of tops to each other using bead sealant. Clean sealant from exposed surfaces in a manner precluding surface damage.

3.3.3 Install tops plumb and level.

3.3.4 Adhere to adjacent surfaces in accordance with manufacturer's recommendations.

3.4 PROTECTION

3.4.1 Counter tops must be protected, after their installation, with cardboard until the final inspection of this work.

3.4.2 Replace damaged products.

END OF SECTION

1 General

1.1 DESCRIPTION OF WORK

1.1.1 Extent of stainless steel laboratory casework and fixtures is shown on drawings or indicated herein.

1.1.2 Work encompasses the fabrication and installation of stainless steel laboratory casework components consisting of: stainless steel countertops, backsplashes and integral sinks.

1.1.3 Waste Lines and traps are to be furnished and installed under Division 22. All sinks provided and installed by this Section are listed in Part 2 of this section. These sinks are provided with a tailpiece. Piping and fittings downstream from tailpiece are furnished and installed under the requirements of Division 22.

1.1.4 Sealants are specified under Division 7. Sealants which come into contact with any materials specified in 12 36 54 are to be installed under this Section.

1.1.5 Related Sections:

1.1.5.1 Laboratory Casework section 12 35 53.13 and Laboratory Countertops 12 36 53
1.1.5.2 Mechanical/Plumbing, Division 22
1.1.5.3 Provide cut-outs and holes in casework necessary for installation of service fittings.

1.2 SUBMITTALS

1.2.1 Product data sheets:

1.2.1.1 Submit Manufacturer's Product data sheets for Products proposed for use in the work of this section.

1.2.2 Samples:

1.2.2.1 Three (3) sets of 200 mm x 200 mm samples, or 200 mm long as applicable, of specified product, material and finish:

1.2.2.1.1 Stainless steel sheet.

1.2.3 Shop Drawings:

1.2.3.1 Clearly indicate materials being supplied and finishes, connections, attachments, reinforcing, locations or exposed fastening, colours, gloss intensities and coating types by name.
1.2.3.2 Completely detailed Shop Drawings including plans, elevations, sections and details shall clearly indicate:

1.2.3.2.1 Laboratory casework, frame assembly, countertops, plumbing/mechanical service fittings, sinks, and miscellaneous items.

1.2.3.2.2 Location for roughing-in of plumbing and electrical services.

1.2.3.2.3 Coordinate elevations with floor plan for each room and indicate locations and dimensions required for services.

1.2.3.2.4 The laboratory casework manufacturer shall furnish shop drawings illustrating the layout and placement of all laboratory casework and fume hoods as well as any products included in this section.

1.2.3.2.5 Indicate the type and location of all service fittings and associated supply connections.

1.2.3.2.6 Preparation instructions and recommendations.

1.2.3.2.7 Storage and handling requirements and recommendations. Installation methods.

1.2.4 Closeout Submittals:

1.2.4.1 Operation and maintenance instructions:

1.2.4.1.1 Submit data for operation and maintenance of Products included in work of this section, for incorporation into operation and maintenance manuals.

1.3 COORDINATION

1.3.1 Coordinate with mechanical, electrical, and other Subtrades for installation and connections.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery, storage, and handling of Products in accordance with Manufacturer's written instructions.

1.4.2 Package or crate, and brace Products to prevent damage or distortion during shipment and handling. Label packages and crates, and protect finish surfaces by sturdy wrappings or equivalent protection. Utilize temporary skids under large or heavy units.

1.4.3 Deliver Products to location at building site designated by Departmental Representative.

1.4.4 Do not deliver Products to site until conditions are such that no damage will occur to them while in storage.

1.4.5 General Contractor shall be responsible to make certain that casework is not delivered until building and storage areas are sufficiently dry so that casework will not be damaged by excessive changes in moisture content.

1.4.6 Do not deliver casework until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas.

1.5 SITE CONDITIONS, SCHEDULING

1.5.1 Scheduling: Deliver equipment or its parts ready for installation in accordance with construction schedule. Verify required delivery date sufficiently before delivery to ensure that construction is not delayed.

1.5.2 Coordinate scheduling and requirements with Divisions 22 and 26.

1.5.3 Field measurements: Accurate field measurements to be completed before manufacturing. Show recorded measurements on final Shop Drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

1.6 PERFORMANCE REQUIREMENTS

1.6.1 Chemical resistance performance:

1.6.1.1 Test Procedure:

1.6.1.1.1 Test panels shall withstand the following tests with no loss of adhesion or film protection, no discolouration or change in gloss, or no film softening. Concentrations identified as (*) can have slight discolouration or change in gloss, or temporary file softening. Concentrations are noted as percent by weight.

1.6.1.2 Test results:

1.6.1.2.1 Acids: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried.

• Hydrochloric Acid	37%*, 30%, 20%, 10%
• Sulphuric Acid	70%*, 60%, 25%
• Nitric Acid	50%*, 30%, 10%
• Phosphoric Acid	75%, 25%
• Acetic Acid	98%, 50%
• Formic Acid	60%
• Perchloric Acid	60%
• Phenol	85%

1.6.1.2.2 Solvents: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried. Volatile solvents shall be applied by a saturate cotton ball method.

Ethyl Alcohol	Butyl Alcohol
Methyl Alcohol	Ethyl Acetate

Ethyl Ether	Methylethyl Ketone
Toluene	Acetone
Benzene	Carbon Tetrachloride
Formaldehyde (37%)	Gasoline
Naphtha	Kerosene
Xylene	Glycerine
Furfural	Ether
Xylol	Chloroform

1.6.1.2.3 Bases and Salts: Minimum of 5 drops (0.25 ml) shall be applied to the test site on panel and covered with a watch glass for 60 minutes, then washed and dried.

Sodium Hydroxide	40%, 10%
Ammonium Hydroxide	28%
Potassium Hydroxide	40%, 10%
Hydrogen Peroxide	5%
Zinc Chloride	Saturated
Sodium Sulphide	Saturated
Sodium Carbonate	Saturated
Sodium Chloride	Saturated

1.7 DEFECTS

1.7.1 Warrant work of this section for defects.

1.7.1.1 Defects include, but are not limited to:

1.7.1.1.1 Ruptured, cracked, or stained coating.
1.7.1.1.2 Discoloration, weld spots or lack of finish integrity.
1.7.1.1.3 Cracking or peeling of finish.
1.7.1.1.4 Slippage, shift, or failure of attachment to wall, floor, or ceiling.
1.7.1.1.5 Weld or structural failure.
1.7.1.1.6 Warping or unloaded deflection of components.
1.7.1.1.7 Crevices and sharp and/or irregular edges.

2 Products

2.1 MATERIALS

2.1.1 Stainless steel:

2.1.1.1 Sheet: Type 316 alloy, weldable.
2.1.1.2 Finish: AISI No. 4 Brushed finish, unless otherwise indicated.

2.1.2 Sealant: One component, clear silicone sealant, chemical curing, antifungal composition.

2.2 COUNTER TOPS

2.2.1 Provide counter tops of the following materials where shown on drawings:

2.2.2 Stainless Steel: Provide 1.5mm thick (16 gauge) stainless steel sheet, AISI Type 316 with No. 4. Finish. Weld all joints, grind smooth and polish to become practically invisible. Keep welded field jointing to a minimum. Apply reinforcing channels to underside of top where necessary to insure rigidity without deflection.

2.2.3 Extend top down to provide a 38mm. thickness and a full return flange under frame.

2.2.4 Form backsplash to be coved to and integral with top surface. Provide 45° beveled top edge with concealed return leg.

2.2.5 Provide a 6mm raised marine edge around perimeter of tops. Pitch top surface two ways to bowl to provide adequate drainage.

2.2.6 Where stainless steel sinks occur in stainless steel tops, factory assemble sinks and tops into one integral unit with welds ground smooth and polished.

2.2.7 Grind all edges smooth.

2.3 STAINLESS STEEL SINKS:

2.3.1 16 gauge, Type 316, with No. 4 Finish. Fabricate with horizontal and vertical corners rounded and coved to at least 15mm radius. Slope sink bottoms to pitch to outlet. Provide double wall construction for sink partitions with top edge rounded to at least 15mm diameter. Continuous butt weld joints and provide factory punching for fixtures. Weld sink units to tops and finish to produce an integral unit with invisible joint line.

2.3.2 Sink Schedule: Refer to drawings for location, dimensions and quantities of the following sinks:

2.3.2.1 **SK-1:** Stainless steel single compartment integral sink: **600** mm long, **450** mm wide, and **275** mm deep. Provide 100 mm high backsplash as required with 45 degree beveled top edge with concealed return leg. Provide raised rim - marine edge - on all sides, and integral drainboard as indicated on drawings.

2.3.2.2 **SK-2:** Stainless steel single compartment integral sink: **600** mm long, **400** mm wide, and **275** mm deep. Provide 100 mm high backsplash as required with 45 degree beveled top edge with concealed return leg. Provide raised rim - marine edge - on all sides.

3 Execution

3.1 INSTALLATION

3.1.1 Install casework within system, align and set level with levelling devices, in accordance with Shop Drawings. Installation is not to proceed until completion of floor finishes so that flooring is continuous below floor supported casework, unless otherwise specified.

3.1.2 At wall locations secure wall cabinets to face of finished walls and partitions, applying self-tapping countersunk screws through wall finish material into each concealed stud flange and steel backer plates where provided, complete with button washers and finished to match counter.

3.1.3 Install components to effect a secure, neat and complete installation.

3.1.4 Protection: Protect materials and installed laboratory casework and fixtures from damage by work of other trades until the final inspection of this work.

3.1.5 Replace damaged product.

3.2 TOLERANCES

3.2.1 Installation tolerances:

3.2.1.1 Plumb between cabinet joints: 0.794 mm.
3.2.1.2 Counters; level: 3.18 mm in 3048 mm.

END OF SECTION