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SECTION 09100 - METAL FRAMING

**PART 1 GENERAL**

1.01 SUMMARY

- A. Section covers framing for non load bearing partitions, built-up walls, soffits and ceilings, and including but not limited to the following:
1. Furring for masonry walls and ceilings receiving cement plaster and gypsum wallboard.
  2. Metal stud construction for partitions.
  3. Installation of hollow metal door frames.
  4. Additional strengthening of steel studs at bracket and cabinet locations, and additional furring, nailing and bolting necessary to allow for the installation of concealed work.
  5. Backing grounds and reinforcement for cabinet and counter work; backing for shelf cleats in closets, shelves, toilet accessories, lighting fixtures, equipment and other items to be attached to metal framing work.
  6. Furring required to house air-conditioning ductwork, plumbing and electrical conduits.
- B. Related Sections:
1. Section 06100 – Rough Carpentry.
  2. Section 07210 – Building Insulation.
  3. Section 08110 – Metal Doors and Frames.
  4. Section 08305 – Access Panels.
  5. Section 09210 – Lathing, Plaster and Stucco.
  6. Section 09250 – Gypsum Board Systems.

1.02 SUBMITTALS

- A. Product data, manufacturer's installation instructions, and samples requested by the Resident.
- B. Certificates:
1. Certify that materials meet or exceed the requirements of this Section.
  2. Certification that each fire endurance rating for each assembly will provide the scheduled hourly rating in accordance with local building code.
  3. Certification that each partition is designed and installed to meet or exceed the specified performance design criteria.

1.03 REFERENCE STANDARDS

- A. Except as otherwise specified herein or shown on the Drawings, comply with the latest editions of all applicable codes and regulations including the applicable requirements of the

following Reference Standards and Codes which are hereby made a part of this Section, as they relate to the metal framing.

1. Gypsum Construction Handbook, latest edition, published by US Gypsum Company.
2. American Society for Testing and Materials,(ASTM) latest editions:
  - a. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.
  - b. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring.
  - c. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.
3. ANSI A97.2 - Installation of Steel Framing Members to Receive Screw Attached Gypsum Wallboard and Backing Board.
4. BOCA Building Code, latest Edition.
5. The Occupational Health and Safety Administration (OSHA) Code of Federal Regulations(CFR), Volume 29.

#### 1.04 QUALITY ASSURANCE

- A. Fire Resistance Ratings: Provide fire-resistance rated assemblies for the scheduled construction type, identical to those listed in GA-600, Fire Resistance Design Manual or to design designations in UL Fire Resistance Directory or in listing of other testing and agencies acceptable under the local building code.

#### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in good condition and store in a place protected from damage and exposure to the elements.

### **PART 2 PRODUCTS**

#### 2.01. ACCEPTABLE MANUFACTURERS

- A. Dale Industries, Inc.
- B. Dietrich Industries.
- C. National Gypsum Co.
- D. United States Gypsum Company (USG).
- E. Products of other manufacturers, which meet the requirements of the Drawings of this Section and the specifications, may be provided if approved by the Resident.

2.02 MATERIALS

- A. Studs and Runners: 20 gage (minimum) Type SJ steel studs, width indicated on the drawings, hot-dip galvanized, and matching top and bottom runner ASTM A446, Grades A thru F, and galvanized in accord with ASTM A525, G-90. Provide studs, bridging, and top and bottom stud runner tracks made with same type steel. Provide stud runner and tracks made with same metal thickness gauge as studs with which they are used. Except where more stringent requirements may be detailed on the Drawings, provide studs in accord with the following table:

Condition of Use	Metal Thickness
Total wall height of 14 ft. and less with wall finish both sides	20 gauge
Total wall height of 14 ft. and less with wall finish one side only	20 gauge
Total wall height of 14 ft.-20 ft.-11 in.	18 gauge
Total wall height of 21 ft. and higher	16 gauge

1. Provide punched "C"-shaped studs of sizes indicated on Drawings for all conditions. If stud sizes are not indicated on Drawings, provide 4 inch size. Provide unpunched channel-shape top and bottom stud runner tracks of width necessary to accommodate studs.
  2. Where track extends to structure above use Superior No. 53 Flex Track as manufactured by Porter Electrical Division, H.K. porter Co., Inc. Provide same gauge and finish as studs.
- B. Bracing angles: 3/4" x 1-1/4", 22 gage galvanized.
- C. Screw Fasteners: Type S, 3/8", 1", and 1-5/8" long.
- D. Channels: 16 gauge galvanized cold-rolled steel, 0.0598-inch minimum thickness and 7/16 inch min. wide flanges.
1. Carrying Channels: 1-1/2 inch deep, 475 lbs per 1000 ft.
  2. Furring Channels: 3/4 inch deep, 300 lbs per 1000 ft.
- E. Furring channels (hat section): ASTM C645, hat shaped, 7/8-inch depth, roll-formed from 25 gage electro-galvanized steel. Provide manufacturer's clips for attachment to runner channel.
- F. Furring Accessories:
1. USG DWC-25 hat channels or Gold Bond Screw Furring Channel

2. USG Z-Furring Channels: Manufacturer's standard zee-shaped furring members with slotted or non-slotted web, 1-1/2 inch depth, fabricated from 25 gage hot-dip galvanized steel sheet complying with ASTM A525, Coating Designation G60.
  3. Resilient Channels: USG RC-1, 25 gage, 1/2" x 2 1/2"
  4. Patented systems, such as W.R. Grace Construction Products Thermo-Stud Exterior Wall System, will also be acceptable.
- G. Hanger and tie wire: Soft annealed, low carbon steel wire zinc-coated.
1. Hanger wire: ASTM A641, Class 1 zinc coating, galvanized, soft temper, 8 gage annealed steel.
  2. Tie wire: Minimum 16 gauge galvanized or USG Clip anchorage.
- H. Hanger Rods and Flat Hangers: Mild Steel, zinc coated or protected with rust-inhibitive paint.
- I. Angle Type Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0635 inch thick galvanized steel sheet complying with ASTM A446, Coating Designation G90, with bolted connections and 5/16 inch diameter bolts.
- J. Fasteners: Self-drilling, self-tapping, sheet metal screws. Type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.
- K. Caulking: Acoustic sealant manufactured by Tremco Mfg. Co., Cleveland, Ohio or by USG.
- L. Access panels: Comply with provisions of Section 08305.
- M. Furring, Blocking and Grounds: Refer to Section 06100 - Rough Carpentry, for materials and preservative treatment.

### **PART 3 EXECUTION**

#### **3.01 INSPECTION**

- A. Verify that conditions are satisfactory to receive metal framing and without defects affecting quality of the work.
- B. Do not proceed with installation until unsatisfactory conditions are corrected.

#### **3.02 FRAMING SYSTEM INSTALLATION**

- A. General: Comply with applicable provisions of ASTM C841 and C926. Construct framing

in accordance with latest directions of United States Gypsum Co., National Gypsum Co., Dietrich Industries, or acceptable equivalent, and details on the drawings.

- B. Partition Layout: Position partitions according to layout on the Drawings. Snap chalk lines at ceiling and floor. Make certain that partitions will be plumb. Where partitions occur parallel to and between joists, install ladder blocking between joists.
- C. Runner Installation:
1. Anchor runners securely:
    - a. To concrete and masonry: Use stub nails, 9/64 inch diameter low velocity power driven fasteners equivalent to Ramset No. 1508, or USG TAPCON Concrete Fastening System, with 7/8 inch minimum penetration into concrete. Space anchors within 6 inches of ends of each track segment and at 32 inches o.c. maximum.
    - b. To metal inserts in concrete: Use 3/8" Type S 12 pan head screws.
    - c. To suspended ceilings: Use 5/16 inch diameter bolts with nuts and washers, expandable hollow wall anchors or toggle bolts. Space anchors within 6 inches of ends of each track segment and at 32 inches o.c. maximum, as required to connect to framing member spacing.
    - d. To wood framing: Use 1-1/4" Type S oval head screws, No. 10 full-thread screws or 12d nails. Space anchors within 6 inches of ends of each track segment and at 32 inches o.c. maximum.
  2. To all substrates, secure runners with fasteners located 2" from each end and spaced a maximum of 24" o.c.. Attach runner ends at 3-piece doorframes with two anchors; one-piece frames are normally supplied with welded-in-place prepunched flanges for two anchors into substrate.
  3. At partition corners, extend one runner to end of corner and butt the other runner into it, allowing necessary clearance for plaster thickness. Do not miter runners.
- D. Stud Erection:
1. Insert floor to ceiling steel studs between runners, twisting them into vertical position with open side facing in same direction, engaging floor and ceiling runners and spaced 16" o.c.. Anchor studs adjacent to doors and borrowed light frames, intersections and corners, to floor and ceiling runners. Except for fire rated construction, do not anchor intermediate partition studs to runners. For 25, 22, and 20 gage studs, use a crimping tool equal to USG Metal Lock Fastener or positive screw attachment with 3/8" or 1/2" Type S or S-12 pan head screws through each stud and runner flange.
  2. Place studs in direct contact with doorframe jambs, abutting partitions, partition corners and existing construction elements. Fasten to floor and ceiling runners using positive screw attachment or a crimping tool equal to USG Metal Lock Fastener. Grouting of doorframes is required. Comply with special door opening construction details on the drawings.
  3. Where a stud directly abuts an exterior wall and there is a possibility of

- condensation or water penetration through the wall, place a No. 15 asphalt felt strip between stud and wall surface.
4. Over metal doors or borrowed light frames, place a section of runner horizontally with a web-flange bend at each end. Secure runner to strut-studs with two screws in each bent web. At the location of vertical joints over the doorframe header, place a cut-to-length stud extending to the ceiling runner.
  5. Splice studs when required by nesting one into the other forming a box section with a minimum length of 8", fastened together with two 3/8" Type S pan head screws in each flange. Locate each screw no more than 1" from ends of splice.
  6. Form corners and intersections with 3 studs.
  7. At corner conditions with angles of other than 90 degrees, provide continuous corner pieces brake-formed to the proper corner angle with legs, which extend to cover the width of the face flanges of the "C" studs.
  8. Locate stud within 2 in. maximum from all abutting partitions, partition corners and other construction.
    - a. Provide two studs (web to web) at each door and window frame, and each cased opening, extending from floor to structure above. Securely attach to each other and to track with screws.
    - b. Anchor studs securely to jamb and head anchor clips of each door and window frame by bolt or screw attachments.
    - c. Provide header (runner track), using a mitered head splice, at head of openings and fasten to adjacent vertical studs with screws.
    - d. Position at vertical joints over opening frame, an additional cut-to-length stud extending from opening frame header to ceiling runner.
    - e. Cut non-load bearing studs 1/2 in. short of overhead structural elements to permit deflection.
- E. Chase Wall Framing:
1. Align two parallel rows of floor and ceiling runners according to partition layout. Spacing between outside flanges of each pair of runners shall not exceed 24". Follow instructions above for attaching runners.
  2. Position steel studs vertically in runners, with flanges in the same direction and with studs on opposite sides of chase directly across from each other. Except in fire rated walls, anchor studs to floor and ceiling runner flanges with a crimping tool equal to USG Metal Lock Fastener or 3/8" or 1/2" Type S pan head screws.
  3. Brace assembly with 2 1/2" or wider steel studs. Anchor web at each end of metal brace to stud web with two 3/8" pan head screws. When chase wall studs are not opposite, install steel stud cross-braces 24" o.c. horizontally and securely anchor each end to a continuous horizontal 2 1/2" runner screw attached to chase wall studs within the cavity.
- F. Furred Ceiling Framing: Space 1-1/2" metal furring channels 16" o.c. at right angles to the long side of the space, supported on side wall construction or other structural members. Where intermediate support is required, or at unsupported ends, suspend with channels or studs from the structure above. As an alternate, 1 5/8" steel studs may be used as furring. Saddle tie furring channels to joists with double strand 18 gage tie wire at each intersection.

Provide 1" clearance between furring ends and abutting walls and partitions. At splices, nest furring channels with at least 8" overlap and securely wire-tie each end with double strand 18 gage tie wire. Frame around openings such as light troffers with additional furring channels and wire ties to joists.

G. Suspended Ceiling Grillage Erection:

1. Space 8-gage hanger wires 48" o.c. along carrying channels and within 6" of ends of carrying channel runs. In concrete, anchor hangers by attachment to reinforcing steel, by loops embedded at least 2" or by approved inserts. For steel construction, wrap hanger around or through beams or joists.
2. Install 1-1/2" carrying channels 48" o.c. or spaced as tested for fire rated construction, and extend within 6" of walls. Position channels for the correct ceiling height, level, and secure with hanger wire saddle tied along channels. Provide 1" clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12" and secure each end with double strand 18-gage wire.
3. Attachment of suspension wires to structural elements:
  - a. Metal decks: Double-wrap-tie each hanger suspension wire to a 16 inch length of No. 4 (1/2 inch dia.) steel reinforcing bar and drop wire through accurately spaced drilled or punched holes in metal decking. Align length of reinforcing bars across flutes of decking.
  - b. Concrete slabs: Install looped or pigtail (corkscrew) type hanger suspension wires through accurately spaced drilled holes in slab formwork. Assure that loop or pigtail is standing vertical before concrete is placed.
4. Erect furring channels at right angles to 1-1/2" carrying channels. Space furring within 6" of walls. Provide 1" clearance between furring ends and abutting walls and partitions. Attach furring channels to 1-1/2" channels with furring channel clips equal to products of USG, installed on alternate sides of the carrying channel. Saddle tie furring to channels with double strand 18-gage wire when clips cannot be alternated. At splices, nest furring channels with at least 8" overlap and securely tie each end with double strand 18 gage tie wire.
5. When required in fire rated assemblies, install double furring channels to support gypsum panel ends and back-block with gypsum board strip. When staggered end joints are not required, control joints may be used.
6. At light troffers or openings that interrupt the carrying or furring channels, install additional cross reinforcing to restore the lateral stability of the grillage with 3/4" cold rolled channels wire tied a top and parallel to main runner channel.
7. Light Fixture Protection: Use over recessed lighting fixtures installed in direct suspension grid when required in fire rated construction. Cut 5/8" fire rated gypsum wallboard panels in pieces to form a five-sided enclosure, trapezoidal in cross section. Fabricate box larger than the fixture to provide at least 1/2" clearance between wallboard and fixture.
8. Brace suspended soffits, ceilings, and the like, against uplift wind action as required

- by local Building Code, with diagonal supports at not more than 4'-0" o.c. each way.
9. Duct interference: Where wide air conditioning ducts above gypsum board ceilings interfere with suspension hangers, provide independent framing below ductwork to support the ceiling.
    - a. Support framing from floor or roof structure above. Do not attach framing to ductwork. Indicate layout and details of construction and attachment on shop drawings.

H. Masonry and Concrete Wall Furring:

1. Furr exterior walls and designated interior walls using Z, hat, or resilient channel steel furring channels fastened directly to the interior face of exterior walls and the finished face or faces of interior walls.
  - a. Use Z furring channels to mechanically attach blanket or rigid insulation to walls unless hat or resilient channels are indicated on the drawings. Install insulation panels progressively as Z furring channels are attached to the wall.
2. Furring Channel Erection - Direct Attachment: Attach furring channels to masonry or concrete surfaces vertically unless horizontal construction is indicated on the drawings. For channels positioned horizontally, attach a furring channel not more than 4" from both the floor line and the ceiling line. Secure channels with fasteners placed on alternate flanges and spaced 16" o.c. Use a 2" cut nail in mortar joints of brick, clay tile, or concrete block, or in the field of lightweight aggregate concrete block; 5/8" concrete stub nail, USG TAPCON anchors or other power driven fasteners in monolithic concrete.
  - a. Channels may be secured using adjustable wall brackets and 3/4" cold rolled channels to provide additional space for pipes, conduits or ducts.
  - b. At windows, attach furring channels horizontally over masonry returns to support metal lath at corners.
3. Free-standing Furring: Use 1-5/8" steel studs erected vertically between floor and ceiling. Plumb and align runners at the desired distance from the exterior wall. Fasten runners to floor and ceiling as provided for partitions. Snap studs into place in the runners.
  - a. Secure the stud framing to the wall with adjustable furring brackets attached to the wall at third points of the vertical span. Fasten the brackets to the studs with 3/8" pan head screws. Other furring providing greater height may be constructed with wider and heavier steel studs, braced as indicated above but not exceeding 48" o.c..
4. Z-furring Channel Erection: Erect insulation vertically and hold in place with Z-furring channels spaced 16" o.c. Except at exterior corners, attach narrow flanges of furring channels to wall with concrete stub nails or power driven fasteners spaced



24" o.c. At exterior corners, attach wide flange of furring channel to wall with short flange extending beyond corner. On adjacent wall surface, screw attach short flange of furring channel to web of attached channel. Start from this furring channel with a standard width insulation panel and continue in regular manner. At interior corners, space second channel no more than 12" from corner and cut insulation to fit. Hold insulation in place with 10" long staple field-fabricated from 18-gage tie wire inserted through slots in channel. Install wood blocking around window and door openings and as required for attachment or support of fixtures and furnishings.

5. Provide resilient or hat channel furring where indicated, with same spacing and construction as for regular furring.
  
- I. Backing plates: Provide 20 gauge channel drywalls studs installed horizontally and screwed in place between wall studs to provide surface area required for attachment of furniture, equipment and accessories.
  1. Where indicated on Drawings provide wider reinforcing of 24 gauge galvanized sheet steel screw applied to face of studs.

END OF SECTION