

SECTION 05400 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior non-load-bearing, curtain-wall framing.
2. All other light gage framing sizes and gages are as noted on construction documents and are to be installed per the manufacturer's requirements.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads without deflections greater than the following:

1. Exterior Non-Load-Bearing, Curtain-Wall Framing:

Horizontal deflection of **1/600** of the wall height where wall studs back up masonry veneers.

Horizontal deflection of **1/360** of the wall height where studs back up EIFS or wood siding veneers.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
- C. Mill certificates or test reports.
- D. Welder certificates.
- E. Research/evaluation reports.

1.4 QUALITY ASSURANCE

- A. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
- B. Mill certificates signed by steel sheet producer or test reports from a qualified independent testing agency.

- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by GA File Numbers in GA-600, "Fire Resistance Design Manual," or by design designations from UL's "Fire Resistance Directory" or from the listings of another testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allied American Studco, Inc.
 - 2. Angeles Metal Systems.
 - 3. Clark Steel Framing Industries.
 - 4. Consolidated Fabricators Corp.
 - 5. Consolidated Systems, Inc.
 - 6. Dale Industries, Inc.
 - 7. Design Shapes in Steel.
 - 8. Dietrich Industries, Inc.
 - 9. Knorr Steel Framing Systems.
 - 10. MarinoWare; Div. of Ware Industries, Inc.
 - 11. Scafco Corp.
 - 12. Steel Construction Systems.
 - 13. Steel Developers, LLC.
 - 14. Steeler, Inc.
 - 15. Super Stud Building Products, Inc.
 - 16. Unimast, Inc.
 - 17. United Metal Products, Inc.

2.2 MATERIALS

- A. Steel Sheet: ASTM A 653/A 653M, structural steel, G60 zinc coating, Grade 33 for minimum uncoated steel thickness of 0.0428 inch and less; Grade 50 for minimum uncoated steel thickness of 0.0538 inch and greater.
- B. Wall Framing: Manufacturer's standard steel studs, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:
 - 1. Depth: 6-inches
 - 2. Minimum Uncoated-Steel Thickness: 0.0428 inch. (18 gage)
 - 3. Flange Width: 1-5/8 inches.
 - 4. Section Properties: $S_x = 0.772 \text{ in}^3$ $I_x = 2.316 \text{ in}^4$ $M_x = 16,764 \text{ in-lb.}$

5. Track: Manufacturer's standard U-shaped steel track, unpunched, with straight flanges, complying with ASTM C 955, manufacturer's standard flange width except where noted as deflection track on the contract drawings. Minimum uncoated-steel thickness to match steel studs

2.3 ACCESSORIES AND MISCELLANEOUS MATERIALS

- A. Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of **33,000 psi**, of manufacturer's standard thickness and configuration, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked, bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- F. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
- G. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- H. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- I. Thermal Insulation: ASTM C 665, Type I, unfaced mineral-fiber blankets produced by combining glass or slag fibers with thermosetting resins.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to ASTM C 1007, manufacturer's written recommendations, and requirements in this Section.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 3. Install framing members in one-piece lengths.

4. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed.
 5. Install insulation in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 6. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- B. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of **1/8 inch in 10 feet** and as follows:
1. Space individual framing members no more than plus or minus **1/8 inch** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- C. Non-Load-Bearing, Curtain-Wall Installation: Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure. Space studs as indicated; set plumb, align, and fasten both flanges of studs to track, unless otherwise indicated.
1. Isolate non-load-bearing steel framing from building structure with deflection track to prevent transfer of vertical loads while providing lateral support.
 2. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings but not more than **54 inches** apart. Fasten at each stud intersection.
 3. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.
- D. Joist Installation: Install, align, and securely anchor perimeter joist track sized to match joists as indicated on Shop Drawings. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of **1-1/2 inches**. Reinforce ends and bearing points of joists as indicated on Shop Drawings.
 2. Space joists not more than **2 inches** from abutting walls and at spacings indicated.
 3. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
 4. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated. Install web stiffeners to transfer axial loads of walls above.
 5. Install bridging at each end of joists and at intervals indicated. Fasten bridging at each joist intersection as indicated.
 6. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
 7. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

- E. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
 - 1. Field and shop welds will be subject to testing and inspection.
 - 2. Remove and replace Work that does not comply with specified requirements.
 - 3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

END OF SECTION 05400