



SECTION 05.40.00

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cold-formed metal framing for:
- B. Exterior load-bearing steel stud walls.
  - 1. Interior load-bearing steel stud walls.
  - 2. Exterior steel stud curtain walls.
  - 3. Floor joists.
  - 4. Roof trusses.
- C. Bridging, bracing, clips and other accessories.

1.2 RELATED SECTIONS

- A. Section 09110 - Non-Load Bearing Wall Framing.
- B. Section 09205 - Furring and Lathing: Lath and furring for interior plaster applications.
- C. Section 09210 - Gypsum Plaster: Interior plaster applications.
- D. Section 09220 - Portland Cement Plaster: Exterior Stucco and EIFS applications.
- E. Section 09250 - Gypsum Board: Gypsum interior sheathing.
- F. Section 09260 - Gypsum Board Assemblies: Shaft Walls and Area Separation Walls.

1.3 REFERENCES

- A. ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- B. ASTM A 1003 - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
- C. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- D. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.
- E. ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.

- F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
- G. AISI - Standard for Cold-Formed Steel Framing General Provisions.
- H. AISI - North American Specification (NASPEC) for the Design of Cold-Formed Steel Structural Members - 2001.
- I. American Welding Society (AWS).a. AWS D1.1 "Structural Welding Code - Steel."b. AWS D1.3 "Structural Welding Code - Sheet Steel."
- J. AISI/COS 2001 - Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Story Family Dwelling.

#### 1.4 DESIGN REQUIREMENTS

- A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.
- B. Design loads: As indicated on the Structural Drawings.
- C. Design framing systems to withstand design loads without deflections greater than the following:
- D. Exterior Walls: Lateral deflection of:  $L/240$ .
- E. Exterior Walls: Lateral deflection of:  $L/360$ .
- F. Exterior Walls: Lateral deflection of:  $L/600$ .
- G. Interior Load-Bearing Walls: Lateral deflection of:  $L/240$ .
- H. Interior Load-Bearing Walls: Lateral deflection of:  $L/360$
- I. Interior Load-Bearing Walls: Lateral deflection of:  $L/600$ .
- J. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).
- K. Design framing system to accommodate deflection of primary building structure and construction tolerances.
- L. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.

#### 1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Submit manufacturer's product literature and data sheets for specified products.
- C. Manufacturer's certification of product compliance with codes and standards.
- D. Shop Drawings: Submit shop drawings prepared by a licensed professional engineer for approval by the projects Architect and General Contracting indicating:
  1. Locations of framing members, wall framing sections and opening elevations.
  2. Sizes and spacing of framing members.
  3. Methods of fastening framing members to each other and to supporting systems.

4. Details of vertical deflection connections to structures.
  5. Locations and spacing of lateral bracing and structural bracing systems.
  6. Accessory products required for complete installation.
  7. Shop Drawings shall be signed and sealed by a registered PE (Professional cold-formed specialty Engineer) registered in the state of the project.
- E. Structural Calculations: Submit structural calculations prepared by a licensed professional engineer for approval by the projects Architect and General Contractor indicating:
1. Submittal shall be signed and sealed by a registered PE (Professional cold-formed specialty Engineer) registered in the state of the project.
  2. Description of design criteria.
  3. Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application.
  4. Selection of framing components, accessories, fasteners and welded connection requirements.
  5. Engineer shall have a minimum of 5 years experience with projects of similar scope.

## 1.6 QUALITY ASSURANCE

- A. Contractor shall provide effective, full time quality control over all fabrication and erection complying with the pertinent codes and regulations of government agencies having jurisdiction.
- B. Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 "Structural Welding Code-Sheet Steel."
- D. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Notify manufacturer of damaged materials received prior to installing.
- B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per the recommendations of ASTM C955.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: CRACO Mfg., Inc. located at: 1122 Johnson Rd; York, SC 29745; Toll Free Tel: 803-684-5544; Fax: 803-684-2091; Email: [technical@cracometals.com](mailto:technical@cracometals.com); Web: [www.cracometals.com](http://www.cracometals.com)

## 2.2 COMPONENTS

- A. Structural Studs: Cold-Formed galvanized steel C-studs.
1. Flange Length: 1 5/8 inch (41mm) 162 flange.
  2. Flange Length: 2 inch (51mm) 200 flange.
  3. Flange Length: 2-1/2 inch (64mm) 250 flange.
  4. Flange Length: 3 inch (76 mm) 300 flange.
  5. Flange Length: 3-1/2 inch (88.9 mm) 350 flange.
  6. Web Depth: 2-1/2 inch (64 mm) 250 depth.
  7. Web Depth: 3-5/8 inch (92 mm) 362 depth.
  8. Web Depth: 4 inch (102 mm) 400 depth.
  9. Web Depth: 6 inch (152.4 mm) 600 depth.
  10. Web Depth: 8 inch (203 mm) 800 depth.
  11. Web Depth: 10 inch (254 mm) 1000 depth.
  12. Web Depth: 12 inch (305 mm) 1200 depth.
  13. Web Depth: 14 inch (355.6 mm) 1400 depth.
  14. Web Depth: As indicated on drawings.
  15. Minimum Material Thickness: 33 mil (20 gauge) - ASTM color reference: white.
    - a. Design Thickness: 0.0346 in. (0.88 mm).
    - b. Minimum Delivered Thickness: 0.0329 in. (0.84 mm).
  16. Minimum Material Thickness: 43 mil (18 gauge) - ASTM color reference: yellow.
    - a. Design Thickness: 0.0451 in. (1.14 mm).
    - b. Minimum Delivered Thickness: 0.0428 in. (1.09 mm).
  17. Minimum Material Thickness: 54 mil (16 gauge) - ASTM color reference: green.
    - a. Design Thickness: 0.0566 in. (1.44 mm).
    - b. Minimum Delivered Thickness: 0.0538 in. (1.37 mm).
  18. Minimum Material Thickness: 68 mil (14 gauge) - ASTM color reference: orange.
    - a. Design Thickness: 0.0713 in. (1.81 mm).
    - b. Minimum Delivered Thickness: 0.0677 in. (1.72 mm).
  19. Minimum Material Thickness: 97 mil (12 gauge) - ASTM color reference: red.
    - a. Design Thickness: 0.1017 in. (2.58 mm).
    - b. Minimum Delivered Thickness: 0.0966 in. (2.45 mm).
  20. Minimum Material Thickness: As required by design.
  21. Minimum Material Thickness: As indicated on drawings.
  22. Minimum Yield Strength: 33ksi (227 MPa) (for 33mils through 118mils).
  23. Minimum Yield Strength: 50ksi (345 MPa) (optional for 54mils and up).
  24. Minimum Yield Strength: As required by design.
- B. Structural Track: Cold-Formed galvanized steel runner tracks
1. Flange Length: 1 1/4 inch (32 mm) T125 flange.
  2. Flange Length: 1 1/2 inch (38 mm) T150 flange.
  3. Flange Length: 2 inch (51 mm) T200 flange.
  4. Flange Length: 2 1/2 inch (63 mm) T250 flange.
  5. Flange Length: 3 inch (76mm) T300 flange.
  6. Flange Length: 3 1/2 inch (89 mm) T350 flange.
  7. Web: 2 1/2 inch (64mm) 250 depth.
  8. Web: 3 5/8 inch (92mm) 362 depth.
  9. Web: 4 inch (102mm) 400 depth.
  10. Web: 6 inch (152.4mm) 600 depth.
  11. Web: 8 inch (203mm) 800 depth.
  12. Web: 10 inch (254mm) 1000 depth.
  13. Web: 12 inch (305mm) 1200 depth.
  14. Web: 14 inch (355.6 mm) 1400 depth.
  15. Web: Track Web Size to match stud web size.

16. Minimum Material Thickness: 33 mil (20 gauge) - ASTM color reference: white.
    - a. Design Thickness: 0.0346 in. (0.88 mm).
    - b. Minimum Delivered Thickness: 0.0329 in. (0.84 mm).
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    - a. Design Thickness: 0.0713 in. (1.81 mm).
    - b. Minimum Delivered Thickness: 0.0677 in. (1.72 mm).
  20. Minimum Material Thickness: 97 mil (12 gauge) - ASTM color reference: red.
    - a. Design Thickness: 0.1017 in. (2.58 mm).
    - b. Minimum Delivered Thickness: 0.0966 in. (2.45 mm).
  21. Minimum Material Thickness: As required by design.
  22. Minimum Material Thickness: As indicated on drawings.
  23. Minimum Material Thickness: Track Thickness to match wall stud thickness.
  24. Minimum Yield Strength: 33ksi (227 MPa) (for 33mils through 118mils).
  25. Minimum Yield Strength: 50ksi (345 MPa) (optional for 54mils and up).
  26. Minimum Yield Strength: As required by design.
- C. Deflection Track: Cold-Formed Deep Leg Runner Slip Track.
1. Leg Length: 2 inch (51 mm) T200 flange.
  2. Leg Length: 2-1/2 inch (63 mm) T250 flange.
  3. Leg Length: 3 inch (76mm) T300 flange.
  4. Leg Length: 3-1/2 inch (89 mm) T350 flange.
  5. Leg Length: As required by design.
  6. Minimum Material Thickness: 33 mil (20 gauge).
  7. Minimum Material Thickness: 43 mil (18 gauge).
  8. Minimum Material Thickness: 54 mil (16 gauge).
  9. Minimum Material Thickness: 68 mil (14 gauge).
  10. Minimum Material Thickness: 97 mil (12 gauge).
  11. Minimum Material Thickness: As required by design.
  12. Minimum Yield Strength: 33ksi (227 MPa) (for 33mils through 118mils).
  13. Minimum Yield Strength: 50ksi (345 MPa) (optional for 54mils and up).
  14. Minimum Yield Strength: As required by design.
- D. Deflection Track Alternate: **CRACO Slotted Slip Track**
1. Size: Web Widths of 2 1/2", 3-5/8", 4", 6" & 8".
  2. Size: Gauge from 33 mil (20ga.) thru 68 mil (14ga.)
  3. Leg Length: 2 1/2 inch
  4. Size: As required by design.
  5. UL listed assembly.
- E. U-Channel (CRC Cold Rolled Channel):
1. Size: 150U50-54 1-1/2" (38mm) 54mils (16ga.).
  2. Size: 075U50-54 3/4" (19.1mm) 54mils (16ga.).
  3. Size: As required by design.
- F. SmartFrame **BridgeSmart Connector Clips**

1. Series 300: Minimum Thickness 33mils (20ga.) for use with 3-5/8" & 4" Studs
  2. Series 600: Minimum Thickness 33mils (20ga.) for use with 6" & 8" Studs
  3. Size: As required by design.
  4. Used to connect U-Channel to Steel Studs as Bridging
- G. SmartFrame **CRC Connector**
1. Size SFCRC075: Minimum Thickness 43mils (18ga.)
  2. Used to connect ends of U-Channel together.
- H. Standard Clip Angles: **SmartFrame UtilityAngles**
1. Clip Angels: Minimum Thickness: 54mils (16ga) 0.0538".
  2. Clip Angels: Minimum Thickness: 68mils (14ga) 0.0677".
  3. Clip Angels: Minimum Thickness: 97mils (12ga) 0.0966".
  4. Clip Angels: As required by design.
- I. Furring Channel: Furring existing walls and suspended ceiling applications.
1. Size: 087F125-33 7/8" (22mm) Furring Channel 33mils (20ga).
  2. Size: 087F125-43 7/8" (22mm) Furring Channel 43mils (18ga).
  3. Size: 087F125-54 7/8" (22mm) Furring Channel 54mils (16ga).
  4. Size: 150F125-33 1-1/2" (38mm) Furring Channel 33mils (20ga).
  5. Size: 150F125-43 1-1/2" (38mm) Furring Channel 43mils (18ga).
  6. Size: 150F125-54 1-1/2" (38mm) Furring Channel 54mils (16ga).
  7. Size: As required by design.
- J. Framing Accessories: Accessories required in this project.
1. Flat Strapping for X-bracing.
  2. Flat Strapping and bridging for lateral bracing.
  3. SmartFrame StrapTies
  4. Gusset Plates.
- K. Fasteners: Self-drilling, self-tapping screws; complying with ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- L. Touch-Up Paint: Complying with ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

## 2.3 MATERIALS

- A. Steel: Galvanized Steel meeting or exceeding the requirements of ASTM A 1003.
1. Coating: Galvanized CP60 coating minimum, complying with ASTM C 955.
  2. Coating: Galvanized CP90 coating minimum, complying with ASTM C 955.

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Inspect supporting substrates and structures for compliance of proper conditions for installation and performance of the cold-formed structural framing.

### 3.2 PREPARATION

- A. Prepare attachment surfaces so that they are plumb, level, and in proper alignment for accepting the cold-formed structural framing.

### 3.3 FABRICATION

- A. Prior to fabrication of framing, submit shop drawings to the architect or engineer to obtain approval.

- B. Framing components may be preassembled into panels prior to erecting. Prefabricate panels so they are square, with components attached in a manner which prevents racking and minimizes distortion during lifting and transport.
- C. Cut all framing components square for attachment to perpendicular members or as required for an angular fit against abutting members.
- D. Plumb, align and securely attach studs to flanges of both upper and lower runners, except that in the case of interior, non-load bearing walls where studs need not be attached to upper or lower runners.
- E. In all doubled jamb studs and doubled headers not accessible to insulation contractors, provide insulation equal to that specified elsewhere.
- F. Splices in members other than top and bottom runner track are not permitted.
- G. Provide temporary bracing where required, until erection is complete.

#### 3.4 INSTALLATION - NON-AXIAL LOAD-BEARING CURTAIN WALLS

- A. Runners shall be securely anchored to the supporting structure as shown on the drawings.
- B. Jack studs or cripples shall be installed below window sills, above window and door heads, and elsewhere to furnish supports.
- C. Lateral bracing shall be provided by use of gypsum board and gypsum sheathing or by horizontal straps or cold-rolled channels. Bracing shall conform to Section D3 of the AISI North American Specification (NAS).
- D. Provisions for structure vertical movement shall be provided where indicated on the drawings prepared by the engineer of record.
- E. Handling and lifting of prefabricated panels shall be done in a manner so as not to cause distortion in any member.

#### 3.5 INSTALLATION - AXIAL LOAD-BEARING WALLS

- A. Securely anchor runners to the supporting structure as shown on the drawings.
- B. Provide complete, uniform and level bearing support at the bottom runner.
- C. Include headers and supporting studs at wall openings as shown on the drawings.
- D. Provide diagonally braced stud walls, as indicated on the drawings at locations designated as "shear walls" for frame stability and lateral load resistance. Position additional studs when necessary or as indicated on the drawings to resist the vertical components.
- E. Splices in axially loaded studs are not permitted.

#### 3.6 INSTALLATION - JOISTS

- A. Align joist bearing at foundation walls by means of shims and/or non-setting grout.
- B. Locate joists or a load distribution member directly over bearing studs at the top of bearing walls.
- C. Provide web stiffeners at reaction points and/or points of concentrated loads or where indicated on the drawings.

- D. Install joist bridging where indicated on the drawings.
- E. Install additional joists under parallel partitions when the partition length exceeds one-half the joist span, also around all floor and roof openings, which interrupt one or more spanning members unless otherwise noted.
- F. Install end blocking where joist ends are not otherwise restrained from rotation.

### 3.7 INSTALLATION - TRUSSES

- A. Install trusses in accordance with applicable building code requirements and the truss manufacturer's recommendations.
- B. Refer to AISI RG-9518 for additional information.
- C. Install roof bracing in accordance with the truss design.
- D. Install trusses with the plane of the truss webs plumb and parallel to each other, aligned and accurately positioned.
  - 1. Truss Spacing: 16 inches (406 mm) on center.
  - 2. Truss Spacing: 24 inches (610 mm) on center.
  - 3. Truss Spacing: As required by design.
- E. Install each truss directly over a bearing stud or a load distribution member designed for this purpose.
- F. Install lateral supports as required per manufacturer's design.
- G. Immediately after installation, install bridging and permanently brace trusses per truss design.
- H. Install approved uplift connectors to connect individual truss to wall studs as required by design.

END OF SECTION