MANUFACTURED METAL CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies high quality metal casework, specifically designed for the dental laboratory environment, VA standard cabinets and related accessories, including base cabinets, wall cabinets, and full height cabinets.

1.2 RELATED WORK:

A. Sealants: Section 07 92 00, JOINT SEALANTS.

B. Resilient Base: Provided by others.

C. Backing Plates for Wall Mounted Casework: Provided by others.

D. Countertop Construction and Materials and Items Installed in Countertops: Section 12 36 00, COUNTERTOPS.

E. Plumbing Requirements Related to Casework: Final utility connections provided by others.

F. Electrical Lighting and Power Requirements Related to Casework: Final utility connections provided by others.

1.3 QUALITY ASSURANCE:

A. Approval by Contracting Officer Representative (COR) is required of manufacturer and installer based upon certification of qualifications specified.

B. Manufacturer’s Qualifications:

1. Manufacturer is regularly engaged in design and manufacture of metal of scope and type similar to requirements of this project for a period of not less than five (5) years.

2. Manufacturer has successfully completed at least three (3) projects of scope and type similar to requirements of this project.

3. Submit manufacturer’s qualifications and list of projects.

C. Installer Qualifications:

1. Installer has completed at least three (3) projects in least five (5) years in which these products were installed.

2. Submit installer qualifications.

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.

2. Certificate of installer’s qualifications specified.

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 casework 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, 152 mm (6 inch) square, showing chemical resistant finish, in each color.

F. Manufacturer’s warranty.

1.5 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 “Warranty of Construction”.

B. Manufacturer Warranty: Manufacturer shall warranty their wood casework for a minimum of five (5) years from date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.6 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-14 Carbon Structural Steel

A240/A240M-14 Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A283/A283M-13 Low and Intermediate Tensile Strength Carbon Steel Plates

A568/A568M-14 Steel, Sheet, Carbon and High-Strength, Low-Alloy Hot-Rolled and Cold-Rolled, General Requirements

A794/A794M-12 Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16% Maximum to 0.25% Maximum) Cold Rolled

B456-11 Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

C1036-11(R2012) Flat Glass

C1036-12e1 Heat-Strengthened and Fully Tempered Flat Glass

C1172-14 Laminated Architectural Flat Glass

C. American National Standard Institute:

Z97.1-09(R2010) Safety Glazing Material used In Buildings

D. Builders Hardware Manufacturers Association (BHMA):

A156.1-13 Butts and Hinges

A156.9-10 Cabinet Hardware

A156.5-14 Auxiliary Locks and Associated Products

A156.11-14 Cabinet Locks

A156.16-13 Auxiliary Hardware

E. American Welding Society (AWS):

D1.1/D1.1M-10 Structural Welding Code Steel

D1.3/D1.3M-05(R2008) Structural Welding Code Sheet Steel

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series Metal Finishes Manual

G. U.S. Department of Commerce, Product Standard (PS):

PS 1-09 Construction and Industrial Plywood

H. Underwriters Laboratories Inc. (UL):

325-06(R2013) Door, Drapery, Gate, Louver, and Window Operators and Systems

437-08(R2013) Key Locks

I. Federal Specifications (Fed. Spec.):

A-A-55615 Shield, Expansion; Nail Expansion (Wood Screw and Lag Bolt Self-Threading Anchors)

J. Scientific Equipment and Furniture Association (SEFA):

2.3-10 Installation of Scientific Laboratory Furniture and Equipment

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Sheet Steel:

1. ASTM A794/A794M, cold rolled, Class 1 finish, stretcher leveled.

2. Other types of cold rolled steel meeting requirements of ASTM A568/A568M are acceptable for concealed parts.

B. Carbon Steel:

1. ASTM A1008 CS type B, Shall be mild cold rolled, pickled, selected for flatness, free from rust, scale and buckle. The framing part of units shall be rolled or formed shaped steel. All gauges mentioned are U.S. standard.

C. Structural Steel: ASTM A283/A283M or ASTM A36/A36M.

D. Stainless Steel: ASTM A240/A240M, Type 302B.

E. Paintlok Steel: Where double pan door and drawer construction are specified, electro galvanized, phosphate treated steel, conforming to ASTM A591 shall be used.

F. Glass:

1. ASTM C1048 Kind FT Type I, Class 1, Quality q3.

2. For Doors: 6 mm (1/4 inch) thick; except where laminated glass is shown on construction documents.

3. For Shelves: 6 mm (3/8 inch) thick.

G. Laminated Glass: Fabricate of two sheets of 3 mm (1/8 inch) thick clear ASTM C1172, Kind LT 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).

H. 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.

I. Fasteners:

1. Exposed to View: Chrome plated steel or stainless steel, or finished to match adjacent surface.

2. Provide round head or countersunk fasteners where exposed in cabinets.

3. Expansion Bolts: Fed Spec. A-A-55615. Do not provide 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 (2) or more units are required, use products of one (1) manufacturer.

B. Manufacturer of casework assemblies is to assume complete responsibility for the final assembled unit.

C. Provide products of a single manufacturer for parts which are alike.

2.3 CASEWORK FABRICATION:

A. General: Construction and design shall develop maximum strength and rigidity in each sectional unit. Each sectional unit shall be completely integral rigid unit in itself to permit relocation at any subsequent time. All component parts of the section shall be formed insuring uniformity and interchangeability and shall be assembled in jigs for accurate alignment. All joints shall be notched, keyed and overlapped forming inter-locking joint construction. Vertical and horizontal members shall be spot welded at stress points. Screws shall not be used in the construction of the unit proper and shall only be used where backs, pans, and panels are required to be removable for accessibility. All sectional units shall be located on leveling devices easily adjustable from within the units, to compensate for unevenness in the laboratory floor. (Base molding shall be supplied and applied by the flooring contractor to the units after the units have been securely bolted together within the assembly in the laboratory.) All base cabinets which have electrical or plumbing fixtures specified as drawn are to have a separate service chase space located behind the run to carry the specified electrical and/or plumbing systems.

1. Welding: Comply with AWS Standards D1.1/D1.1M and D1.3/D1.3M.

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 (3 inches) wide, sloping top, shelf reinforcement channel and shelves. Toe space or casework soffits and ceilings under sloping tops. |
| 1.20 mm (0.047 inch) (18 gage) | Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (3 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. General 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 walls 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 install 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 be 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 (1) 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.

a. Mount junction boxes on rear of cabinets.

a. Provide electric work in accordance with Division 26, ELECTRICAL.

14. Provide reinforcing for hardware.

15. Size Dimensions:

a. Use dimensions shown on construction documents or within tolerances specified.

b. Tolerance:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Depth | Nominal Dim (mm (inch)) | Plus Tolerance (mm (inch)) | Minus Tolerance (mm (inch)) |
|  | Depth | 305 (12) | 1 (25) | 0 (0) |
|  | Width | * -
 | 0 (0) | 1 (25) |
| Wall Hung Cabinet | Height | * -
 | 1 (25) | 1 (25) |
| Counter Mounted Cabinet | Height | * -
 | 1 (25) | 1 (25) |
| Floor Standing Cabinet | Height | * -
 | 1 (25) | 0 (0) |

1)Full height cabinets shown on construction documents are to be the same height back to back.

2) Manufacturer's Tolerance for the same Length, Depth or Height of Cabinet: Not to exceed 1.58 mm (0.0625 inches).

D. Base Units:

1. Base Units Sides shall be die formed, 18 gauge, one piece construction. The sides will have a 1" return flange at the top, reinforcing flange at the bottom and rear and a 1" channel shape return at the front. Provisions for mounting drawer runners are 1/4-20 weld nuts, welded to a 1-1/16" x 1/2" x 28-7/8" x 18 gauge hat section. Each cabinet side receives (2) hat sections welded in position for drawer mounting and for stiffening of the side. All base units are to have 6/32 weld nuts for attaching door hinges to left or right side, for adding full height or 2/3 height doors. All drawer suspensions are attached with ¼”-20 x ½” machine screws. Weld nuts are provided for maximum of six drawers per unit. This construction will be essential to the flexibility of the system, and will allow the owner to change unit configuration without removing unit from an assembly, and without purchasing a new base unit. Door and drawer components will be available from manufacturer for future alteration.

2. Base Unit Bottoms shall be die formed 18 gauge, one piece construction, flanged on sides and rear for attachment to the base unit side and back. At the front of the base unit bottom, there shall be a channel shaped return forming the bottom rail. Base unit bottom shall have 1" diameter ventilation holes on 2" center in front of toe base panel as required. Corner gusset plates shall be 11 gauge plate provided in each corner of the base units. Each gusset plate shall be provided with a leveling device. Each 3/8" x 1-3/4" shall have a 1/4" square head for easy adjustment with a square socket from above. Access to the leveling bolts shall be through holes in the bottoms directly above the leveling bolts concealed with removable hard board or optional stainless steel bottom saver as required.

3. Base Unit Back shall be 18 gauge upper and lower panels attached to base unit sides. Upper panel will have a 1" top flange, and 1" diameter ventilation holes on 2" centers as required. Lower panel will have 1" bottom flange. Base unit backs shall have a removable section for access to the pipe space behind units. The 18 gauge removable section in the back shall be securely held in place with 8-32 machine screws into weld nuts.

E. 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 on construction documents, provide toe space at front recessed 76 mm (3 inches).

3. Where space allows for back to back setups a service pedestal, no smaller than 6”, will be utilized as a utility chase. The pedestal shall be constructed of die formed 16 gauge construction, flanged for attaching pedestal sides. Each side shall have a minimum 4” wide utility pass thru. The 4” opening will start 3” down from top of pedestal and end 3” from bottom. Aisle sides of pedestal are to be solid. Front of pedestal to have die formed 18 gauge removable access doors. Door is held in position with slotted quarter turn latch with offset cam. Pedestal is to have 11 gauge bottom corner gussets welded to bottom ¾” flanges. Gusset to have 3/8 -16 weld nuts to accept 3/8-16 leveler.

F. Doors:

1. Door Construction shall be of double pan construction with a finished thickness of 13/16" with corners welded and ground smooth. Inner pan to be 20 gauge; outer pan 18 gauge. Inner and outer pan will have 25/32" returns on all four sides. The inner pan will be spot welded to the outer pan. Doors will be removable from the hinge for cleaning; the hinge will be removable from the cabinet for cleaning. Both inner and outer pan shall be fabricated from Paintlok steel. The doors shall be hung on a concealed hinged, incorporating a six-way adjustment, 110 opening, with a spring for self-closing action. The hinge is to be manufactured from steel and have a nickel plated coating; the door will close against rubber bumpers. Door handles to be bow type 5-3/8" long; satin brushed aluminum finish attached with machine screws.

2. Fabricate glazed metal doors with reinforced frame and construct either from one (1) 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.

3. Provide sheet steel hinge reinforcement inside doors.

4. Sliding doors: Provide stops to prevent bypass.

5. Doors removable without use of tools except where equipped with locks.

G. Drawers:

1. Drawer Front Construction shall be of double pan construction with finished thickness of 13/16" with corners welded and ground smooth. The outer drawer head will be 18 gauge and the inner drawer head will be 20 gauge. Both inner and outer drawer heads will have 25/32" return on all four sides. The inner drawer shall be spot welded to the outer drawer head to prevent removal. The inner drawer head will have unexposed 8/32 threaded weld nuts for attaching to the drawer body. The double pan drawer head will be removable from the body, to facilitate cleaning. Drawer handle to be bow type as previously specified. Drawer shall close against rubber bumpers. Both inner and outer pan shall be fabricated from Paintlok steel.

2. Form drawer Bodies from one (1) piece steel and shall be of 18 gauge welded construction. The drawer sides will have a 180 degree x 5/16" flat hem and the drawer back will have a 180 degree x 1/2" flat hem for rigidity. The drawer body will have relief openings to facilitate cleaning. Provide reinforcement for locks and provide rubber bumpers at both sides of drawer head to cushion closing. Equip with roller suspension guides.

3. Drawer Suspension: Where standup base cabinets are specified, drawer suspension shall be 14 gauge "C" shaped member with positive stops. Drawer to operate smoothly on a 15/16" diameter x 1/4" steel ball bearing with a 7/32" shoulder. Bearing to have a 1/2" x 5/16" x 24" threaded attachment stud. The load rating is 200 lbs. per pair.

4. Where student benches (ref: 1604 cabinet) are specified, drawer suspension shall be 8300 16" Knape & Vogt Tru-Trac single extension box drawer slide. Slides shall be medium duty, rail disconnect, 3/4" extension. Drawer to operate smoothly on precision steel ball bearings. Ball retainers to be made of Polyamide resin for whisper quiet movement, bright, electro zinc plated and lacquered finish. The load rating is 75 lbs. per pair.

5. Where technician benches (ref: 436 drawer unit) are specified, the drawer slide shall be Accuride 2632 full extension with low profile. There shall be full steel ball bearings to provide for silenced movement (in and out). There shall be hold-in detent, a positive outstop, and rail disconnect. The load rating is 75 lbs. per pair.

6. Knee Space Sectional Units: These units shall be plain, contain drawers, or incorporate dust collecting systems as specified or drawn. Drawer shall be constructed as specified. Rails shall be provided above and below the drawers and stiles shall be provided between the drawers. The panels of these units shall be of a minimum of 18 gauge and shall have angle shaped flanges on the top and bottom at the front, back and sides.

H. Metal Backshelf:

1. A metal backshelf shall be provided for each student workstation. Where single sided workstations are specified the backshelf will be 6 3/4” deep. Where workstations are specified as back-to-back the backshelf shall be 13 1/2” deep. Both types of backshelves are 6 ½” high and constructed of 18 gauge die formed steel with 1” returns on all sides top and bottom. At each workstation duplex boxes will be welded to the back shelf. Casework manufacturer will furnish duplex receptacles with cover plates, and holes for gas valves. Electrical and plumbing contractors are to furnish all materials and labor for completion and hookup to building. Access to upper utility metal backshelf is available by removing exposed countersunk fasteners from shelf cap. Metal backshelves for wet labs and support labs are to be the same construction sized to approved drawings. Holes for faucets, model trimmer valves, gas, air, electric and other required utilities shall be properly located in accordance with approved drawings.

I. Panel Legs:

1. Will be 16 gauge inner and outer pan with 15/16" return on all four sides. Inner and outer pan to be welded together to form a finished 1" thick leg. Bottom return to be reinforced and have 3/8" weld nuts attached for levelers. Leveling device to be 3/8" x 1 3/4". Where apron/table assemblies are attached to panel 1/4" - 20, weld nuts will be attached to the inside of the panel leg. Where panel legs are on an exposed end the front edge will have a ¾” radius.

2. Where specified tube legs shall be 1-1/2” x 1-1/2” x 18 gauge seamless welded with a threaded grater clip to accept leveling device.

J. Side Closure Panels:

1. Where required 22 gauge panels with 1” return flanges on (4) sides shall be provided. Panel dimension to be determined from actual field dimensions. Panels shall mount to cabinet with Tek screws.

K. Wall Cabinets:

1. Shall match construction to the base units as specified, and shall be constructed of not less than 20 gauge steel throughout. All component parts shall be die formed ensuring uniformity, and inter-changeability, and shall be notched, and overlapped forming interlocking joint construction. Vertical and horizontal members shall be spot welded at all the stress points. Tops and bottoms shall have extruded aluminum one piece double "U" tracks for sliding doors.

2. Sliding doors shall be formed of 20 gauge double pan steel or smoked acrylic, and equipped with finger pulls. Doors to operate on aluminum tracks, top and bottom. Nylon rollers at bottom and nylon guides at top.

3. Wall cabinets shall be provided with, unless otherwise specified, 20 gauge shelves, adjustable on 1/2" centers and supported on adjustable clips engaging in slotted members. Shelves shall have channel shaped flanges at the sides, front and back. See paragraph F above for door construction specifications.

L. Sloping Tops:

1. Provide sloping tops for casework where shown on construction documents.

2. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.

3. Omit sloping tops or filler plates whenever a gypsum wall board bulkhead assembly is furred down to top 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.

M. Shelves:

1. Capable of supporting an evenly distributed minimum load of 122 kg per square meter(25 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 1067 mm (42 inches) in length and over 305 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 on construction documents as adjustable.

5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.

6. At pharmacy with sloping shelf, provide 13 mm (1/2 inch) wide clear acrylic plastic raised edge, 3 mm (1/8 inch) thick, secured to front edge of shelf.

N. Closures and Filler Strips at Pipe Spaces:

1. Flat steel strips or plates.

2. Openings less than 203 mm (8 inches) wide: 1.2 mm (0.047 inch) thick.

3. Openings more than 203 mm (8 inches wide 0.9 mm (0.359 inches) wide.

O. Frames:

1. Undercounter Table and Bench Frames:

a. Provide welded construction.

b. Provide open frame type with aprons and legs when required.

c. Aprons:

1) Channels shaped welded at corners, with leg sockets and reinforcing triangular corner gussets welded in corners.

2) Pierce sockets to receive leg bolts and notch gussets to receive legs.

3) 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.

4) 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.

5) Fabricate metal components from sheet steel.

a) Use 1.5 mm (0.0598 inch) thick sheet for gussets and channel aprons.

b) Use 1.2 mm (0.0478 inch) thick sheet for other items.

6) At knee space, provide exposed metal sides and metal closure plate for soffit. Where shown on construction documents at knee space, provide exposed metal back secured with continuous angle closures at both side.

d. Legs:

1) Cold rolled tubing or 1.5 mm (0.0598 inch) formed steel.

2) Leveling-anchoring device at floor.

3) Stud bolt at top for attachment to leg socket.

e. Leg Braces:

1) Tables and benches not anchored to walls.

2) Brace back against front legs near bottom with steel angle, channel or tubular braces.

3) Fasten braces together with steel straps.

f. Leg Shoes:

1) Fit laboratory casework legs at bottom with either stainless steel, aluminum, or chromium plated brass shoes, not less than 25 mm (1 inch) in height.

2) Fit other legs with a movable molded vinyl shoe 100 mm (4 inches) high and coved at bottom.

2. Suspension Frame:

a. Provide suspension system 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 construction documents.

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. Provide mounting channels and support frames to allow for pipe chases and service channels when required.

d. Cabinets to have a 1.49 mm (0.059 inch) steel shaped form welded across entire width of back to engage continuous slot in wall mounting channel. Provide two (2) fastening devices through case stile at the front to provide final positive latching and locking of case in position.

e. Paint construction materials that are exposed.

3. Wheeled Carrier:

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

2.4 ACCESSORIES:

A. Retractable Air Gun System:

1. Nevins Model# 200IAG or equal.

B. Renfert Basic Quattro IS:

1. Nevins Model# 2959 or equal.

C. Bench Top Electronic Denture Curing & Washout System:

1. Nevins Model# 5400 or equal.

2. Shall operate on 220V single phase, 2,600 Watts. The system shall be constructed from stainless steel with exterior in a polished finish. The hinged cover shall have a Bakelite handle.

3. Programmable Touch Pad. The body of the unit is heat insulated shall be easily accessible from front of the unit curing cycle. Time may be programmed, in 0.1 minute Increments from 0 to 99 hours 59 minutes. Temperature may be programmed from room temperature to 100° Celsius in 0.10°C increments. The system allows for two separate curing temperatures plateaus. The washout time may be programmed form 0 to 99 hours 59 minutes. The washout temperature may be programmed from 55° to 95°C at 1° increments. Shower starts when temperature reaches 55°C.

4. Memory shall retain program in the event of a power failure.

5. Capacity shall accommodate twelve flasks for curing cycle and 6 flask halves for washout cycle.

6. Drain Valve shall be ball type with ½” NPT and located on back of unit.

D. Electronic Denture Curing System:

1. Shall operate on 220V single phase, 1,750 Watts. The system shall be constructed from stainless steel with exterior in a polished finish. The hinged cover shall have a Bakelite handle. The body of the unit is heat insulated. Unit measures 17” High x 10” Wide x 18 ½” Deep.

3. Programmable Touch Pad shall be easily accessible from front of the unit. Time may be programmed in 0.1minute increments from 0 to 99 hours 59 minutes. Temperature may be programmed from room temperature to 100° Celsius in 0.10°C increments. The system allows for two separate curing temperature plateaus.

4. Memory shall retain program in the event of a power failure.

5. Capacity shall accommodate nine flasks.

6. Drain Valve shall be ball type with ½” NPT and located on left side of unit.

E. Hand-Held Eyewash with thermostatic Mixing Valve:

 1. Nevins Model# EWHH18TM or equal.

F. Flammable Storage Cabinet:

1. Nevins Model# FLAMCAB 353522 or equal. 35”H X 35”W X 22”D.

G. Vaniman Sanvac:

1. Nevins Model# Vaniman Sandva or equal.

H Pneumatic Press:

1. Nevins Model# 83200 or equal.

I. Casting & Soldering Unit:

 1. Nevins Model# E135NT or equal.

2. Casting Machine Guard: Where centrifugal casting machines are used a wood platform will be securely fastened to cabinet. The wood platform will be covered on top and front with 20ga. stainless steel. A 21” diameter 20 gauge guard with 5/16” bottom return, and 3 1/2” access hole, shall be securely fastened to wood platform.

J. Stool:

 1. Simplicity Stool (Black Naugahyde). Nevins M# 3554-202N or equal.

2. Chairs are to meet or exceed ANSI/BIFMA/GSA standards.

3. Chair bases to be reinforced five-point base with double wheel casters.

4. Chair shall have height and back support adjustments.

K. Baldor Lathe With Chuck:

 1. Nevins Model# 380WCT or equal.

L. BenchTop Polishing Unit:

 1. Nevins Model# 80502 or equal.

M. Dispensing Trays and Bins

1. Design trays and bins to fit cabinets where shown on construction documents.

2. Where specified 20 gauge bin inserts shall be fabricated to fit inside cabinet drawer. The insert shall have a 2” top return front and back and ¾” side returns. The bin insert will have 1 or 2 partitions as specified, to separate the different types of dental stone. The partition will be fabricated to tight tolerance and spot welded in position to prevent leakage and contamination of the stone. The insert shall be removable for cleaning.

3. Lock securely in place without the use of tools.

4. Fit at angle to provide gravity feed where shown on construction documents.

5. Dispensing Trays:

a. Equip trays with two (2) longitudinal dividers adjustable to three (3) positions.

b. Approximate dimensions: 152 mm (6 inches) in width 76 mm (3 inches) in depth, and length to suit cabinets depth furnished.

6. Dispensing Bins:

a. Open front, except for retaining rim.

b. Approximate dimensions: 152 mm (6 inches) in width, 127 mm (5 inches) in depth, and length to suit cabinets furnished.

N. Furnace Shelf:

1. Where burnout ovens are indicated a 18 gauge furnace shelf with a 5/8” return flange on front and a 15/16” return flange on back, shall be securely fastened to backing in wall (provided by general contractor) using 18 gauge angled brackets with 1” return flanges. Top of shelf to be finished with 20 gauge stainless steel with a 5/8” front return.

O. Vertical Utility Enclosure:

1. Utility enclosures shall be fabricated in two pieces. Sizes to be determined from field measurements and conditions. The housing shall be constructed of 18 gauge steel. Each section will have a removable 18 gauge formed door. Door is held in position with slotted quarter turn latch with offset cam on the inside rear wall of both pieces, ¾” offset hat sections will be spot welded, for use by utility contractors to stake their pipes. Ceiling contractor to fit grid and tile around enclosure.

P. Sliding Waste Receptacle:

1. Sliding waste receptacles shall be sized to fit inside drawer. Height of receptacle varies to fit cabinet. Top edge of 20 gauge receptacle has flat hem on four sides.

Q. Dust Collection Systems:

1. Individual Dust Collection System shall be tested in accordance with UL Standard UL3101-1 first edition October 6, 1993 and carry the seal of recognized testing Laboratory.

2. Single Station Dust Collecting System Is to be built into the knee space sectional unit utilizing a front mount collection device. The collection device shall be onepiece construction aluminum die cast, to avoid air leaks, and whistling. The inlet orifice will be screened to prevent dropped dental crowns from being pulled into the system. The screen opening shall be sized for maximum airflow, minimal surface noise. Screen shall be made from .030 Aluminum hex pattern. The collection device shall have a safety shield fabricated from 3/16” clear acrylic. Corners are to have a radius and all edges shall be bull nosed. Two 3/16” diameter holes shall be located at the top of the shield for an optional 2x magnifier. Bottom edges are to be tapered to allow for operator’s hands to be closer to work piece.

3. Dust Collector Motor: Shall operate at 120V, 60Hz, 600W motor and controlled by a circuit board that provides additional features. Motor is protected with a 4.0 micron cartridge filter that sets on top of the motor. The exhaust side of the motor shall have a 1.2 lb. density polyether filter for carbon dust.

a. Settings: The dust collector motor is actuated by a lighted power switch. The dust collector is to have two operating modes. One setting is for manual, which will allow the dust collector to operate continuously until power switch is shut off. The second mode is automatic and incorporates a dedicated receptacle for an electric laboratory handpiece. When the laboratory handpiece is activated, the dust collector motor is automatically activated. When the laboratory handpiece is stopped the dust collector will automatically shut off four seconds later. The four-second delay removes ambient dust and allows restart of the handpiece without strain on the motor.

4. Bag Full LED The dust collector will incorporate an automatic shutoff when the dust collector bag is full. A red LED will indicate when the bag is full and needs to be changed. The green LED indicates that the bag is operational.

5. Service Motor LED The dust collector will have an automatic shutoff with a red LED indicator to determine when the motor brushes need replacement.

6. Speed Selector The dust collector will incorporate a rheostat adjustment from 55 CFM to 98 CFM.

7. Disposable Filter Bag: Shall be accessed from below the knee space sectional unit. The access door to the filter bag shall have spring loaded hinges and ¼ turn thumb screws to secure the door in the closed position. Rubber gasketing shall be provided between the access door and the knee space sectional unit. The filter bag shall be 12” wide x 14” deep with tapered front corners. The inlet port will be reinforced with a fiber board collar. The collar will incorporate a rubber gasket assuring a tight fit around the inlet pipe. The filter bag shall have two layers of material. The inner material will be a white polyester media, and the outer material shall be a yellow fiberglass media. Both materials are to be sewn together into a single bag. The finished bag shall have a 95 % efficiency rating for a 7.7-micron particle. Testing standard shall be ASHRAE 52.1—1992 for non-supported extended surface type air filters.

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 shown or called for, shall be heavy duty 5 disc tumble with interchangeable cylinder. Exposed lock shall be polished nickel. Identifying number shall be stamped on lock face and key. Locks shall have capacity for over 200 key changes with master keying. Key can be captive or non-captive as specified.

2. Locked pair of hinged door over 915 mm (36 inches) high:

a. ANSI/BHMA A156.5, similar to E0261, Key one (1) side.

b. On active leaf use three (3) point locking device, consisting of two (2) steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.

c. On inactive leaf provide 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. Provide one (1) type for each condition as follows:

a. Drawer and Hinged Door up to 915 mm (36 inches) high: E07261.

b. Drawer and Hinged Door: Pin-tumbler, cylinder type lock with not less than four (4) pins or a UL 437 rated wafer lock with brass working parts and case.

c. Sliding Door: E07161.

4. Key locks differently for each type casework and master key for each service.

a. Key drug locker inner door different from outer door.

b. Furnish two (2) keys per lock.

c. Furnish six (6) master keys per service or Nursing Unit.

5. 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 (1) for drawers up to 584 mm (23 inches) wide.

b. Two (2) for drawers over 584 mm (23 inches) wide.

c. Sliding door flush pull, each door: B02201.

d. Provide drawer and door pulls of a design that can be operated with a force of 22.2 N (5 pounds) or less, with one (1) hand and not require tight grasping, pinching or twisting of the wrist.

2. Door in seismic zones: B03352.

a. Do not provide thumb latch on doors equipped with three (3) point locking device.

b. Provide lever operated two (2) point latching device on paired doors over 915 mm (36 inches) high if three (3) 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 1220 mm (48 inches).

b. Omit on doors with locks.

4. Drawer Slides:

a. Provide B05051 for drawers over 152 mm (6 inches) deep.

b. Provide B05052 for drawers 76 to 152 mm (3 to 6 inches) deep.

c. Provide B05053 for drawers less than 76 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 (5) knuckle design with 63 mm (2 1/2 inch) high leaves and hospital type tips.

d. Two (2) hinges per door except use three (3) hinges on doors 1220 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 on construction documents.

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 (2) 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: LO3011 or LO3031.

a. Install two (2) 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 AMP 500 series and as specified.

B. Steel Cabinets including Closures and Filler Strips:

1. All upper and lower case cabinets, tables, fillers, and related steel components shall have a baked-on acid, alkali and solvent resistant finish except hardware and stainless steel.

2. Pretreatment: After fabrication of cabinet and prior to the applications of the finishing process, each cabinet shall be fully submerge each unit after assembly and welding in a degreasing bath to fully cleaned all surfaces of grease, dirt, oil, flux, and other foreign matter by physical and chemical means. Hand wiping will not be acceptable. Treat entire unit with metallic phosphate process, leaving surfaces with uniform, fine grained, crystalline phosphate coating, providing excellent bond for subsequent finish.

3. Finish Shall consist of a system of multiple passes of electrostatically applied POWDER coatings. Solvent paint or liquid coatings of any type will not be acceptable. The final finish shall be highly resistant to abrasion, acids, alkalis, and solvents, and shall be flexible, hard and smooth. The dry film thickness on any and all parts shall be a maximum of 2.30 mils, and without "orange peel", sags, runs, or overspray.

3. Testing Procedure Chemical spot tests shall be made by applying 10 drops (approximately 0.5 cm3) of each reagent listed below to surface being tested. Each reagent spot shall be open to atmosphere (without covering of any sort) and performed at ambient temperature 68F -72F. After one (1) hour, chemicals shall be flushed away with cold water and the surface washed with a mild detergent and 150F warm water. The result shall be that there is no effect, no film breakage, and no failure other than a light discoloration or loss of luster.

4. Finish resistant to action of the following reagents when 0.5 cm3 (10 drops) are applied to the surface and left open to the atmosphere for period of one (1) hour.

|  |  |
| --- | --- |
| Hydrochloric Acid 37 percent | Ethyl Alcohol |
| Phosphoric Acid 75 percent | Methylethyl Keytone |
| Sulfuric Acid 25 percent | Acetone |
| Sulfuric Acid 85 percentNitric Acid 25 percent Nitric Acid 60 percentGlacial Acetic Acid 98 percent | AcetoneEthyl Acetate |
| Sodium Hydroxide 10 percent | Ethyl Ether |
| Sodium Hydroxide (concentrated) | Carbon Tetrachloride |
| Ammonium Hydroxide 28 percentHydrogen Peroxide 5 percent | Xylene |
| Phenol 85 PercentFormaldehyde 37 percent |  |

5. Color of finish: Steel casework shall be manufacturer's standard colors. Colors are subject to pigment, gloss, baking time and temperature approval by manufacturer.

C. Brass:

1. U.S. Standard Finish No. 26 for hardware items.

2. Other brass items: ASTM B456, chromium plated finish meeting requirements for Service Condition SCI.

D. Aluminum: Chemically etched medium matte, clear anodic coating, Class II, Architectural, 0.4 mils (0.0004 inches) thick.

E. Stainless Steel: Mechanical finish No. 4 on sheet except No. 7 on tubing.

2.7 Task Lighting

A. Lighting shall be adjustable task lights or fixed task lights.

B. Adjustable task light: shall be double arm with adjustments, and set into a base that allows light to swivel. Housing and diffuser are to be aluminum. Plastic housings and diffusers are not acceptable due to fire exposure from bunsen burner. Light source is one 36w color corrected (5500k°) full color spectrum tube.

C. Fixed task light: shall be an aluminum housing with plastic parabolic diffuser. Light shall be mounted to 1 ¼” diameter electro welded tubing with 16 gauge wall thickness. Each tube to have (2) 11 gauge mounting plates for adding work pan shelves. Light source is from two 55w color corrected (5500°k) full color spectrum tubes.

**2.8 PLUMBING**

A. Undermount Sinks: Shall be seamless die-drawn stainless steel type 304,18-8. Interior and top surfaces shall be polished to a non-porous fully blended #4 finish with highlighted bowl rim, fully coated underside insulates for sound, and absorbs condensation. Conforms to ASME/ANSI A112.19.3M.

B. Sinks Welded To stainless steel top are three piece fabricate stainless steel type 304 with #4 finish, fully welded and polished with coved corners in accordance with NSF Standard #7. Underside fully coated with sound deading material. Embossed drain hole.

C. Strainers shall be flat or beehive. Flat type strainers shall be stainless steel and fit 2” to 2 ½” opening. Beehive strainer shall be 3 ¾” high, polished white brass.

1. Beehive to fit inside flat strainer and have no less than (24) ¼” diameter holes and a slotted top ¼” x 1 3/16”.

D. Traps: Mini-Trap shall be molded of NSF rated PVC. Seals are commercial grade Buna N O-Ring. Locking bolt is type 304 stainless steel. Trap is 7-5/16” x 6-5/16”. Standard 1 ½” NPT connection.

E. High Volume Plaster Trap Measures 19” Wide x 17” Deep x 15” High. The lower portion is fabricated of translucent heavy gauge polyethylene. The removable top is constructed of PVC. All connections are standard 1 ½” NPT. Trap capacity is 5 gallons. A selcon valve with garden hose thread is provided to drain water down to a level conducive for removing and cleaning.

F. Intermediate Volume Plaster Trap Is one piece spun copper with cast brass cover, held to trap with stainless steel clamping ring. Trap body is 8 ½” diameter and 11 ½” deep. Top has 1 ½” NPT connection, and capacity shall be two gallons.

G. Valves and Faucets: All plumbing fittings provided for this facility shall be of one manufacturer to provide ease of future maintenance and availability of repair parts. All faucets and fittings manufactured and furnished in accordance with the recommended practices listed by SEFA (Scientific Equipment & Furniture Association), Section 7 for laboratory & hospital fixtures.

1. Valve bodies are of cast brass alloy, which conforms to A.S.T.M. standard C85700 or C84400. Flanges, turrets and handles are of forged brass alloy, which conforms to A.S.T.M. standard B-124-74-280. Assembly components are of rod brass alloy or stainless steel alloy. Seals and seat discs are of materials, which are suitable for potable water. Chrome plating must conform to A.S.T.M. standard B456-5.

2. All water faucets shall have an operating cartridge that contains all working parts that are subject to wear, and shall close with the pressure of the water to ease shut off and to provide a tight seal, all moving parts which are in the waterway shall be of stainless steel or monel with the exception of seal, which shall be of ethylene propylene diene monomer. The handle broach shall be a four point tapered broach to allow ease of handle removal. All repair parts shall interchange regardless of fitting type. Faucet shall be capable of converting to manual, or self-closing, without requiring removal of the body or any special tools.

3. All gooseneck spouts must be attached to faucet body by means of a union connection to allow changing of spouts after installation. Spouts which are threaded directly into faucet body will not be permitted. All gooseneck spouts must be easily converted from rigid to swing or swing to rigid after installation, with no special adapters required. Sealing shall be achieved by double O-ring or E.P.D.M. seal. Vacuum breaker spouts shall be of atmospheric type, which conforms to A.S.S.E. standard 1001. All ground key gas cocks shall have stem and body ground and lapped and shall have stem held in place by spring and locknut that has been stacked to prevent removal.

H. All floating needlepoint valves shall have working parts contained within a removable cartridge. Needlepoint shall be stainless steel precision finished and shall be held in place on stem assembly with a U-clip, which is of stainless steel. Needlepoint shall seat against a brass seat contained with a replaceable sleeve.

I. Micro control type valves shall have same features as needlepoint and shall have a tapered needle point and shall have a length no less than .750 inches and shall seat into an orifice no less than 1/8” diameter. Valve shall have a minimum of 5 ½ full turns of the handle from off position to full on position.

**2.9 ELECTRICAL:**

A. Electrical Box Shall be galvanized construction. CDOW Gem Box and 4” x 4” x 2 1/8” boxes with ½” knockouts will be used where specified. All boxes are welded into position by casework manufacturer, attachment with mechanical devices are not acceptable.

B. Electric Receptacles: Are commercial specification grade for 125V/15Amp, 125V/20Amp, 250V/20Amp. Cover plates are chrome plated.

2.10 PRODUCTS OF OTHER COMPONENTS DIRECTLY RELATED TO CASEWORK:

A. Refer to Section 07 92 00, JOINT SEALANTS for work related to sealants used in conjunction with joints of countertops, casework systems, and adjacent materials.

B. Refer to Section 12 36 11, COUNTERTOPS for work related to metal, molded resin, and methyl methacrylic polymer countertops and/or shelving used in conjunction with casework systems. When countertop materials are provided by the casework manufacturer, they are to include the following features:

1. Capable of being suspended from vertical support rails or horizontal wall strips or service modules.

2. Provided with rounded corners and impact resistant material on exposed edges.

3. Capable of being easily relocated and installed without tools.

4. Capable of being suspended and easily changed under counter mounted storage units.

5. Provide leveling adjustment capability so units can be brought into a level position.

6. Secured using fasteners. Show detail on shop drawings.

E. Refer to Section 12 36 11, COUNTERTOPS for work related to and integral with countertop systems such as pegboards, funnel and graduate racks.

F. Refer to Division 22, PLUMBING for the following work related to casework systems:

1. Sinks, faucets and other plumbing service fixtures, venting, and piping systems.

2. Compressed air, gas, vacuum and piping systems.

G. Refer to Division 26, ELECTRICAL for the following work related to casework systems:

1. Connections and wiring devices.

2. Connections and lighting fixtures except when factory installed by the manufacturer.

PART 3 - EXECUTION

3.1 COORDINATION:

A. Begin only after work of other trades is complete, including wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected, and area free of trash and debris.

B. Verify location and size of mechanical and electrical services as required and perform cutting of components of work installed by other trades.

C. Verify reinforcement of walls and partitions for support and anchorage of casework.

D. Coordinate with other Divisions and Sections of the specification for work related to installation of casework systems to avoid interference and completion of service connections.

3.2 INSTALLATION:

A. Install casework in accordance with manufacturer’s written instructions.

1. Install in available space; arranged for safe and convenient operation and maintenance.

2. Align cabinets for flush joints except where shown otherwise on construction documents.

3. Install with bottom of wall cabinets in alignment and tops of base cabinets aligned level, plumb, true, and straight with no distortion to a tolerance of 3.2 mm in 2438 mm (1/8 inch in 96 inches) and securely anchor to building structure. Shim as required.

4. Bolt continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16” tolerance.

5. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.

B. Work Surfaces

1. Where required due to field conditions, scribe to abutting surfaces.

2. 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.

3. Secure work surfaces to casework and equipment components with materials and procedures recommended by the manufacturer. Adjust and Clean.

C. 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.

3. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.

D. Support Rails:

1. Install true to horizontal at heights shown on construction documents; maximum tolerance for uneven floors is plus or minus 13 mm (1/2 inch).

2. Shim as necessary to accommodate variations in wall surface not exceeding 5 mm (3/16 inch) at fastener.

E. Wall Strips:

1. Install true to vertical and spaced as shown on construction documents.

2. Align slots to assure that hanging units will be level.

F. 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.

G. Seal junctures of casework systems with mildew-resistant silicone sealants as specified in Section 07 92 00, JOINT SEALANTS.

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.

C. Secure filler plates to casework top members, unless shown otherwise on construction documents.

D. Secure filler plates more than 152 mm (6 inches) in width top edge to a continuous 25 x 25 mm (1 x 1 inch) 0.889 mm (1/16 inch) thick steel formed steel angle with screws.

E. Anchor angle to ceiling with toggle bolts.

F. Install closure strips at exposed ends of pipe space and offset opening into concealed space.

G. Finish closure strips and fillers with same finishes as cabinets.

3.4 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 305 mm (12 inches) on center with minimum of three (3) fasteners in 915 or 1219 mm (3 or 4 foot) unit width.

H. Anchor floor mounted cabinets with a minimum of four (4) 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 on construction documents, show on shop drawings proposed fastenings and method of installation.

3.5 ADJUSTMENTS:

A. Adjust equipment to insure proper alignment and operation.

B. Replace or repair damaged or improperly operating materials, components or equipment.

3.6 CLEANING:

A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.

B. Remove from job site trash, debris and packing materials resulting from work of this section.

C. Leave installed areas clean of dust and debris resulting from work of this section.

3.7 INSTRUCTIONS:

A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.

B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.

C. Commencing at least seven (7) days prior to opening of facility, provide one (1) 4-hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

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