

SECTION 12 31 33 MANUFACTURED METAL SHELVING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured metal shelving, including frame.
- B. Items specified in this section.
 - 1. Pharmacy storage shelving including metal and shelves, posts, and base plates.

1.2 RELATED WORK

- A. Color of shelving finish: Section 09 06 00, SCHEDULE FOR FINISHES.

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. Manufacturing Qualifications: Engage an experienced manufacturer whose internal processes meet or exceed ISO 9001 requirements.
- C. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.
- D. 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 shelving 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 shelving assembly.
- F. Warranty: Submit a copy of manufacturer's warranty.
- G. Maintenance Data: Provide manufacturer's instructions for care and cleaning of the finish. Provide manufacturer's instructions for shelf relocation and/or spacing adjustments.

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

C1036-06Flat Glass

C. American National Standard Institute:

Z97.1-09.....Safety Glazing Material used In Buildings

D. Builders Hardware Manufacturers Association (BHMA):

A156.1-06Butts and Hinges

A156.9-10Cabinet Hardware

A156.5-10Auxiliary Locks and Associated Products

A156.11-10 ..Cabinet Locks

A156.16-02 ..Auxiliary Hardware

E. American Welding Society (AWS):

D1.1-10Structural Welding Code Steel

D1.3-08Structural 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

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

1.6 DELIVERY, STORAGE AND HANDLING

- A. Follow manufacturer's instructions and recommendations for delivery, storage and handling requirements.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify quantities of four-post shelving units before fabrication. Indicate verified measurements on shop drawings. Coordinate fabrication and delivery to ensure no delay in progress of the work.
- B. Established Dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating four-post shelving units without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence four post shelving units with adjoining work to minimize possibility of damage and soiling during remainder of construction period.
- B. Schedule installation of specified four-post shelving after finishing operations; including painting have been completed.
- C. Delivery, Storage, and Handling: Comply with all instructions and recommendations made by manufacturer's representative for delivery, storage and handling requirements.
- D. Pre-installation Conference: Schedule and conduct conference on project site to review methods, procedures, and logistic details for installing four-post shelving units.
 1. Recommend attendees:
 - a. COR
 - b. Prime Contractor or representative
 - c. Architect, Engineer, or person responsible for the layout design
 - d. Manufacturer's representative

- e. Subcontractors or installers whose work may affect, or be affected by the installation of this shelving.

1.9 Warranty

- A. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units, which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of, other rights the owner may have under general conditions provisions of the contract documents.
- B. Limited Lifetime warranty: Subject to the terms in the written warranty, warrant the original purchaser exclusively that the shelving manufactured by it will be free from defects in materials and workmanship for the lifetime of the four-post shelving.

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. Fabricate units from ASTM Class 1, cold-rolled commercial grade sheet or coil steel with all bends and radiuses consistent and true. There shall be no sharp edges and shelving shall exhibit no irregular seams, oil-canning, dents or distortion in any manner.
- E. 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 shelving.
 - 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 SHELVING 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)	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.
1.20 mm (0.047 inch) (18 gage)	Base pedestals, top sides, back, and bottom panels, closure scribe and filler strips 75 mm (three inches) or more. 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, spreaders and stretchers when formed without welding. Toe base gussets, 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.
- C. Design:
 1. Four-post type consisting of uprights, 6 tier shelves, shelf supports, and Quik-Bases™, designed to be assembled without fasteners or clips. Shelves (except for divider locating slots where applicable) and upright posts shall have no holes on any exposed surface faces. Cross-bracing of any sort shall be unacceptable. Shelf

fronts and backs shall be flush with outside faces of upright posts. Back Panels when required shall be flush with the post face and require no additional tools or hardware to install. Design shall permit individual shelf adjustment or removal anywhere along the entire height of the shelving unit. Shelving shall require no tools to erect or make adjustments to, including relocation or removal of individual shelves.

D. Uprights:

1. Formed from steel sheet to tubular "T" (tee) shape posts for intermediate supports and tubular "L" (angle) shape posts for end supports. Posts shall have keyhole slots on inner wall only and shall have either a full size sheet steel panel or tie strips linking the posts and forming an upright.
2. Upright quantities, sizes, and types are to be determined by plan view and elevations.

E. Closed Uprights:

1. Single unit (starter) and/or row end uprights on a range of shelving shall consist of two 1 inch (25 mm) wide 18 gauge cold rolled steel posts roll-formed into a tubular "L" formation. Keyhole slots shall be punched on the inner wall only located on 1-1/2 inch (38 mm) centers. There shall be no holes in the outside face surface of the posts. The front and back posts shall be joined by welding a full height 24 gauge closure sheet to provide the required upright depth and structural rigidity. Closed "L" (angle) uprights to be manufactured to heights specified.
2. Intermediate (adder) uprights located between and linking shelf sections within a range of shelving shall consist of two 2 inch (51 mm) wide 18 gauge cold rolled steel posts roll-formed into a tubular "T" formation. "T" uprights shall be used as a common upright between units. Keyhole slots shall be punched on the inner wall only located on 1-1/2 inch (38 mm) centers. There shall be no holes in the outside face surface of the posts. The front and back posts shall be joined by welding a full height 24 gauge closure sheet to provide the required upright depth and structural rigidity. Closed "T" (tee) uprights to be manufactured to heights specified.

F. Shelves:

1. Shelf shall be formed from 22 gauge (18 gauge optional) cold rolled sheet steel with 5/8 inch (16 mm) flanges on all sides and a return hem on the front and back flanges. Shelves shall be independently adjustable on 1-1/2 inch (38 mm) centers. If slotted, single entry

shelves shall have two rows, and double entry 4 rows of slots to accept file divider tabs. If plain, no holes shall be permitted on shelf surface for shelf depths less than 18 inches (457 mm).

G. Canopy Tops:

1. Same construction as shelf. Must be plain, exhibiting no holes on surface for depths less than 18 inches (457 mm).

H. Shelf supports:

1. Formed from heavy gauge sheet steel. 24 inch (610 mm), 30 inch (762 mm) and 36 inch (914 mm) widths shall be formed of 14 gauge and 42 inch (1067 mm) and 48 inch (1219 mm) shall be formed of 11 gauge hot rolled pickled steel to the specified width x 3/4 inch (19 mm) or optional 1-1/4 inch (32 mm) high with two additional return flanges to form a structural channel. A 13/16 inch (21 mm) flange at each end shall be left unformed to accept two shoulder rivets. Rivets shall be 7/16 inch (11 mm) diameter at the head, solid steel, and spaced to interlock into keyhole slots on the inner wall of upright post.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Before installing shelving, verify wall and floor surfaces covered by shelving 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 shelving base.
- D. Verify that there is a minimum of 18 inches clear between canopy tops and sprinklers.
- E. Minimum space between shelving rows shall be 36".

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 shelving in alignment with hex bolts or other internal fastener devices removable from interior of shelving 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 indicated in drawings; 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.
- F. Cabinets 6D: Ground to nearest cold water pipe in accordance with NFPA, Underwriters Laboratories, Inc., or other nationally recognized laboratory approved ground specified system.

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.

END OF SECTION 12 31 00