Part 1 General

1.1 RELATED SECTIONS

Section 06 10 00 – Rough Carpentry

Section 09 65 00 – Resilient Flooring

Section 11 53 00 – Laboratory Equipment

Division 23 - Mechanical

Division 25 – PLC Controls

Division 26 – Electrical

Division 27 – Communication Systems

1.2 REFERENCES

.1 References:
- .1 American Society for Testing and Materials (ASTM): A167-94 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
  SEFA 3 – Scientific Equipment and Furniture Association
- .2 SEFA 8 - Scientific Equipment and Furniture Association
- .3 NFPA 30 - National Fire Protection Association
- .4 NFPA-45 - National Fire Protection Association
- .5 UL - Underwriters Laboratories
- .6 ASTM D552 - Bending Test

1.3 DESCRIPTION

.1 Section includes:
- .1 Metal casework as detailed on drawings and as specified including all related components and accessories required to form integral units and a complete installation.
- .2 Provide all labour, materials, tools and equipment and services for all metal casework components as indicated and as required, and all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for sound, secure and complete installation.

1.4 SUBMITTALS

.1 Shop Drawings
- .1 Submit shop drawings in accordance with Section 01 33 00
- .2 Indicate all dimensions, details of construction, and accessory items.

.3 Indicate wall reinforcement and appropriate fastening and method of installation.
.4 Submit shop drawings for furniture assemblies showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fittings.
.5 Coordinate shop drawings with other work involved.
.6 Provide roughing-in drawings for mechanical and electrical services when required.

.2 Product Data
.1 Submit catalog and model numbers for all components.
.2 Submit addresses and telephone numbers of nearest stocking/service parts locations.

.3 Samples
.1 Submit samples in accordance with Section 01 33 00.
.2 Submit 300 x 300 mm samples of each type of fabric, finish, and colour as requested by Contract Administrator.
.3 Samples from non-specified manufacturers will be required and reviewed per specification. Samples shall be delivered, at no cost to the Contract Administrator to a destination set forth by the Contract Administrator. Samples shall be full size, production type samples. Miniature, or "Show Room" type samples are not acceptable. Furnish the following:
.1 One 18” combination (1) drawer and (1) cupboard base unit showing complete construction details, including (1) shelf.
.2 One 36” acid storage base cabinet typical of specified elevations.
.3 One sample of all top materials shown or called for, of sufficient size to perform finish requirement tests.
.4 Sample of all mechanical service fittings, locks, door pulls, hinges, and interior hardware.

.4 Project Close-Out Data
.1 Provide manufacturer’s product specifications and maintenance data including maintenance procedures and materials for incorporation into Maintenance Manual in accordance with Section 01 78 00.
.2 Provide final drawings, room-by-room, of all products installed under this specification.
.3 Provide address and phone number of nearest service organization.

1.5 QUALITY ASSURANCE

.1 Source Quality Control
.1 The steel laboratory furniture contractor shall also provide worktops and fume hoods all manufactured or shipped from the same geographic location to assure proper staging, shipment and single source responsibility.
1. General Performance: Provide certification that furniture shall meet the performance requirements described in SEFA 8.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver all components to site in manufacturer's clearly identified containers. Packaging to contain manufacturer's name, product name and identification number and other related information.

.2 Materials must be available for review as required by Contract Administrator.

1.7 SITE CONDITIONS

.1 Existing Conditions
- .1 Assure that walls scheduled to receive attachment of system components are adequately reinforced to accept installation of this work.
- .2 Assure that wall, floor, and ceiling work is finished.

.2 Storage and Protection
- .1 Store packaged materials in original containers or wrapping with manufacture's labels intact.
- .2 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
- .3 Provide temporary protection as required, and repair all damage to such work at no additional cost to Owner.

.3 Waste Management and Disposal.
- .1 Comply with requirements of Workplace Hazardous Materials Information (WHMIS) regarding use, handling and disposal of hazardous systems.

1.8 SEQUENCING

.1 Sequence this work to allow work by other divisions.

.2 Coordinate this work with other operations in same area to avoid conflicts.

1.9 MAINTENANCE

.1 Comply with requirements of Section 01 78 00.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Products
- .1 Metal Laboratory Casework (Bases)
  2. The Contractor shall supply, deliver and install metal laboratory casework, countertops, sinks, fittings and faucets, fumehood, shelving and related components by VWR International Inc. in accordance with the requirements

hereinafter specified and the Material List.

.2 All cabinet bodies and interiors to be painted with Light Neutral No. 61. All door and drawer fronts to be painted with Wineberry No. 96.

.3 Fume hood body interior and enclosure at the top to be painted with Light Neutral No. 61. The fume hood door fronts to be painted with Wineberry No. 96.

2.2 MATERIALS

.1 Fabrication

.1 Base Cabinet

.1 Shall be available in heights and depths indicated on drawings.

.2 Components

.1 Cabinet

.1 Steel:
Cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies shall be fabricated from Cold Rolled Steel. (Note: All Drawer and Door Styles are available)

.2 Drawer and Door

.1 The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel and shall be welded and ground smooth.

.2 Drawer and door, when closed, shall be recessed to create an overall flush face.

.3 Drawer and door pulls shall be an integral contour radiused pull along the top edge.

.3 Materials

.4 General Requirements:
It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

.1 Steel:

.1 Cold Rolled Steel:
Cold rolled sheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge U.S. Standard; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

.2 Glass:

.2 Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass. Glass used in fume hoods or other hazardous locations shall be 7/32" laminated safety float glass, except the glass

shielding fluorescent lights in fume hoods shall be tempered glass to provide greater resistance to heat and impact.

.3 Hardware and Trim:

.3 Drawer and Door Pulls:

.1 Pull shall be of modern design, offering a comfortable continuous handgrip. Pull shall be integrally formed at top of drawer and door, and grooved in back of drawer head to interlock with drawer body. Use of Aluminum, Steel, or plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.

.4 Sliding Door Pulls:

.1 Flush pulls for sliding doors shall be aluminum, with clear, lacquer finish, providing a recessed finger grip.

.2 Finger holes or slots machined into doors will not be acceptable.

.5 Hinges:

.1 Hinges shall be made of Type 304 stainless steel .089 thick, 2-1/2" high, with brushed satin finish, and shall be the institutional type with a five-knuckle bullet-type barrel.

.2 Hinges shall be attached to both door and case with two screws through each leaf.

.3 Welding of hinges to door or case will not be accepted.

.4 Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" high shall be hung on 3 hinges.

.6 Locks:

.1 Locks, where shown or called for, shall be a National Lock, 5-disc tumbler with heavy-duty interchangeable cylinder. Exposed lock noses shall be satin nickel plated and stamped with identifying numbers. Locks shall have capacity for 225 primary key changes. Master key one level with the potential of 40 different, non-interchangeable master key groups.

.7 Positive Catch:

.1 A two-piece heavy-duty cam action positive catch shall be provided on all base cupboard doors and shall be positioned near the pivoting edge of door to provide a clean unobstructed opening.

.2 Main body of the catch shall be confined within an integral cabinet divider rail, while latching post shall be mounted on the hinge side of door.

.3 Nylon roller type catches are not acceptable.

.8 Elbow Catches:

.1 Elbow catches and strike plates shall be used on left hand doors of double door cases where locks are used, and are to be burnished cast aluminum, with bright brass finish.

.9 Shelf Adjustment Clips:

.1 Shelf adjustment clips shall be nickel-plated steel.

.10 Leg Shoes:

.1 Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling device.

.2 Shoes shall be a pliable, black vinyl material. Use of a leg shoe, which does not conceal leveling device, will not be acceptable.

.11 Base Molding:

.1 Base molding shall be provided by others.

.12 Support Rods, Upright Rod Assemblies and Rod Sockets:

.1 Upright rods, cross rods and ring support rods, where specified, shall be anodized Duralumin (2" or 3/4" dia., as required).

.2 Rod sockets shall be chrome-plated brass, secured through tabletops with lock nut and spring washer.

.3 Rod clamps shall be heavy duty, designed to securely hold rod assembly in any position.

.4 Use of wood rod assemblies will not be accepted.

.13 Label Holders:

.1 Label holders, where shown or called for, shall be self adhesive type aluminum with satin finish and designed for 2-1/2" x 1-1/8" cards, unless otherwise specified.

.14 Number Plates:

.1 Number plates, where shown or called for, shall be self-adhesive type aluminum with indented black lettering.

.15 Sink Supports:

.1 Sink supports shall be the hanger type, suspended from top front and top rear horizontal rails of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full length reinforcements welded to the front and rear top rails.

.2 Two 3/4" x 1-2/2" x 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks.

.3 When sink capacity exceeds 3,750 cu. in., the sink supports shall be suspended from full-length reinforcements welded to the two end rails.

.4 Two 1" x 2" x 10 gauge full-length channels shall be hung from the four 1/4" dia. rods to provide an alternate sink cradle.

.16 Support Struts:

.1 Support struts shall consist of two 16 gauge channel uprights fastened top and bottom by two adjustable "U" shaped spreaders, each 12 gauge, 1-1/2" x length required formed from galvanized steel.

.2 Struts shall be furnished to support drain troughs, and to support worktop at plumbing space under fume hood superstructures or other heavy loads.

.3 Support struts can be furnished with hangers at extra cost when specified, to support mechanical service piping and drain lines.

.2 Construction

.1 Steel Base Cabinet Construction:

.1 General:

.1 The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory Equipment Industry.

.2 First class quality casework shall be insured by the use of proper machinery, tools, dies, fixtures and skilled workmanship to meet the intended quality and quantity for the project.

.3 All cabinet bodies shall be flush front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcement at exterior corners. All face joints shall be welded and ground smooth to provide a continuous flat plane.

.4 Each cabinet shall be complete so that units can be relocated at any subsequent time without requiring field application of finished ends or other such parts.

.5 Case openings shall be rabbetted on all four sides for both hinged and sliding doors to provide a dust resistant case.

.6 All cabinets shall have a cleanable smooth interior. Bottom edges shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.

.2 Steel Gauges:

Gauges of steel used in construction of cases shall be 18 gauge, except as follows:

.1 Corner gussets for leveling bolts and apron corner braces, 12 gauge.

.2 Hinge reinforcements, case and drawer suspension channels, 14 gauge.

.3 Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.

.4 Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

.2 Base Cabinets:

.1 End uprights shall be formed into not less than a channel formation at top, bottom, back and front.

.2 The front edge shall further offset to form a strike for doors and drawers, and shall be perforated for the support of drawer channels, intermediate rails and hinge screws.

.3 An upright filler shall be screwed in place in all cupboard units to close the back of the channel at front of the upright and to provide a smooth interior for the cupboard to facilitate cleaning.

.4 The upright filler shall be perforated with shelf adjustment holes at not more than 2" centers painted prior to assembly.

.5 The inside front of the upright shall be further reinforced with a full height 14 gauge hinge reinforcement angle.

.6 Top horizontal rail on base cabinets shall interlock within the flange at top of end panels for strength, but shall be flush as face of unit. Top rail shall have a full width rabbet for swinging doors and drawers. Reinforcements shall be provided at all front corners for additional welded strength between vertical and horizontal case members.

.7 Intermediate rails shall be provided between doors and drawers, but shall not be provided between drawers unless made necessary by locks in drawers. When required, intermediate rails shall be recessed behind doors and drawer fronts, and designed so that security panels may be added as required.

.8 Intermediate vertical uprights shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers. However, to allow storage of large or bulky objects, no upright of any type shall be used at the center of double door cupboard units.

.9 Cabinet bottom, and bottom rail shall be formed of one piece of steel except in corner units and shall be formed down on sides and back to create a square edge transition welded to cabinet end panels, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.

.10 Toe space rail shall extend up and forward to engage bottom rail to form a smooth surfaced fully enclosed toe space, 3" deep x 5" high. Whenever toe space base is omitted for units to set on building bases on separate steel bases, then the toe space rail shall extend back 4-1/2".

.11 Back construction shall consist of a top and bottom rail, channel formed for maximum strength and welded to back and top flange of end uprights, open for access to plumbing lines. Cupboard units only shall be provided with removable back panels.

.12 Die formed gussets, with multiple ends for strength, shall be furnished in each bottom corner of base units to insure rigidity, and a 3/8"-16 leveling bolt, 3" long, shall engage a clinch nut in each gusset. Access to the leveling bolts shall be through plug buttons in the bottom pan. Each leveling bolt and gusset shall be capable of supporting 500 lbs. Access to

leveling bolts through toe space or leveling bolts requiring special tools to adjust are not acceptable.

.13 Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear; formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.

.14 Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front. They shall be fully coved at interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in drawer head providing a 3/4" thick drawer head.

.15 Drawer suspension assembly shall consist of 2 sections providing a quiet, smooth operation on ball bearing nylon rollers. All drawers shall be self-closing from a point 5" open. Cabinet channels shall maintain alignment of drawer and provide an integral drawer stop, but the drawer shall be removable without the use of tools. Drawers shall provide 13-5/8" front to back clearance when fully extended. Drawers shall rise when opened thus avoiding friction with lower drawers and/or doors. Drawer suspension system shall incorporate a double stop, lock open feature. Case suspension channels shall be Galvanized Steel, drawer suspension channels shall be Cold Rolled Steel. Drawer suspension channels on Stainless Steel Cabinets shall be zinc plated after they are formed.

.16 Steel Door assembly (two-piece) for solid pan swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.

.17 Steel Drawer/door assemblies shall be painted prior to assembly. Both shall be punched for attaching drawer pulls. Likewise, inner pan formation of door and drawer body shall be indented for in-field installation of locks when required.

.18 Doors shall be readily removable and hinges easily replaceable. Hinges shall be applied to the cabinet and door with screws. Welding of hinges to either cabinet or door will not be acceptable.

.19 Knee space panels, where shown or specified, shall be 18 gauge, finished same as casework cabinets, and easily removable for access to mechanical service areas.

.3 Special Purpose Storage Cabinets:

.1 Acid Storage Fume Hood Cabinets:

.1 Acid storage fume hood cabinets shall utilize the same gauges of steel and construction features as other base cabinets except they shall be completely lined with a one piece Polyethylene corrosion resistant liner.

.2 The liner shall be 1/4" thick, molded into a seamless tub, including top, sides and bottom, with a 1" lip at the bottom front to contain spills.

.3 Each door shall have a set of louvers at the top and bottom, and have a 1/8" sheet polyethylene liner.

.4 Where specified, each cabinet shall be vented into the fume hood with a 1-1/2" vent pipe. It should provide a positive airflow directly into the fume hood exhaust system. Where specified or shown on drawings, supply an epoxy coated wire shelf supported by integral brackets built into the Polyethylene liner.

.4 Solvent Storage Cabinets:

.1 Solvent storage cabinets shall be specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UFC, OSHA and NFPA No. 30 - 1993, and cabinets shall be UL approved and labeled.

.2 The bottoms, top, sides and doors shall be fabricated of 18" gauge steel and shall be all double panel construction with a 1-1/2" air space between panels.

.3 All joints shall be welded, or screwed, to provide a rigid enclosure. The doors shall swing on full-length stainless steel piano hinges and shall be fully insulated.

.4 The doors are self-closing and synchronized so that both doors will always fully close.

.5 The right hand door is equipped with a three-point latching system that automatically engages when the doors close.

.6 Each door is equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit. Units 24" long have only one door, self-closing, and equipped with a three-point latching system and hold-open feature.

.7 A 2" deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A full-depth adjustable shelf is also provided. The shelf is perforated to allow air circulation within the cabinet.

.8 Two diametrically opposed vents with spark screens are provided in the back of the cabinet as well as a grounding screw. The cabinet shall have interior finish same as exterior. The cabinet shall be labeled: "FLAMMABLE - KEEP FIRE AWAY".

.5 Steel Sliding Door Upper Cabinet Construction:

.1 Sliding door storage cabinets shall have a completely finished interior same as exterior. Doors shall be suspended from the top by nylon rollers in a roll formed steel track welded to top of cabinet. Track shall be so designed to prevent accidental removal of doors in operation position.

.2 End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. Front fascia of upright shall be 1" wide with inside edge formed in channel 2" x 1/4". A full height box

reinforcement shall be fitted to the channel, formed to provide a recessed strike for door and to reinforce the case. The backside of the reinforcement shall be perforated with shelf adjustment holes spaced at not more than 1" centers. The back of upright shall be formed to a 2-1/2" formation. A 14-gauge hinge reinforcement same as specified for base units shall be welded to inner side of front uprights.

.3 Cabinet tops shall be formed with a 1-1/2" wide front fascia, and a 2" x 2" channel formation at front edge flanged down and back. Door suspension roll formed steel track shall be welded to cabinet top.

.4 Cabinet flush bottoms shall be formed with a 1" wide front fascia, and a channel formation at front edge flanged back and up to create a door recess rabbet for dust stop.

.5 Cabinet backs shall be welded to the top, bottom and ends. Backs shall be perforated for shelf adjustment holes on not more than 1" centers. Holes shall be set in a channel formation in cabinet back and enclosed by end uprights.

.6 Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear, formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.

.7 Glazed sliding doors shall be suspended from the top in a roll formed steel track welded to cabinet top and shall glide on nylon rollers. Track shall be so designed to prevent accidental removal of doors. Doors shall be 3/4" thick and consist of an inner and outer door pan welded together to form a single unit. Outer door pan shall be 18 gauge steel, formed into a channel or flanged shape at all four sides. It shall be pierced and formed to create a 3" wide frame with a beveled edge around the glass opening in the center of the door. Inner door pan shall be 18 gauge steel, flanged at all four sides, and pierced for a glass opening in center of the door. Doors shall be glazed with 1/8" float glass, held in place by a rubber or vinyl gasket around the entire edge of the glass. Outer door pan shall be pierced for a recessed flush pull, as described under HARDWARE.

.8 Solid panel sliding doors shall be suspended same as glazed sliding doors. Door assembly (two-piece) shall consist of inner and outer pan formations, mechanically assembled after painting. All doors shall be 3/4" thick and contains sound deadening material.

.9 Sliding plate glass doors shall be available for 48" high cases and under. The plate glass doors shall operate on an extruded aluminum track at the bottom of the cabinet, and in an extruded aluminum channel at the top. The bottom of each glass door shall be furnished with a continuous aluminum shoe the full length of the door, which shall be equipped with two nylon rollers that operate on the extruded aluminum track. The aluminum shoes on the bottom of the plate glass doors shall be equipped with pulls for operation of the doors, and also to prevent bypassing of the doors. Plate glass doors shall close against rubber bumpers.

.6 Steel Swinging Door Upper Cabinet Construction:

.1 Swinging door storage cabinets shall have a completely finished interior same as exterior.

.2 End uprights shall be formed at the front in a 1" channel formation with the inside flange formed to provide a 31/32" x 1/2" door recess. The back of the upright shall be formed to a 2-1/2" formation. A 14 gauge hinge reinforcement, same as specified for BASE CABINETS, shall be welded to inner side of front uprights.

.3 Cabinet tops shall be formed into a 1" x 1-3/16" channel shape at front, with a 31/32" x 1/2" offset for door recess, and with flange at rear and sides for electro-welding cabinet top to cabinet back and ends.

.4 Cabinet flush bottoms shall be formed with a 1" wide front fascia and a 13/16" channel shape formation at front edge flanged back and up to create a door recess rabbet for dust stop.

.5 Cabinet backs shall be welded to the top, bottom and ends. Backs shall be perforated for shelf adjustment holes on not more than 1" centers. Holes shall be set in a channel formation in cabinet back and enclosed by end uprights.

.6 Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear, formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.

.7 Glazed swinging doors shall be 3/4” thick and consist of an inner and outer door pan welded to form a single unit. Outer door pan shall be 18 gauge steel, formed into a channel or flanged shape at all four sides. It shall be pierced and formed to create a 3” wide frame with a beveled edge around the glass opening in the center of the door. Inner door pan shall be 18 gauge steel, flanged at all four sides, pierced for a glass opening in center of the door, with 14 gauge hinge reinforcements welded in place. Doors shall be glazed with 1/8” float glass, held in place by a rubber or vinyl gasket around the entire edge of the glass. Outer door pan shall be pierced for a recessed flush pull, as described under HARDWARE.

.8 Door assembly (two-piece) for solid panel swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed into a channel or flanged shape at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.

.7 Steel Free Standing Table Construction:

.1 In general, freestanding tables and/or apron and leg assemblies consist of welded leg assemblies connected to aprons by mechanical fasteners.

.2 Table apron rails shall be formed of 16-gauge steel. The rails shall be 4" high, formed top and bottom into a 1.844" wide channel formation with 3/8" high return. Where drawers occur, the apron rails shall provide the required opening.

.3 Table legs shall be 2" square welded tubing. Securely welded to bottom end shall be a 14-gauge die formed gusset with four flanges. A threaded clinch nut shall accommodate a 3/8" 16 x 2-1/2" long adjustment bolt.

.4 Stretchers shall be constructed of 18-gauge steel and furnished where indicated on drawings. They shall be formed into a 2-7/64" x 1-1/2" channel formation, and secured to table legs by a die-formed clip of 16-gauge steel. Clips shall be welded at ends of channel.

.5 Table tops shall be as indicated on drawing and by specifications, and all clips, screws and parts for fastening top to apron, shall be provided with apron section. Leg shoes for table legs shall be furnished with leg assembly.

2.3 PERFORMANCE REQUIREMENTS

.1 Steel Casework Construction Performance:

.1 Base cabinets shall be constructed to support at least a uniformly distributed load 200 lbs. per square foot of cabinet top area, including working surface without objectionable distortion of interference with door and drawer operation.

.2 Base cabinet corner gussets with leveling bolts shall support 500 lbs. per corner, at 1-1/2" projection of the leveling bolt below the gusset.

.3 Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 lbs. per square ft. up to a maximum of 200 lbs., with nominal temporary deflection, but without permanent set.

.4 Drawer construction and performance shall allow 13-5/8" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of 10,000 cycles with an evenly distributed load of 150 lbs.

.5 Swinging doors on floor-mounted casework shall support 200 lbs. suspended at a point 12" from hinged side, with door swung through an arc of 160 degrees. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

.2 Steel Paint System Finish and Performance Specification:

.1 Steel Paint System Finish:

.1 After Cold Rolled Steel component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals.

.2 After the phosphate treatment, the steel shall be dried and all steel surfaces shall be coated with a chemical and corrosion-resistant, environmentally

friendly, electrostatically applied powder coat finish. All components shall be individually painted, insuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance.

.3 The completed finish system in standard colors shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

.2 Steel Colour Selection:

.1 All cabinet bodies to be painted with colour “Light Neutral” No. 61.

.2 All door and drawer fronts to be painted with colour “Wineberry” No. 96

.3 All cabinet interiors to be painted with colour “Light Neutral” No. 61.

.4 Fume hood body interior enclosure at the top of the fume hood to be painted with colour “Light Neutral” No. 61.

.5 Fume hood door fronts to be painted with colour “Wineberry” No. 96

.3 Performance Test Results (Chemical Spot Tests):

.1 Testing Procedure:

.1 Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" dia. watch glass, convex side down to confine the reagent.

.2 Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide mouth bottle to retard evaporation.

.3 All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° ±3° F. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried.

.4 Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

.2 Test Evaluation:

Evaluation shall be based on the following rating system.

Level 0 – No detectable change.
Level 1 – Slight change in color or gloss.
Level 2 – Slight surface etching or severe staining.
Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

After testing, panel shall show no more than three (3) Level 3 conditions.

Test Reagents

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	Cotton ball & bottle
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichlor Acetic Acid	Cotton ball & bottle
16.	Dimethylformanide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle
18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle
20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle
22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Iodine, Tincture of	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Cloride	Cotton ball & bottle
29.	Mono Chlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass
32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass

45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

* Where concentrations are indicated, percentages are by weight.

.3 Performance Test Results (Heat Resistance):

.1 Hot water (190° F - 205° F) shall be allowed to trickle (with a steady stream at a rate not less than 6 ounces per minute) on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.

.4 Performance Test Results (Impact Resistance):

.1 A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye-ball examination.

.5 Performance Test Results (Bending Test):

.1 An 18 gauge steel strip, finished as specified, when bent 180o over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.

.6 Performance Test Results (Adhesion):

.1 Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16" apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

.7 Performance Test Results (Hardness):

.1 The test sample shall have a hardness of 4-H using the pencil hardness test. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest).

.2 The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The

pencil used before that one-that is, the hardest pencil that will not rupture the film-is then used to express or designate the hardness.

2.4 WORKSURFACES MATERIALS

.1 Epoxy Resin Tops (Lab Testing Work Surface):

.1 Epoxy Resin tops shall consist of modified epoxy resin (Kremesin) that has been especially compounded and cured to provide the optimum physical and chemical resistance properties required of a heavy-duty laboratory table top.

.2 Tops and curbs shall be a uniform mixture throughout their full thickness, and shall not depend upon a surface coating that is readily removed by chemical and/or physical abuse.

.3 Tops and curbs shall be non-glaring.

.4 Tops shall be 1" thick, exposed edges beveled top and bottom, and drip grooves provided on the underside at all exposed edges. 4" high curbs at the backs and ends of tops shall be 1" thick and bonded to the deck to form a square watertight joint.

.5 Sink cutouts shall be smooth and uniform without saw marks with the top edge beveled.

.6 The bottom edge of the sink opening shall be finished smooth with the edge broken to prevent sharpness. Corners of sink cutouts shall be radiused not less than 3/4"

.2 Plastic Laminate Tops (Computer Work Surface) :

.1 Plastic laminate tops and back-splash shall be built up to a 1/16" thick plastic surface (of the color and pattern selected), attached to the sub-top with a water resistant adhesive. Substrate shall be of 40-45 lbs. medium density particle board to make a finished top thickness of 1". All exposed edges shall be self-edge banded unless otherwise specified. All particle board edges and underside of top shall be sealed.

2.5 WORK TOP PERFORMANCE REQUIREMENTS:

.1 Molded Epoxy Resin:

.1 Physical Properties:

.1	Flexural Strength (A.S.T.M. Method D790-90) =	15,000 PSI
	Compressive Strength (A.S.T.M. MethodD695-90) =	30,000 PSI
	Hardness, Rockwell E (A.S.T.M. Method D785-89) =	100
	Water Absorption (A.S.T.M. Method D570-81)% by weight, 24	
	24 Hours =	0.04
.2	% by weight, 7 Days =	0.05
	% by weight, 2 Hour Boil =	0.04
	Specific Gravity =	1.97
	Tensile Strength =	8,500 PSI

.2 Performance Test Results (Heat Resistance):

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

.3 Performance Test Results (Chemical Resistance):

.1 Tops shall resist chemical attacks from normally used laboratory reagents. Weight change of top samples submerged in the reagents* listed in the next paragraph for a period of seven (7) days shall be less than one-tenth of one percent, except that the weight change for those reagents marked with ** shall be less than one percent. (Tests shall be performed in accordance with A.S.T.M. Method D543-67 at 77o F.).

*Where concentrations are indicated, percentages are by weight.

Acetic Acid, Glacial	Iso-Octane
Acetic Acid, 5%	Kerosene
Acetone	Methyl Alcohol
Ammonium Hydroxide, 28%	Mineral Oil
Ammonium Hydroxide, 10%	Methyl Ethyl Ketone
Aniline Oil	Nitric Acid, 70%**
Benzene	Nitric Acid, 40%
Carbon Tetrachloride	Nitric Acid, 10%
Chromic Acid, 40%**	Oleic Acid
Citric Acid, 10%	Olive Oil
Cottonseed Oil	Phenol, 5%
Dichromate Cleaning Solution**	Soap Solution, 1%
Diethyl Ether	Sodium Carbonate, 20%
Dimethyl Formamide	Sodium Carbonate, 2%
Distilled Water	Sodium Chloride, 10%
Detergent Solution, 1/4%	Sodium Hydroxide, 50%
Ethyl Acetate	Sodium Hydroxide, 10%
Ethyl Alcohol, 95%	Sodium Hydroxide, 1%
Ethyl Alcohol, 50%	Sodium Hypochlorite,5%
Ethylene Dichloride	Sulfuric Acid, 85%
Heptane	Sulfuric Acid, 30%
Hydrochloric Acid, 37%	Sulfuric Acid, 3%
Hydrochloric Acid, 10%	Toluene
Hydrogen Peroxide, 28%	Transformer Oil
Hydrogen Peroxide, 3%	Turpentine

NOTE: Dichromate cleaning solution is a formula from Lange's Handbook of Chemistry.

.4 Performance Test Results (Chemical Spot Tests - 24 Hours):

.1 Chemical spot tests shall be made by applying 10 drops (approximately 1/2 cc) of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/2" diameter watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" or larger ball of cotton shall be saturated with the solvent and placed on the surfaces to be tested. The cotton ball shall then be covered by an inverted 2-ounce, wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire 24-hour test period and at a temperature of 77 degrees F. + 3 degrees F. At the end of the test period, the reagents shall be flushed from the surfaces with water and the surface scrubbed with a soft bristle brush under running water, rinsed, and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Spots where dyes have dried shall be cleaned with a cotton swab soaked in alcohol to remove the surface dye. The test panel shall then be evaluated immediately after drying.

Ratings:
A = No effect or slight change in gloss.
B = Slight change in color or marked loss of gloss.
C = Slight surface etching or severe staining.
D = Swelling, pitting, or severe etching.

Reagents*	Rating
Acetic Acid, 98%	A
Acetone**	A
Ammonium Hydroxide, 28%	A
Carbon Tetrachloride**	A
Chloroform**	A
Chromic Acid, 60%	C
Chromic Acid, 40%	C
Dichromate Cleaning Solution***	C
Dimethyl Formamide	A
Ethyl Acetate**	A
Ethyl Alcohol**	A
Formaldehyde, 37%	A
Formic Acid, 90%	A
Hydrochloric Acid, 37%	A
Hydrofluoric Acid, 48%	C
Hydrogen Peroxide, 28%	A
Methanol**	A
Methylethyl Ketone**	A
Nitric Acid, 70%	B
Phenol, 85%	A
Phosphoric Acid, 85%	A
Sodium Carbonate, 20%	A

Sodium Hydroxide, 40%	A
Sodium Hydroxide, 10%	A
Sodium Hypochlorite, 5%	A
Sulfuric Acid, 96%	D
Sulfuric Acid, 85%	A
Toluene**	A
Wrights Blood Stain	A
Xylene**	A

* Where concentrations are indicated, percentages are by weight.
** Indicates these solvents tested with cotton and jar method.
*** Dichromate cleaning solution is a formula from Lange's Handbook Of Chemistry.

2.6 SINKS, CUPSINKS, DRAINS, ELECTRICAL, MISCELLANEOUS FITTINGS

.1 Fittings:
  .1 AS PER MATERIAL LIST.

.2 Construction:
  .1 Valves:
    .1 AS PER MATERIALS LIST.

  .2 Rod-driven remote control valves
    .1 AS PER MATERIALS LIST.

  .3 Outlets:
    .1 AS PER MATERIALS LIST.

  .4 Electrical Fittings:
    .1 AS PER MATERIALS LIST.

  .5 Miscellaneous:
    .1 AS PER MATERIALS LIST.

  .6 Performance:
    .1 AS PER MATERIALS LIST.

  .7 Sepia bronze finish performance

Part 3 Execution

3.1 INSTALLERS

.1 Use only manufacturer authorized installers for Work of this Section.

.2 Acceptable Installers
- .1 VWR International, 2360 Argentia Road, Mississauga, Ontario
  Contact: Rick Stephenson – Direct Sales Representative VWR International, Mississauga, Ontario L5N 5Z7 Phone: (905) 928-2801.

3.2 INSTALLATION

.1 Assemble and install all items in strict accord with manufacturer's printed instructions.
- .1 Anchor all fixed components firmly, square, level, plumb.

.2 Horizontal support elements.
- .1 Install at heights indicated with all tops, shelves, and writing surfaces level within 1/8" across width.

.3 Vertical support elements.
- .1 Install plumb, spaced as indicated on shop drawings.
- .2 Align slots to assure hanging units are level.

.4 Sealing.
- .1 The backsplash and work surface joints; the backsplash and wall joints; and the joints between the work surfaces shall be sealed with a 100% acrylic rubber, UV resistant, clear color which is paintable and stainable, mildew and weather resistant.
- .2 Sealant shall non-hazardous and equal to Geocel DuraSeal Adhesive/Sealant manufactured by Geocel Corp., PO Box 398, Elkhart, IN 46515.

.5 Laboratory Furniture.
- .1 Furnish all cabinets and casework, including tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Furnish and install all filler panels, knee space panels and scribes as shown on drawings.
- .2 Furnish and deliver all utility service outlet accessory fittings, electrical receptacles and switches identified on drawings as mounted on the laboratory furniture. All plumbing and electrical fittings, not preinstalled in equipment, will be packaged separately and properly marked for delivery to the appropriate contractor.
- .3 Furnish and deliver, all laboratory sinks, cup sinks or drains, drain troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system.
- .4 Furnish service strip supports where specified, and setting in place service

tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.

.5 Removal of all debris, dirt and rubbish accumulated as a result of the installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and orderly.

3.3 FIELD QUALITY CONTROL

.1 Adjust components to assure proper alignment and operation.
.2 Repair, if acceptable, or replace all damaged or improperly operating items.
.1 Sequence this work to allow work by other divisions.
.2 Coordinate this work with other operations in same area to avoid conflicts.

3.4 CLEANING

.1 Immediately after installation and adjustment; clean all surfaces to remove all marks, soil and foreign matter.
.2 Just prior to Substantial Performance, recheck all components and perform all required additional cleaning.

3.5 DRAWINGS

.1 Manufactured Metal Casework Components:
.1 Refer to drawing A2 Large Scale Floor Plan and Interior Elevations for drawings indicating manufactured casework components required.

END OF SECTION