

## SECTION 123553 13 – STEEL LABORATORY CASEWORK AND RELATED PRODUCTS

### PART 1 — DESCRIPTION OF WORK

#### 1.00 SUMMARY AND SCOPE

A. Section Includes:

1. Using **Kewaunee Scientific Corporation, RESEARCH COLLECTION Laboratory Furniture** as a steel casework specification standard, furnish all cabinets and casework, including tops, ledges, supporting structures, and miscellaneous items of equipment as listed in these specifications, equipment schedules, and drawings. 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 as listed in these specifications, equipment schedules, and drawings, as mounted on the laboratory furniture. All plumbing and electrical fittings, not preinstalled in equipment, shall be packaged separately and properly marked for delivery to the appropriate contractor.
3. Furnish and deliver, for installation by the mechanical contractor, 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 or listed in these specifications, equipment schedules, and drawings. 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 set in place, service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.
5. Remove 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.

B. Related Divisions:

1. Divisions 5 & 6: Behind-the-Wall Blocking and Studs
2. Division 9: Base Molding
3. Division 11: Chemical Fume Hoods
4. Division 22: Plumbing
5. Division 26: Electrical Fittings and Connections
6. Division 27: Communications

C. Related Publications:

1. 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 D522 - Bending Test

#### 1.01 BASIS OF WORK

- A. It is the intent of this specification to use **Kewaunee Scientific Corporation – RESEARCH COLLECTION Laboratory Furniture** as the standard of construction for laboratory furniture. The construction standards of this product line shall provide the basis for quality and functional installation.
- B. Supply all equipment in accordance with this specification. The offering of a product differing in materials and construction from this specification requires written approval from the

owner/architect. This approval must be obtained seven (7) days before the quotation deadline. Procedures for obtaining approval for an alternate manufacturer are defined in section 1.03.B in this specification.

- C. General Contractors should secure a list of approved laboratory furniture manufacturers from the architect as a protection against non-conformance to these specifications.
- D. Participants in the quotation process have the option of clarifying deviations to the specified design, construction, or materials. Without such clarifications, sealed quotations to the owner or owner representative will be construed as being in total conformance to the requirements of the specification.
- E. The owner/owner's representative reserves the right to reject qualified or alternate proposals and to award based on product value where such action assures the owner greater integrity of product.

## **1.02 QUALITY ASSURANCE**

- A. 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.
- B. General Performance: Provide certification that furniture shall meet the performance requirements described in SEFA 8.
- C. Finish Performance: Provide independent test lab certification that furniture shall meet the performance requirements described in section 2.05 of these specifications.

## **1.03 SUBMITTALS**

- A. Manufacturer's Data: Submit manufacturer's data and installation instructions for each type of casework.
- B. Samples:

Samples from non-specified manufacturers will be required and reviewed per specification. Samples shall be delivered, at no cost to the architect or owner, to a destination set forth by the architect or owner. This must be done seven (7) days before quotation deadline as a condition of approval of each bidder. 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

The architect or owner will retain the above samples of the successful manufacture to insure that material delivered to jobsite conforms in every respect to the samples submitted.

- C. Shop Drawings:

Submit shop drawings for furniture assemblies showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fittings.

  - 1. Coordinate shop drawings with other work involved
  - 2. Provide roughing-in drawings for mechanical and electrical services when required

## PART 2 — PRODUCTS

### 2.00 MANUFACTURERS

- A. The basis of this specification is steel casework manufactured according to the standards used by **Kewaunee Scientific Corporation**, 2700 Front Street, Statesville, North Carolina. The specified design is Research Collection. All laboratory equipment covered by the specification shall be the product of one manufacturer and be fabricated at one geographic location to assure shipping continuity and single-source responsibility. All quotations from a manufacturer other than Kewaunee Scientific Corporation shall contain a review of the following capabilities:
1. List of shop facilities
  2. List of engineering and manufacturing personnel
  3. Proof of financial ability to fulfill the contract
  4. List of a minimum of ten (10) installations over the last five (5) years of comparable scope
  5. Proof of project management and installation capabilities
  6. SEFA member in Good Standing
- B. The selected manufacturer shall warrant that all products be free of defects in material and workmanship for a period of one year. The period shall start at the date of acceptance or occupation, whichever comes first. Purchaser shall notify the manufacturer's representative immediately of any defective product. The manufacturer shall have a reasonable opportunity to inspect the goods. The purchaser shall return no product until receipt by purchaser of written shipping instructions from the manufacturer.

### 2.01 CABINET MATERIAL: (Choose one)

- A. 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*)
- B. Stainless Steel:  
Cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies shall be fabricated from stainless steel. (*Note: Only Square Edge Drawer and Door Styles are available*)

### 2.02 DRAWER AND DOOR STYLE: (Choose one)

- A. Inset – Square Edge  
Drawers and doors, when closed, shall be recessed to create an overall flush face with 1/8" reveals. The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel. The top front corners of the door shall be welded and ground smooth.
- B. Inset – Contour  
Drawers and doors, shall have a full width, integral contour radiused pull along the top edge, and when closed, shall be recessed to create an overall flush face with 1/8" reveals. The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel. The top front corners of the door shall be welded and ground smooth.
- C. Overlay – Square Edge  
Drawer and door, when closed, shall rest against face of cabinet shell, creating a 3/4" overlay front with 1/8" reveal. The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel. The top front corners of the door shall be welded and ground smooth. Cabinet shall be available with 5-knuckle, semi-concealed or concealed hinges and optional pulls.

D. Overlay – Wood on Steel

Drawer head and door, when closed, shall rest against face of cabinet shell, creating a 3/4" overlay front with 1/8" reveal. The door and drawer head shall be 3/4" thick, square edged, composition core, hardwood veneer plywood with 1/8" hardwood edging. The exposed grain for doors and drawer fronts shall run vertical and be matched to the door or drawer front above or below it. Drawer heads shall be grooved on backside to interlock with channel formation in drawer body. Cabinet shall be available with 5-knuckle, semi-concealed or concealed hinges and optional pulls.

The hardwood species shall be: (chose one)

Red Oak

or

Maple

E. Overlay – Bevel Edge

Drawer head and door shall have a 45° beveled top edge and shall rest against face of cabinet shell, when closed, creating a 3/4" overlay front with 1/8" reveal. The outer door and drawer head shall have a channel formation on all four sides to eliminate sharp raw edges of steel and the top front corners shall be welded and ground smooth. Cabinet shall be available with 5-knuckle, semi-concealed or concealed hinges and optional pulls.

## 2.03 MATERIALS

A. General Requirements:

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

B. 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. Stainless Steel:

Stainless Steel shall be Type 304; 12, 14, 16, 18 and 20 gauge U.S. Standard. Stainless steel shall be supplied with a #4 finish free of burrs, weld marks, or other imperfections.

C. Composition Core Plywood

Composition core plywood shall be 3-ply and shall be compliant with ANSI A208.1-199, and/or ANSI A208.2-1994

D. Hardware and Trim:

1. Drawer and Door Pulls: (chose one)

- a. Drawer and door pulls shall be mounted on 4" centers, offering a comfortable hand grip, and be securely fastened to doors and drawers.

They shall be manufactured from: (chose one)

Pull Style 1 – Anodized aluminum in a shallow rounded shape.

or

Pull Style 2 – 5/16" diameter steel rod finished with a black epoxy paint.

or

Pull Style 3 – 5/16" diameter steel rod finished with a white epoxy paint.

or

Pull Style 4 – 3/8" diameter stainless steel rod with brushed satin finish.

or

Pull Style 6 – 5/16" diameter chrome plated brass rod with brushed satin finish.

or

Pull Style 8 – Anodized aluminum in a flat rectangular shape.

or

- b. Aluminum-Recessed – Pull Style 9 (Not available on Overlay – Wood on Steel)  
Pull shall be aluminum, with clear lacquer finish, recessed into the face of doors and drawer heads. Use of plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.

or

- c. Integral – Pull Style 5 – (Available for Inset Contour Style only)  
Pull shall be integrally formed at top of drawer and door, and offer a comfortable continuous handgrip. Use of aluminum, steel, or plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.

2. Sliding Door Pulls:

Sliding door pulls shall be Aluminum-Recessed – Pull Style 9. Finger holes or slots machined into doors will not be acceptable.

3. Hinges: (Choose one) (*Note: not all hinges meet SEFA 8 specifications*)

a. Inset 5-Knuckle Hinges:

Inset style cabinets shall use 5-Knuckle hinges 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. Hinges shall be attached to both door and case with two screws through each leaf. Welding of hinges to door or case will not be accepted. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges. (*Note: meets SEFA 8 specifications*)

or

b. Overlay Hinges:

Overlay style cabinets shall use: (Choose one)

Overlay 5-Knuckle Hinges:

5-Knuckle hinges 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. Hinges shall be attached to both door and case with two screws through each leaf. Welding of hinges to door or case will not be accepted. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges.

or

Overlay Semi-concealed

3-knuckle, semi-concealed hinges with a matte nickel finish. Hinge shall have three dimensional adjustment and provides up to 270° opening. It shall incorporate an integrated catch to keep door closed without the use of additional catch hardware. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges.

or

Overlay Concealed 170° Swing

Fully concealed hinges with a matte nickel finish. Hinge shall have three dimensional adjustment and provide up to 170° opening. It shall incorporate an integrated catch to keep the door closed without the use of additional catch hardware. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges.

4. Drawer Slide: (Choose One)

- a. Heavy duty, full extension, soft-close, self-closing, zinc plated, ball bearing slides, rated

for 100 pound loads (See Drawer Assemblies in 2.04, option 1)

or

- b. Blum LEGRABOX, integral drawer, concealed full extension, soft-close, self-closing slides. (See Drawer Assemblies in 2.04.B.12, option 2)  
*(Note: available on Overlay style cabinets only)*
5. Locks:
  - a. Disk Tumbler:

Locks when shown or called for shall be a 5-disc tumbler with heavy duty interchangeable cylinder. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity for 2000 primary key changes and Master Keyed one level with the potential of 5 different, non-interchangeable Master Key groups.
  - b. Pin Tumbler:

Locks when shown or called for shall be a pin tumbler with heavy duty interchangeable cylinder. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity of at least 2000 primary key changes, and the capacity to be Master Keyed, Grand-master Keyed, Sub-master Keyed, and Mason Keyed.
6. Catches – For steel casework with 5-knuckle hinges:
  - a. Positive Catch:

A two-piece heavy-duty cam action positive catch Main body of the catch shall be confined within an integral cabinet top or divider rail, while latching post shall be mounted on the hinge side of door. Polyethylene roller type catches are not acceptable.
7. Elbow Catches:

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.
8. Shelf Adjustment Clips:

Shelf adjustment clips shall be die formed, nickel-plated steel.
9. Leg Shoes:

Leg shoes shall be a pliable, black vinyl material and shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Use of a leg shoe, which does not conceal leveling device, will not be acceptable.
10. Base Molding:

Base molding shall be provided by others.
11. Label Holders:

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.
12. Number Plates:

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

Sink supports shall be the hanger type, suspended from end panels of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full-depth reinforcements, welded to the top of end panels. Two 3/4" x 1-1/2" x 12 gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks.
14. Support Struts:

Support struts shall consist of two 16 gauge channel uprights fastened top and bottom by two adjustable 12 gauge "U" shaped spreaders, each, 1-1/2" x length required, formed from galvanized steel. Struts shall be furnished to support drain troughs, and to support worktop at plumbing space under fume hood superstructures or other heavy loads. Support struts can be furnished with hangers at extra cost when specified, to support mechanical service piping and drain lines.

## 2.04 CONSTRUCTION

### A. Steel Cabinet Construction:

#### 1. General:

- a. The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory Equipment Industry. 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.
- b. 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 reinforcements.
- c. 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.
- d. Case openings of Inset style cabinets shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust resistant case.
- e. All cabinets shall have a cleanable smooth interior. Bottoms shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges.
- f. Cabinets shall be designed using a standardized grid pattern to allow reconfiguration of doors and drawers.

#### 2. Steel Gauges:

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

- a. Leveling bolt reinforcements 12 gauge.
- b. Top and intermediate front horizontal rails, apron rails, hinge reinforcements, and reinforcement gussets, 16 gauge.
- c. Drawer assemblies, door assemblies, bottom, bottom back rail, toe space rail, and adjustable shelves, 20 gauge.

### B. Base Cabinets:

1. End uprights shall be formed into not less than an L formation at top, bottom, back and a 3/4" wide front C formation. A pilaster shall be added to the inside front of the upright for cabinet and hinge reinforcement and shall be perforated for the support of drawer channels, intermediate rails, hinge screws, and shelf adjustment holes.
2. A 7/8" high top horizontal rail shall interlock with the flange at top of end panels for strength, but shall be flush at face of unit. Top rails not flush with face of end uprights are not acceptable.
3. Intermediate rails shall be provided between doors and drawers, but shall not be provided between drawers unless made necessary by locks in drawers. Intermediate rails shall be recessed behind doors and drawer fronts, and designed so that security panels may be added

as required.

4. Intermediate vertical uprights shall be furnished to enclose cupboards when used in a unit in combination with a half width bank of drawers.
5. Cabinet bottom 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. Front edge shall include a C formation to form a 7/8" high bottom front rail and shall be flush with face of end uprights. Cabinet bottom front rails not flush with face of end uprights are not acceptable.
6. Toe space rail shall extend up and forward to engage bottom panel to form a smooth surfaced fully enclosed toe space, 3" deep x 4" high.
7. Back construction shall be one piece with integral channel formed for maximum strength and welded to back of top and bottom flanges of end uprights.
8. Each bottom corner of base cabinets shall have a 3/8"-16 leveling bolt, 2-1/2" long capable of supporting 500 lbs. Access to the leveling bolts shall be through plug buttons in the cabinet bottom. Access to leveling bolts through toe space or leveling bolts requiring special tools to adjust are not acceptable.
9. Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear and formed down 3/4" at each end. Shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf. Shelves shall be adjustable on not more than 1" increments.

*Optional*

Each adjustable shelf shall include a lip that extends 1/2" above the front edge.

10. Steel Door assembly (two-piece) for solid panel 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. Door assemblies shall be painted prior to assembly, and shall be punched for attaching pulls. Inner pan formation of door shall be indented for in-field installation of locks when required.
11. 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.
12. Drawer Assemblies: (Choose One)
  - a. 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.

or

- b. Concealed slide drawers shall be Blum LEGRABOX, with integral, concealed, full-extension, soft-close, self-closing drawer slides. Drawer bottoms shall be 5/8" composite core with brushed aluminum face.  
Concealed slide drawer sides shall be fabricated from: (Choose One)
  - 1) cold-rolled steel

or



2) stainless steel

13. Knee space panels, where shown or specified, shall be 20 gauge, finished same as casework cabinets, and easily removable for access to mechanical service areas.

C. Special Purpose Storage Cabinets:

1. Acid Storage Fume Hood Cabinets:

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. 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. Tubs shall include integral cleats at both ends and back to support an optional shelf. Each door shall have a set of louvers at the top and bottom, and have a 1/8" sheet polyethylene liner. Where specified, each cabinet shall be vented into the fume hood with a 1-1/2" vent pipe allowing a positive airflow directly into the fume hood exhaust system. When specified or shown on drawings, cabinet shall include a full-depth phenolic resin.

2. Solvent Storage Cabinets:

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 FM approved and labeled. 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. 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. The doors are self-closing and synchronized so that both doors will always fully close. The right hand door is equipped with a three-point latching system that automatically engages when the doors close. 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. A 2" deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A second pan shall be provided to serve as a full-depth adjustable shelf. Two, 2" diameter, diametrically opposed vents with spark screens shall be 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".

3. Vacuum Pump Cabinets:

Vacuum pump cabinets shall utilize the same gauges of steel and construction features as other base cabinets except they shall be provided without a bottom to allow vacuum pumps and other equipment to be rolled in and out of the cabinet. The interior of the cabinet shall be lined with a 1 inch thick neoprene foam for sound deadening and easy cleaning. Each cabinet shall be furnished with a 120 VAC, 20 amp, duplex receptacle mounted on the inside cabinet back and a pilot lighted toggle switch mounted in the top front panel. Each cabinet shall be furnished with a 1 1/2" diameter PVC vent pipe in the back for venting or access to the fume hood above. The toe kick shall be attached to the doors and shall allow total access to the front of the cabinet. Internal wiring from the switch and pilot light to the receptacle shall not be furnished unless otherwise specified.

D. Upper Cabinet Construction:

1. Upper cabinets shall have a completely finished interior same as exterior and shall be designed so that no mounting hardware is visible when installed.

2. End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. Front edge of end upright shall be 3/4" wide. A pilaster shall be added to the inside front of the upright for cabinet and hinge reinforcement and shall be perforated for hinge

screws, and shelf adjustment holes.

3. Cabinet tops shall be formed with a 7/8" high C formation at the front edge and turned down at the back to engage a wall hanging rail.
4. Cabinet flush bottoms shall be formed with a 7/8" high C formation at the front edge.
5. Cabinet false bottoms shall be formed down on all four edges and shall be removable.
6. Cabinet backs shall be welded to the top, bottom and ends. Backs shall be perforated for shelf adjustment holes. Holes shall be enclosed by end uprights.
7. 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. Shelves shall be adjustable on not more than 1" increments.

*Optional*

Each adjustable shelf shall include a lip that extends 1/2" above the front edge.

8. Glazed 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. Glass shall be held in place by a rubber or vinyl gasket around the entire edge of the glass. Doors shall be glazed with: (Choose one)
  - a. 1/8" float glassor
  - b. 1/8" tempered glassor
  - c. 1/4" safety glass
9. Solid panel 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.
10. Sliding doors shall be suspended from the top in a roll formed steel track fastened to the cabinet top and shall glide on nylon rollers. Track shall be so designed to prevent accidental removal of doors.
11. Swinging doors under 36" high shall be hung on one pair of hinges, doors over 36" high shall be hung on three hinges.
12. 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. Plate glass doors shall be: (Chose one)

1/4" float glass

- or
- 1/4" tempered glass
- or
- 1/4" safety glass

E. Steel Full Height Cabinet Construction:

1. Full height storage cabinets shall have a completely finished interior same as exterior.
2. End uprights shall be formed at front, bottom and back to provide maximum strength and rigidity. Front fascia of upright shall be 1-1/4" wide with inside edge formed in a channel 1/2" x 3/8". A full height box reinforcement shall be fitted to the channel, formed to provide a recessed strike for door and to reinforce the cabinet. The backside of the reinforcement shall be perforated with shelf adjustment holes spaced at not more than 1" centers. Back of upright shall be formed in a 2-1/2" formation. 16 gauge hinge reinforcement shall be welded to inner side of front uprights.
3. Cabinet tops shall be formed into a channel shape at front with flange at rear and sides for electro-welding cabinet top to cabinet back and ends. Front fascia channel shall be strengthened with electro-weld reinforcements.
4. Cabinet bottoms for storage cabinets 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 door recess rabbet for dust stop. Cabinet bottoms shall be formed to provide a flush 1" face rail with a return flange to give a 9/16" deep x 5" high toe space. All cabinets shall have a cleanable smooth interior.
5. Toe space rails shall interlock in back of bottom rail and with end panel to provide a welding plate, and shall extend to the floor with a flange turned back and up for support.
6. 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 enclosed by a formation in cabinet back and enclosed by end uprights.
7. 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 electro-welded to underside of shelf. Shelves shall be adjustable on not more than 1" increments.

*Optional*

Each adjustable shelf shall include a lip that extends 1/2" above the front edge.

8. Glazed 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. Door glazing shall be held in place by a rubber or vinyl gasket around the entire edge of the glass. Doors shall be glazed with: (Choose one)
    - a. 1/8" float glass
  - or
  - b. 1/8" tempered glass
  - or
  - c. 1/4" safety glass
9. Solid panel doors shall consist of inner and outer pan formations mechanically assembled

after painting. All full height solid panel doors shall be further reinforced by a full-height channel formation welded to inner pan. Doors shall be 3/4" thick and contain sound deadening material.

10. 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.
11. Swinging doors under 36" high shall be hung on one pair of hinges, doors over 36" high shall be hung on three hinges.

F. Apron and Leg Assembly 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 channel formation. 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 leveling bolt. Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling bolts. Use of leg shoe which does not conceal leveling device will not be acceptable.
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.

## 2.05 PERFORMANCE REQUIREMENTS

A. Steel Casework Construction Performance:

1. Base cabinets shall be constructed to support at least a uniformly distributed load 200 pounds per square foot of cabinet top area, including working surface without objectionable distortion of interference with door and drawer operation.
2. Base cabinet leveling bolts shall support 500 pounds per corner, at 1-1/2" projection of the leveling bolt below the cabinet bottom.
3. Each adjustable and fixed shelf 4 feet or shorter in length shall support an evenly distributed load of 40 pounds per square foot up to a maximum of 200 pounds, with nominal temporary deflection, but without permanent set.
4. Full extension soft-close, self-closing ball bearing zinc plated drawer slide shall be rated for 100 pound loads.
5. Swinging doors on floor-mounted inset style casework shall support 200 pounds 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.

B. Steel Paint System Finish and Performance Specification:

1. Steel Paint System Finish:

After Cold Rolled Steel and Textured 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.

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.

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

2. Performance Test Results (Chemical Spot Tests):

a. Testing Procedure:

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. 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. 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. 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.

b. 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.**

c. 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.	Dimethylformamide	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 Chloride	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):

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):

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):  
An 18 gauge steel strip, finished as specified, when bent 180° over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
6. Performance Test Results (Adhesion):  
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):  
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).

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.

## **2.06 WORKSURFACES**

- A. Materials: (Choose one or more and import information from WORKSURFACES spec.)
  1. Epoxy Resin Tops (Kemresin)
  2. Environmentally Friendly Epoxy Resin Tops (EarthResin)
  3. Plastic Laminate
  4. Stainless Steel
  5. Hardwood (Natural Finish)
  6. Hardwood (Penetrating Oil Finish)
- B. Performance Requirements: (Choose one or more and import information from WORKSURFACES spec.)

## **2.07 SINKS CUPSINKS, AND DRAINS**

- A. Sinks: (Choose one or more and import information from SINKS, CUPSINKS, and DRAIN spec.)
  1. Molded Epoxy Resin Sinks
  2. Stainless Steel Sinks
- B. Cupsinks: (Choose one or more and import information from SINKS, CUPSINKS, and DRAIN spec.)
  1. Molded Epoxy Resin
  2. Polyethylene
- C. Drain Troughs: (Import information from SINKS, CUPSINKS, and DRAIN spec.)

## **2.08 FITTINGS**

- A. Materials: (Choose one or more and import information from SERVICE FITTINGS AND ACCESSORIES spec.)
  1. Chrome-plated red brass or bronze

2. Coated red brass or sepia bronze
- B. Construction: (Choose one or more and import information from SERVICE FITTINGS AND ACCESSORIES spec.)
1. Water Fittings
  2. Steam Fittings
  3. Distilled Water Fittings
  4. Laboratory Ball Valves
  5. Needle Valve Hose Cock
  6. Gooseneck Type Outlets
  7. Remote Control Valves
  8. Tank Nipples
  9. Sink Outlets
  10. Crumb Cup Strainers
  11. Vacuum Breakers
  12. Aerator Outlets
  13. Waste Lines
  14. Traps
  15. Electrical Fittings
- C. Performance: (Choose one or more and import information from SERVICE FITTINGS AND ACCESSORIES spec.)
1. Maximum line pressures
    - a. Laboratory ball valves
    - b. Needle point cocks
    - c. Vacuum valve
    - d. Water (H&C) valve
    - e. Steam valve
  2. Sepia bronze finish performance



## PART 3 — EXECUTION

### 3.00 SITE EXAMINATION

- A. The owner and/or his representative shall assure all building conditions conducive to the installation of a finished goods product; all critical dimensions and conditions previously checked have been adhered to by other contractors (general, mechanical, electrical, etc.) to assure a quality installation.

### 3.01 INSTALLATION

- A. Preparation:  
Prior to beginning installation of casework, check and verify that no irregularities exist that would affect quality of execution of work specified.
- B. Coordination:  
Coordinate the work of the Section with the schedule and other requirements of other work being prepared in the area at the same time both with regard to mechanical and electrical connections to and in the fume hoods and the general construction work.
- C. Performance:
  - 1. Casework:
    - a. Set casework components plumb, square, and straight with no distortion and securely anchor to building structure. Shim as required using concealed shims.
    - b. Bolt continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerance.
    - c. Secure wall cabinets to solid supporting material, not to plaster, lath or gypsum board.
    - d. Abut top edge surfaces in one true plane. Provide flush joints not to exceed 1/8".
  - 2. Worksurfaces:
    - a. Where required due to field conditions, scribe to abutting surfaces.
    - b. Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure the joints in the field, where practical, in the same manner as in the factory.
    - c. Secure worksurfaces to casework and equipment components with materials and procedures recommended by the manufacturer.
- D. Adjust and Clean:
  - 1. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.
  - 2. Adjust doors, drawers and other moving or operating parts to function smoothly.
  - 3. Clean shop finished casework; touch up as required.
  - 4. Clean worksurfaces and leave them free of all grease and streaks.
  - 5. Casework to be left broom clean and orderly.
- E. Protection:
  - 1. Provide reasonable protective measures to prevent casework and equipment from being exposed to other construction activity.
  - 2. Advise owner and/or his representative of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.