

SECTION 12 31 00  
MANUFACTURED METAL CASEWORK

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies metal casework and related accessories, including base cabinets, wall cabinets, and full height cabinets.
- B. Items specified in this section:
  - 1. Laboratory and Hospital Casework:
  - 2. Stainless Steel worktops, frames, and legs
  - 3. Adjustable Height Clean Up Counters.
  - 4. Double-Bowl Adjustable Height Endoscope Preprocessing Sink.
  - 5. Rolling Table w/ shelf.
  - 6. Wall Mounted Shelving.
  - 7. High Density Shelving.

**1.2 RELATED WORK**

- A. Steel tops and frames: Metal Fabrications 05 50 00
- B. Color of casework finish: Color and Material Legend.
- C. Electrical Components: Division 26, ELECTRICAL.

**1.3 QUALITY ASSURANCE**

- A. Approval by Contracting Officer of proposed manufacturer, or suppliers, will be based upon submission by Contractor certification that, manufacturer regularly and presently manufactures casework specified as one of their principal products.
- B. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.
- C. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.

**1.4 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
  - 1. Manufacturer's Certificate of qualifications specified and finish on casework.
  - 2. Contractor's Certificate of installer's qualifications specified.
  - 3. Safety glass meets requirements of ANSI Standard Z97.1.

C. Manufacturer's Literature and Data:

1. Brochures showing name and address of manufacturer, and catalog or model number of each item incorporated into the work.
2. Manufacturer's illustration and detailed description.
3. List of deviations from contract specifications.
4. Locks, each kind

D. Shop Drawings (1/2 Full Scale):

1. Showing details of construction, including kinds of materials and finish, hardware, accessories and relation to finish of adjacent construction, including specially fabricated items or components.
2. Fastenings and method of installation.
3. Location of service connections and access.

E. Samples:

1. Metal plate, 150 mm (six inch) square, showing chemical resistant finish, in each color.
2. One complete casework assembly, including cabinet(s) with drawers and cupboard.
3. One glazed sliding door with track and pertinent hardware. A complete cabinet may be submitted to fulfill this requirement.
4. Cabinets for subsequent installation may be submitted for above requirements.

**1.5 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

- A36/A36M-08.....Carbon Structural Steel
- A167-99(R 2009).....Stainless and Heat-Resisting Chromium Steel  
Plate Sheet and Strip
- A283/A283M-03(R 2007)...Low and Intermediate Tensile Strength Carbon  
Steel Plates
- A568/A568M-09.....Steel, Sheet, Carbon and High-Strength, Low-  
Alloy Hot-Rolled and Cold-Rolled, General  
Requirements
- A794/A794M-09.....Standard Specification for Commercial Steel  
(CS), Sheet, Carbon (0.16% Maximum to 0.25%  
Maximum) Cold Rolled
- B456-03(R2009).....Electrodeposited Coatings of Copper Plus Nickel  
Plus Chromium and Nickel Plus Chromium

- C1036-06.....Flat Glass
- C. American National Standard Institute:
  - Z97.1-09.....Safety Glazing Material used In Buildings
- D. Builders Hardware Manufacturers Association (BHMA):
  - A156.1-06.....Butts and Hinges
  - A156.9-10.....Cabinet Hardware
  - A156.5-10.....Auxiliary Locks and Associated Products
  - A156.11-10.....Cabinet Locks
  - A156.16-02.....Auxiliary Hardware
- E. American Welding Society (AWS):
  - D1.1-10.....Structural Welding Code Steel
  - D1.3-08.....Structural Welding Code Sheet Steel
- F. National Association of Architectural Metal Manufacturers (NAAMM):
  - AMP 500-505-06 Series...Metal Finishes Manual
- G. U.S. Department of Commerce, Product Standard (PS):
  - PS 1-95.....Construction and Industrial Plywood
- H. Federal Specifications (Fed. Spec.):
  - FF-N-836D.....Nut, Square, Hexagon Cap, Slotted, Castle  
Knurled, Welding and Single Ball Seat
  - A-A-55615.....Shield, Expansion; Nail Expansion (Wood Screw  
and Lag Bolt Self-Threading Anchors)

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Sheet Steel:
  - 1. ASTM A794, cold rolled, Class 1 finish, stretcher leveled.
  - 2. Other types of cold rolled steel meeting requirements of ASTM A568 may be used for concealed parts.
- B. Structural Steel: ASTM A283 or ASTM A36.
- C. Stainless Steel: ASTM A167, Type 302B.
- D. Glass:
  - 1. ASTM C1036 Type I, Class 1, Quality q3,
  - 2. For Doors: 6 mm (1/4 inch) thick; except where laminated glass is shown.
  - 3. For shelves: Either 6 mm (1/4 inch) or 9 mm (3/8 inch) thick.
- E. Laminated Glass: Fabricate of two sheets of 3 mm (1/8 inch) thick clear glass, laminated together with a 1.5 mm (0.060 inch) thick vinyl interlayer, to a total overall thickness of 8 mm (5/16 inch).
- F. Glazing Cushions:

1. Channel shaped, of rubber, vinyl or polyethylene plastic, with vertical flanges not less than 2 mm (3/32 inch) thick and horizontal web 3 mm (1/8 inch) thick.
2. Flanges may have bulbous terminals above the glazing heads or terminate flush with top of beads.

G. Plywood:

1. Prod. Std. PS 1, seven ply, interior.
2. Where both sides are exposed, use Grade AA.
3. Grade AB for other uses.

H. Fasteners:

1. Exposed to view, chrome plated steel or stainless steel, or finished to match adjacent surface.
2. Use round head or countersunk fasteners where exposed in cabinets.
3. Expansion Bolts: Fed Spec. A-A-55615. Do not use lead or plastic shields.
4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
5. Sex Bolts: Capable of supporting twice the load.

**2.2 MANUFACTURED PRODUCTS**

- A. When two or more units are required, use products of one manufacturer.
- B. Manufacturer of equipment assemblies, which include components made by other, shall assume complete responsibility for the final assembled unit.
- C. Constituent parts which are alike, use products of a single manufacturer.

**2.3 CASEWORK FABRICATION**

A. General:

1. Welding: Comply with AWS Standards.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.
3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

0.89 mm (0.035 inch) (20 gage)	Drawer fronts, backs, bodies, closure plates or scribe and filler strips less than 75 mm (three inches) wide, sloping top, shelf reinforcement channel and shelves. Toe space or casework soffits and ceilings under sloping tops.
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1.20 mm (0.047 inch) (18 gage)	Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (three inches) or more. Reinforcement for drawers with locks. Tables legs, spreaders and stretchers, when fabricated of cold rolled tubing. Metal for desks; except legs and aprons. Door exterior and interior panels, flush or glazed. Cross rails of base units. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets.
1.49 mm (0.059 inch) (16 gage)	Aprons, apron division, reinforcing gussets, table legs, desk legs and aprons, spreaders and stretchers when formed without welding. Toe base gussets, drawer slides, and other metal work. Front top rails and back rails except top back rails may be 1.2 mm (0.047 inch) (18 gage) thick.
1.88 mm (0.074 inch) (14 gage)	Drawer runners door tracks.
2.64 mm (0.104 inch) (12 gage)	Base unit bottom corner gussets and leg sockets.
3 mm (0.12 inch) (11 gage)	Reinforcement for hinge reinforcement inside doors and cabinets.

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front, include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of wall units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets, including drawer units.
7. Provide finish panel on exposed cabinet backs.
8. Do not use screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, removable panels and where casework is required to fastened end to end or back to back.
9. Fabricate casework, except benches, and desks with finished end panels.

10. Close flush exposed soffits of wall hung shelving, knee spaces in counters, and toe spaces at bases.
11. In base units with sinks provide one piece, lowered backs.
12. In base units with doors provide removable backs.
13. Provide built-in raceways or tubular or channel shaped members of casework for installation of wiring and electric work. Mount junction boxes on rear of cabinets, Electric work is specified in electrical sections of specifications.
14. Provide reinforcing for hardware.
15. Size Dimensions:
  - a. Used dimensions shown or specified within tolerances specified.
  - b. Tolerance:
    - 1) Depth: 325 mm (13 inches) in lieu of 300 mm (12 inches), 450 mm (18 inches) in lieu of 400 mm (16 inches), except wall hung units above counter. 525 mm (21 inches) to 600 mm (24 inches) in lieu of 550 mm (22 inches).
    - 2) Width: Minus 25 mm (one inch).
    - 3) Height: 25 mm (one inch) plus or minus for wall hung cabinets and counter mounted cabinets, excluding sloping tops. 25 mm (one inch) plus for floor standing cabinets, excluding base and sloping tops. Full height cabinets shown back to back same height.
    - 4) Manufacturer's tolerance for the same length, depth or height: Not to exceed 1.58 mm (0.0625 inches).

**D. Base Pedestals:**

1. Provide adjustable leveling bolts accessible through stainless steel plugs, or notch in the base concealed when resilient base is applied.
2. Except where flush metal base is shown, provide toe space at front recessed 75 mm (3 inches).

**E. Doors:**

1. Hollow metal type, flush and glazed doors not less than 16 mm (5/8 inch) thick.
2. Fabricate flush metal doors of two panels formed into pans with corners welded and ground smooth. Provide flush doors with a sound deadening core.
3. Fabricate glazed metal doors with reinforced frame and construct either from one piece of steel, or have separate stiles and rails mitered and welded at corners, and welds ground smooth.
  - a. Secure removable glazing members with screws to back of doors.

- b. Install glass in rubber or plastic glazing channels.
  - 4. Provide sheet steel hinge reinforcement inside doors.
  - 5. Sliding doors: Provide stops to prevent bypass.
  - 6. Doors removable without use of tools except where equipped with locks.
- F. Drawers:
- 1. Drawer fronts flush hollow metal type not less than 16 mm (5/8 inch) thick with sound deadening core. Fabricate of two panels formed into pans. Weld and grind smooth corners of drawer fronts.
  - 2. Form bodies from one piece of steel, weld to drawer front.
  - 3. Provide reinforcement for locks and provide rubber bumpers at both sides of drawer head to cushion closing.
  - 4. Equip with roller suspension guides.
- G. Sloping Tops:
- 1. Provide sloping tops for casework where shown.
  - 2. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.
  - 3. Omit sloping tops or filler plates whenever ceiling material is turned down and furred-in at face of casework.
  - 4. Provide exposed ends of sloping tops with flush closures.
  - 5. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.
- H. Shelves:
- 1. Capable of supporting an evenly distributed minimum load of 122 kg/m<sup>2</sup> (twenty-five pounds per square foot) without visible distortion.
  - 2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
  - 3. For shelves over 1050 mm (42 inches) in length and over 300 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1-1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
  - 4. Weld shelves to metal back and ends unless shown adjustable.
  - 5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.
- I. Undercounter Table and Bench Frames:
- 1. Using welded construction.
  - 2. Open frame type with aprons and legs when required.
  - 3. Aprons:

- a. Channels shaped welded at corners, with leg sockets and reinforcing triangular corner gussets welded in corners.
  - b. Pierce sockets to receive leg bolts and notch gussets to receive legs.
  - c. Upper flange perforated or slotted to receive screws at 200 mm (8 inch) centers, and back channels when installed against wall. Size slots for 6 mm (1/4 inch) anchor bolts.
  - d. Pierce aprons to receive drawer formation, rail at top of drawer opening. Install channel shaped apron division welded at ends, 762 mm 30 inches apart to front and back aprons, or at each side of drawer.
  - e. Fabricate metal components from sheet steel.
    - 1) Use 1.5 mm (0.0598 inch) thick sheet for gussets and channel aprons.
    - 2) Use 1.2 mm (0.0478 inch) thick sheet for other items.
  - f. At knee space, provide exposed metal sides and metal closure plate for soffit. Where shown at knee space, provide exposed metal back secured with continuous angle closures at both side.
4. Legs:
- a. Cold rolled tubing or 1.5 mm (0.0598 inch) formed steel.
  - b. Leveling-anchoring device at floor.
  - c. Stud bolt at top for attachment to leg socket.
5. Leg Braces:
- a. Tables and benches not anchored to walls.
  - b. Brace back against front legs near bottom with steel angle, channel or tubular braces.
  - c. Fasten braces together with steel straps.
6. Leg Shoes:
- a. Fit laboratory casework legs at bottom with either stainless steel, aluminum, or chromium plated brass shoes, not less than 25 mm (one inch) in height.
  - b. Fit other legs with a movable molded vinyl shoe 100 mm (four inches) high and coved at bottom.
- J. Closures and Filler Strips at Pipe Spaces:
- 1. Flat steel strips or plates.
  - 2. Openings less than 200 mm (8 inches) wide: 1.2 mm (0.047 inch) thick.
  - 3. Openings more than 200 mm (8 inches wide 0.9 mm (0.359 inches) wide.

## **2.4 ACCESSORIES**

- A. Card or Label Holders for Shelves:



1. Fabricate of 0.6 mm (0.0239 inch) thick steel approximately 125 mm (five inches) long, or continuous where shown, having top and bottom edges bent over on face and welded to shelf.
2. Finish exposed surfaces in same color as shelf.
- B. Labels Holders for Doors and Drawers:
  1. Cast or wrought brass or aluminum, 50 mm (2 inch) by 88 mm (3-1/2 inch).
  2. Fasten to casework as recommended by manufacturer.

## 2.5 HARDWARE

- A. Factory installed.
- B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.
- C. Cabinet Locks:
  1. Where locks are shown.
  2. Locked pair of hinged door over 900 mm (36 inches) high:
    - a. ANSI/BHMA A156.5, similar to E0261, Key one side.
    - b. On active leaf use three-point locking device, consisting of two steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
    - c. On inactive leaf use dummy lever of same design.
    - d. Provide keeper holes for locking device rods and cam.
  3. Door and Drawer: ANSI/BHMA A156.11 cam locks.
    - a. Drawer and Hinged Door up to 900 mm (36 inches) high: E07261.
    - b. Pin-tumbler, cylinder type lock with not less than four pins. Disc tumbler lock "duo A" with brass working parts and case, as manufactured by Illinois Lock Company are acceptable.
    - c. Sliding Door: E07161.
  4. Key locks differently for each type casework and master key for each service
    - a. Provide two keys per lock.
    - b. Provide six master keys per service.
4. Marking of Locks and Keys:
  - a. Name of manufacturer, or trademark which can readily be identified legibly marked on each lock and key change number marked on exposed face of lock.
  - b. Key change numbers stamped on keys.
  - c. Key change numbers to provide sufficient information for manufacturer to replace key.
- D. Cabinet Hardware: ANSI BHMA A156.9.

1. Door/Drawer Pulls: B02011.
  - a. One for drawers up to 575 mm (23 inches) wide.
  - b. Two for drawers over 575 mm (23 inches) wide.
  - c. Sliding door flush pull, each door: B02201.
2. Door in seismic zones: B03352.
  - a. Do not provide thumb latch on doors equipped with three point locking device.
  - b. Use lever operated two point latching device on paired doors over 900 mm (36 inches) high if three point locking or latching device is not used.
3. Cabinet Door Catch:
  - a. Install at bottom of wall cabinets, top of base cabinets and top and bottom of full height cabinet doors over 1200 mm (48 inches).
  - b. Omit on doors with locks.
4. Drawer Slides:
  - a. Use B05051 for drawers over 150 mm (6 inches) deep.
  - b. Use B05052 for drawers 75 to 150 mm (3 to 6 inches) deep.
  - c. Use B05053 for drawers less than 75 mm (3 inches) deep.
5. Butt Hinges:
  - a. B01351, minimum 1.8 mm (0.072 inch) thick chrome plated steel leaves.
  - b. Minimum 3.5 mm (0.139 inch) diameter stainless steel pins.
  - c. Full mortise type, five knuckle design with 63 mm (2-1/2 inch) high leaves and hospital type tips.
  - d. Two hinges per door except use three hinges on doors 1200 mm (48 inches) and more in height. Use stainless steel leaves for tilting bin doors.
  - f. Do not weld hinges to doors or cabinets.
6. Pivot hinges: ANSI/BHMA A156.1 A875B.
7. Shelf Supports:
  - a. install in casework where adjustable shelves are noted.
  - b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
  - c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.
8. Sliding Doors:
  - a. Doors supported by two ball bearing bronze or nylon rollers or sheaves riding on a stainless steel track.
  - b. Sliding Door Tracks: B07093. Plastic tracks not acceptable.

- c. Doors restrained by a nylon, polyvinylchloride, or stainless steel guide at opposite end.
- 9. Auxiliary Hardware: ANSI A156.16.
- 10. Door silencers: L03011 or L03031.
  - a. Install two rubber bumpers each door.
  - b. Silencers set near top and bottom of jamb.
- 11. Closet Bar: L03131 chrome finish of required length.

## 2.6 METAL FINISHES

- A. Comply with NAAMM 500 series and as specified.
- B. Steel Cabinets including Closures and Filler Strips:
  - 1. Acid resisting finish except hardware and stainless steel.
  - 2. After fabrication of cabinet submerge in a degreasing bath, and thoroughly rinse to remove dirt and grease, and other foreign matter.
  - 3. Apply non-metallic phosphate coating, then finish with baked-on acid resisting enamel not less than one mil thick.
  - 4. Finish resistant to action of the following reagents when 10 drops (0.5 cm<sup>3</sup>) are applied to the surface and left open to the atmosphere for period of one hour.

Hydrochloric Acid 37 percent	Ethyl Alcohol
Phosphoric Acid 75 percent	Methylethyl Keytone
Sulfuric Acid 25 percent	Acetone
Glacial Acetic Acid	Ethyl Acetate
Sodium Hydroxide 10 percent	Ethyl Ether
Sodium Hydroxide (concentrated)	Carbon Tetrachloride
Ammonia Hydroxide (concentrated)	Xylene
Hydrogen Peroxide 5 percent	Phenol 85 Percent
Formaldehyde 37 percent	

- 5. Color of finish is specified in Color and Material Legend, and Room Finsh Schedule.
- C. Stainless Steel: Mechanical finish No. 4 on sheet except No. 7 on tubing.

## 2.7 DISPENSING TRAYS AND BINS

- A. Design trays and bins to fit cabinets where shown.
- B. Fabricate of steel, polypropylene, fiberglass reinforced polyester resin, or other suitable material.
- C. Lock securely in place without the use of tools.
- D. Fit at angle to provide gravity feed where shown.

E. Dispensing Trays:

1. Equip trays with two longitudinal dividers adjustable to three position.
2. Approximate dimensions: 150 mm (6 inches) in width 75 mm (3 inches) in depth, and length to suit cabinets depth furnished.

F. Dispensing Bins:

1. Open front, except for retaining rim.
2. Approximate dimensions: 150 mm (6 inches) in width, 125 mm (5 inches) in depth, and length to suit cabinets furnished.

**2.8 ELECTRICAL FIXTURES**

- A. Comply with requirements of Division 26 - ELECTRICAL specifications for fixtures, receptacles, wiring and junction boxes required for fixtures and receptacles, included with casework.
- B. Suitable for use with electrical system specified and shown.
- C. Factory install in casework.

**2.9 BASE, BULK STORAGE**

- A. Reinforce decking to support 2440 Kg/M<sup>2</sup> (500 pounds per square foot) evenly distributed over entire unit.
- B. Fabricate of not less than 1.88 mm thick (0.074 inch) steel channels and sheet.
- C. Fabricate to align with toe space of adjacent cabinets.

**2.10 SUSPENSION SYSTEM FOR MEDICAL INSTRUMENT STORAGE DRAWERS:**

- A. Suspension system shall provide for independent suspension of interchangeable under-counter cabinets and of countertops. Provide for removal or exchange of under counter cabinets of various heights, widths and types, and for vertical adjustment of counter tops to heights indicated on drawings.
- B. Suspension Frames: Fabricate of 32 mm (1-1/4 inch square) or 25 mm (1 inch) x 38 mm (1-1/2 inch) rectangular, 2.6 mm (0.104 inch) (12 gauge) steel tubing welded to form full rectangle. Provide integral, adjustable leveling device in steel leg with non marring foot cap.
- C. Mounting channels and support frames shall allow for pipe chases and service channels when required.
- D. Cabinets to have an 1.49 mm (0.059 inch) steel shaped form welded across entire width of back to engage continuous slot in wall mounting channel. Two fastening devices through case stile at front shall provide final positive location and locking of case in position.
- E. All construction materials that are exposed shall be painted.

#### 2.11 WHEELED CARRIER

Provide a wheeled carrier to facilitate installation, removal, and transport of interchangeable cases as part of the interchangeable laboratory furniture system.

#### 2.12 ROLLING TABLE WITH SHELF

Basis of Design: Blickman's Howard Instrument table with shelf, 6'w x 2'd x 3'h. See details A4/AE720 for additional information.

#### 2.13 CUSTOM FABRICATED CLEAN UP COUNTERS AND ENDOSCOPE PREPROCESSING SINK:

See Details on AE720 for dimensions and details.

#### 2.14 HIGH DENSITY SHELVING

Basis of Design: Metro "Top Track" High Density Storage Systems. Features include mobile shelving units on castors with a top mounted guide track between fixed end units.

### PART 3 - EXECUTION

#### 3.1 COORDINATION

- A. Before installing casework, verify wall and floor surfaces covered by casework have been finished.
- B. Verify location and size of mechanical and electrical services as required.
- C. Verify reinforcement of walls and partitions for support and anchorage of casework.

#### 3.2 FASTENINGS AND ANCHORAGE

- A. Do not anchor to wood ground strips.
- B. Provide hat shape metal spacers where fasteners span gaps or spaces.
- C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.
- D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.
- E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to wood blocking for concealed fasteners.
- F. Use not less than No. 12 or 14 wood screws with not less than 38 mm (1-1/2 inch) penetration into wood blocking.
- G. Space fastening devices 300 mm (12 inches) on center with minimum of three fasteners in 900 or 1200 mm (three or four foot) unit width.

- H. Anchor floor mounted cabinets with a minimum of four bolts through corner gussets. Anchor bolts may be combined with or separate from leveling device.
- I. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
- J. Where units abut end to end anchor together at top and bottom of sides at front and back. Where units are back to back anchor backs together at corners with hex bolts placed inconspicuously inside casework.
- K. Where type, size, or spacing of fastenings is not shown or specified, show on shop drawings proposed fastenings and method of installation.

### 3.3 CLOSURES AND FILLER PLATES

- A. Close openings larger than 6 mm (1/4 inch) wide between cabinets and adjacent walls with flat, steel closure strips, scribed to required contours, or machined formed steel fillers with returns, and secured with sheet metal screws to tubular or channel members of units, or bolts where exposed on inside.
- B. Where ceilings interfere with installation of sloping tops, omit sloping tops and provide flat steel filler plates.
  - 1. Secure filler plates to casework top members, unless shown otherwise.
  - 2. Secure filler plates more than 150 mm (six inches) in width top edge to a continuous 25 by 25 mm (one by one inch) 0.889 mm thick steel formed steel angle with screws.
  - 3. Anchor angle to ceiling with toggle bolts.
- C. Install closure strips at exposed ends of pipe space and offset opening into concealed space.
- D. Paint closure strips and fillers with same finishes as cabinets.
- E. Caulk and seal laboratory furniture as specified in Section 07 92 00, JOINT SEALANTS.

### 3.4 CABINETS

- A. Install in available space; arranged for safe and convenient operation and maintenance.
- B. Align cabinets for flush joints except where shown otherwise.
- C. Install cabinets level with bottom of wall cabinets in alignment and tops of base cabinets aligned.
- D. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.
- E. Plug Buttons:

1. Install plug buttons in predrilled or prepunched perforations not used.
2. Use chromium plate plug buttons or buttons finish to match adjacent surfaces.

**3.5 PROTECTION TO FIXTURES, MATERIALS, AND EQUIPMENT**

- A. Tightly cover and protect cabinets against dirt, water chemical or mechanical injury.
- B. Thoroughly clean interior and exterior of cabinets, at completion of all work.

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