



SECTION 054000

COLD-FORMED METAL FRAMING

I. GENERAL

A. SECTION INCLUDES:

1. Exteriors & interior load-bearing wall framing.
2. Exterior non-load bearing.
3. Floor joists framing.
4. Roof rafter and truss framing.
5. Ceiling joist framing.
6. Soffit framing.
7. Connectors.

B. RELATED SECTIONS

1. Section 092216 - Non-Structural Metal (Steel) Framing.

C. DESIGN REQUIREMENTS

1. 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.
2. Design loads: As indicated on the Structural Drawings.
3. Design framing systems to withstand design loads without deflections greater than the following:
 - a) Exterior Load Bearing Wall Framing: horizontal deflection of L/240, L/360, L/600, L/720 of the wall height.
 - b) Interior Load Bearing Wall Framing: horizontal deflection of L/240, L/360 of the wall height under a lateral load of 5psf.
 - c) Exterior Non-Load Bearing Wall Framing: horizontal deflection of L/240, L/360, L/600, L/720 of the wall height.
 - d) Floor Joist Framing: vertical deflection of L/360, L/480 for the live load and L/240 for the total load.
 - e) Rafter Framing: vertical deflection of L/120, L/240, L/360 of the horizontally projected span for the live load.

- f) Ceiling Joist Framing: vertical deflection of L/240, L/240, L/360 of the span for the live load and L/240 for the total load of the span.
- 4. 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 of 120 degrees F (67 degrees C).
- 5. Design framing system to accommodate deflection of primary building structure and construction tolerances.
 - a) Upward and downward movement of 1/2 inch, 3/4 inch, 1 inch, 1-1/2 inch.
- 6. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard to contribution of sheathing materials.

D. SUBMITTALS

- 1. Submit manufacturer's product data sheets for specified products.
- 2. Manufacturer's certification of product compliance with codes and standards.
- 3. Shop Drawings: Submit shop drawings prepared by a licensed professional engineer for approval by the projects Architect and General Contractor indicating:
 - a) Locations of framing members, wall framing sections and opening elevations.
 - b) Sizes and spacing of framing members.
 - c) Methods of fastening framing members to each other and to supporting systems.
 - d) Details of vertical deflection connections to structures.
 - e) Locations and spacing of lateral bracing and structural bracing systems.
 - f) Accessory products required for complete installation.
 - g) Shop Drawings shall be signed and sealed by a registered PE (Professional cold-formed specialty Engineer) registered in the state of the project.
- 4. Structural Calculations: Submit structural calculations prepared by a licensed professional engineer for approval by the projects Architect and General Contractor indicating:
 - a) Submittal shall be signed and sealed by a registered PE (Professional cold-formed specialty Engineer) registered in the state of the project.
 - b) Description of design criteria.
 - c) Engineering analysis depicting stress and deflection (stiffness) requirements for each framing application.
 - d) Selection of framing components, accessories, fasteners and welded connection requirements.

E. QUALITY ASSURANCE

- 1. 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.
- 2. Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.
- 3. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code-Steel" and AWS D1.3 "Structural Welding Code-Sheet Steel."

4. Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

F. DELIVERY, STORAGE, AND HANDLING

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

II. PRODUCTS

A. MANUFACTURER

1. 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; Web: www.cracometals.com

B. COMPONENTS

1. Structural Studs: Cold-Formed galvanized steel C-studs.
 - a) Flange Width: 1-5/8 inch (S162 flange).
 - b) Flange Width: 2-inch (S200 flange).
 - c) Flange Width: 2-1/2 inch (S250 flange).
 - d) Flange Width: 3 inch (S300 flange).
 - e) Flange Width: 3-1/2 inch (S350 flange).
 - f) Web Depth: 2-1/2 inch (250 web).
 - g) Web Depth: 3-5/8 inch (362 web).
 - h) Web Depth: 4 inch (400 web).
 - i) Web Depth: 6 inch (600 web).
 - j) Web Depth: 8 inch (800 web).
 - k) Web Depth: 10 inch (1000 web).
 - l) Web Depth: 12 inch (1200 web).
 - m) Web Depth: 14 inch (1400 web).
 - n) Web Depth: As indicated on drawings.
 - o) Minimum Material Thickness: 33mil (20 gauge) - ASTM color reference: white.
 - (1) Design Thickness: 0.0346 in.
 - (2) Minimum Delivered Thickness: 0.0329 in.
 - p) Minimum Material Thickness: 43mil (18 gauge) - ASTM color reference: yellow.
 - (1) Design Thickness: 0.0451 in.
 - (2) Minimum Delivered Thickness: 0.0428 in.
 - q) Minimum Material Thickness: 54mil (16 gauge) - ASTM color reference: green.
 - (1) Design Thickness: 0.0566 in.
 - (2) Minimum Delivered Thickness: 0.0538 in.
 - r) Minimum Material Thickness: 68mil (14 gauge) - ASTM color reference: orange.
 - (1) Design Thickness: 0.0713 in.
 - (2) Minimum Delivered Thickness: 0.0677 in. (1.72 mm).
 - s) Minimum Material Thickness: 97mil (12 gauge) - ASTM color reference: red.

- (1) Design Thickness: 0.1017 in.
 - (2) Minimum Delivered Thickness: 0.0966 in.
 - t) Minimum Material Thickness: As required by design.
 - u) Minimum Material Thickness: As indicated on drawings.
 - v) Minimum Yield Strength: 33ksi (for 33mils through 97mils).
 - w) Minimum Yield Strength: 50ksi (optional for 54mils and up).
 - x) Minimum Yield Strength: As required by design.
2. Structural Track: Cold-Formed galvanized steel runner tracks
- a) Leg Length: 1-1/4 inch (T125 leg).
 - b) Leg Length: 1-1/2 inch (T150 leg).
 - c) Leg Length: 2 inch (T200 leg).
 - d) Leg Length: 2-1/2 inch (T250 leg).
 - e) Leg Length: 3 inch (T300 leg).
 - f) Leg Length: 3-1/2 inch (T350 leg).
 - g) Web Depth: 2-1/2 inch (250 web).
 - h) Web Depth: 3-5/8 inch (362 web).
 - i) Web Depth: 4 inch (400 web).
 - j) Web Depth: 6 inch (600 web).
 - k) Web Depth: 8 inch (800 web).
 - l) Web Depth: 10 inch (1000 web).
 - m) Web Depth: 12 inch (1200 web).
 - n) Web Depth: 14 inch (1400 web).
 - o) Web Depth: Track Web Size to match stud web size.
 - p) Minimum Material Thickness: 33mil (20 gauge) - ASTM color reference: white.
 - (1) Design Thickness: 0.0346 in.
 - (2) Minimum Delivered Thickness: 0.0329 in.
 - q) Minimum Material Thickness: 43mil (18 gauge) - ASTM color reference: yellow.
 - (1) Design Thickness: 0.0451 in.
 - (2) Minimum Delivered Thickness: 0.0428 in.
 - r) Minimum Material Thickness: 54mil (16 gauge) - ASTM color reference: green.
 - (1) Design Thickness: 0.0566 in.
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 - (1) Design Thickness: 0.0713 in.
 - (2) Minimum Delivered Thickness: 0.0677 in.
 - t) Minimum Material Thickness: 97mil (12 gauge) - ASTM color reference: red.
 - (1) Design Thickness: 0.1017 in.
 - (2) Minimum Delivered Thickness: 0.0966 in.
 - u) Minimum Material Thickness: As required by design.
 - v) Minimum Material Thickness: As indicated on drawings.
 - w) Minimum Material Thickness: Track Thickness to match wall stud thickness.
 - x) Minimum Yield Strength: 33ksi (for 33mils through 97mils).
 - y) Minimum Yield Strength: 50ksi (optional for 54mils and up).
 - z) Minimum Yield Strength: As required by design.
3. Deflection Track: Cold-Formed Deep Leg Runner Slip Track.
- a) Leg Length: 2 inch T200 leg.
 - b) Leg Length: 2-1/2 inch T250 leg.
 - c) Leg Length: 3 inch T300 leg.
 - d) Leg Length: 3-1/2 inch T350 leg.
 - e) Leg Length: As required by design.
 - f) Minimum Material Thickness: 33mil (20 gauge).
 - g) Minimum Material Thickness: 43mil (18 gauge).
 - h) Minimum Material Thickness: 54mil (16 gauge).
 - i) Minimum Material Thickness: 68mil (14 gauge).
 - j) Minimum Material Thickness: 97mil (12 gauge).
 - k) Minimum Material Thickness: As required by design.

- l) Minimum Yield Strength: 33ksi (for 33mils through 97mils).
 - m) Minimum Yield Strength: 50ksi (optional for 54mils and up).
 - n) Minimum Yield Strength: As required by design.
4. Deflection Track Alternate: CRACO SmartTrack SLT (Slotted Track)
- a) Size: Web Widths of 2 ½", 3-5/8", 4", 6", 8" & 10".
 - b) Size: Gauge from 33mil (20ga.) thru 68mil (14ga.)
 - c) Leg Length: 2 ½ inch
 - d) Size: As required by design.
 - e) UL listed assembly.
5. U-Channel (CRC Cold Rolled Channel):
- a) Size: 150U50-54 1-1/2" 54mils (16ga.).
 - b) Size: 075U50-54 3/4" 54mils (16ga.).
 - c) Size: As required by design.
6. SmartFrame BridgeSmart Connector Clips
- a) Series 300: Minimum Thickness 33mils (20ga.) for use with 3-5/8" & 4" Studs.
 - b) Series 354: Minimum Thickness 54mils (16ga.) for use with 3-5/8" & 4" Studs.
 - c) Series 600: Minimum Thickness 33mils (20ga.) for use with 6" & 8" Studs.
 - d) Series 654: Minimum Thickness 54mils (16ga.) for use with 6" & 8" Studs.
 - e) Size: As required by design.
 - f) Used to connect U-Channel to Steel Studs as Bridging
7. Standard Clip Angles: SmartFrame UtilityAngles
- a) Clip Angles: Minimum Thickness: 54mils (16ga) 0.0538".
 - b) Clip Angles: Minimum Thickness: 68mils (14ga) 0.0677".
 - c) Clip Angles: Minimum Thickness: 97mils (12ga) 0.0966".
 - d) Clip Angles: As required by design.
8. Furring Channel: Furring for existing walls and suspended ceiling applications.
- a) Size: 087F125-15 7/8" (22mm) Furring Channel 15mils (25gaEQ).
 - b) Size: 087F125-23 7/8" (22mm) Furring Channel 23mils (20gaEQ).
 - c) Size: 087F125-18 7/8" (22mm) Furring Channel 18mils (25ga).
 - d) Size: 087F125-30 7/8" (22mm) Furring Channel 30mils (20gaNS)
 - e) Size: 087F125-33 7/8" (22mm) Furring Channel 33mils (20ga.)
 - f) Size: 087F125-43 7/8" (22mm) Furring Channel 43mils (18ga).
 - g) Size: 150F125-15 1-1/2" (38mm) Furring Channel 15mils (25gaEQ).
 - h) Size: 150F125-23 1-1/2" (38mm) Furring Channel 23mils (20gaEQ).
 - i) Size: 150F125-18 1-1/2" (38mm) Furring Channel 18mils (25ga).
 - j) Size: 150F125-30 1-1/2" (38mm) Furring Channel 30mils (20gaNS).
 - k) Size: 150F125-33 1-1/2" (38mm) Furring Channel 33mils (20ga).
 - l) Size: 150F125-43 1-1/2" (38mm) Furring Channel 43mils (18ga).
 - m) Size: 150F125-54 1-1/2" (38mm) Furring Channel 54mils (16ga).
 - n) Size: As required by design.
9. Connectors & Framing Accessories: Accessories required by this project.
- a) VertiFlex
 - b) TopFlex
 - c) StrutFlex
 - d) TuffClip
 - e) TuffStrut

- f) TuffAnchor
- g) StrapTies (Flat Strapping)
- h) GussetPlates
- i) WebStiffeners
- j) SolidBlocking
- k) CRC Connector
- l) Resilient Channel (RC-1, RC-2)

- 10. Fasteners: Self-drilling, self-tapping screws; complying with ASTM C 1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- 11. Touch-Up Paint: Complying with ASTM A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

C. MATERIALS

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

III. EXECUTION

A. INSPECTION

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

B. PREPARATION

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

C. FABRICATION

- 1. Prior to fabrication of framing, submit shop drawings to the architect or engineer to obtain approval.
- 2. 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.
- 3. Cut all framing components square for attachment to perpendicular members or as required for an angular fit against abutting members.
- 4. 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.
- 5. In all doubled jamb studs and doubled headers not accessible to insulation contractors, provide insulation equal to that specified elsewhere.
- 6. Splices in members other than top and bottom runner track are not permitted.

7. Provide temporary bracing where required, until erection is complete.

D. INSTALLATION - GENERAL

1. Install steel framing members in accordance with ASTM C1007 and AISI S240 and in accordance to shop drawings.
2. Install framing members in one piece full length.
3. Install temporary bracing and supports to secure framing and support loads in comparable in intensity to those which the structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are complete.
4. Jack studs or short studs shall be installed below windows, above window and door headers, and elsewhere to furnish supports.
5. Lateral bracing shall be provided by use of gypsum board and gypsum sheathing or by horizontal straps or cold-rolled channels.
6. Provisions for structure vertical movement shall be provided where indicated on the shop drawings prepared by the engineer of record.
7. Handling and lifting of prefabricated panels shall be done in a manner so as not to cause distortion in any member.

E. INSTALLATION - LOAD-BEARING WALLS

1. Install continuous top and bottom tracks sized to match the studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as indicated on shop drawings.
2. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8" between the end of wall framing member and the web of the track. Fasten both flanges of each stud to top and bottom tracks. Space studs as indicated on the shop drawings.
3. Align studs vertically where floor framing interrupts wall framing continuity. Where studs cannot be aligned, continuous reinforce track to transfer loads.
4. Align floor and roof framing over studs according to AISI S200.
5. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated on shop drawings. Fabricate headers according to shop drawings.
 - a) Frame wall openings with not less than a double stud at each jamb of frame as indicated on shop drawings. Fasten jamb members together to uniformly distribute loads.
 - b) Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with UtilityAngles or by welding, and space jack studs same as full height wall studs.
6. Install supplemental framing, blocking, and bracing as indicated on shop drawings.
7. Install horizontal bridging in stud framing spaced vertically at 48" on center along the length of the stud as indicated on the shop drawings.
 - a) Channel Bridging: Cold Rolled Channel welded or mechanically fastened to webs of each stud with BridgeSmart Connectors.

- b) Strap Bridging: Combination of flat straps of width and thickness as indicated on shop drawings along with solid blocking of width and thickness as indicated on shop drawings.
- 8. Install steel sheet diagonal bracing straps to both sides of stud flanges along with Utility Angles and anchor to structure as indicated on shop drawings.
- 9. Splices in axially loaded studs are not permitted.

F. INSTALLATION - JOISTS

- 1. Install perimeter track size to match joist framing. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings as indicated on shop drawings.
- 2. Install joist bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both legs of joist track.
- 3. Install joists over supporting framing with a minimum end bearing indicated on shop drawings.
- 4. Reinforce ends of bearing points of joists with web stiffeners as indicated on shop drawings.
- 5. 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 on shop drawings.
- 6. Install web stiffeners to transfer axial loads of walls above.
- 7. Install bridging at intervals as indicated on shop drawings. Fasten bridging at each joist intersection as indicated on shop drawings.
- 8. Secure joists to load bearing interior walls to prevent lateral movement of bottom flange.

G. REPAIRS AND PROTECTION

- 1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings according to ASTM A780.

END OF SECTION