

## INSTRUCTIONS TO SPECIFIER

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Coordinate cross references to other specification sections in this section with actual specification section numbers and titles.

Text in **bold** within square brackets [ ] are editing options. Angle brackets < > are used to indicate where user text is to be inserted.

## **SECTION 054000.10 PREFABRICATED WALL ASSEMBLIES**

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Prefabricated interior and exterior load bearing wall panel assemblies.
- B. Prefabricated interior non-load bearing wall panel assemblies.
- C. Principal Products
  - 1. Cold-formed metal framing
  - 2. Sheathing
  - 3. Air, water, and vapor barriers (membranes only).
  - 4. Insulation
  - 5. Cladding supports
- D. Related Sections:
  - 1. Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
  - 2. Division 7 Section "Building Insulation."
  - 3. Division 9 Section "Gypsum Board Assemblies" for interior non-load bearing metal stud framing and ceiling-suspension assemblies.
  - 4. Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies."

#### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination Procedures:
  - 1. BIM Model of framing layout.
  - 2. Coordinate locations of wall framing members for support of wall-mounted elements.
  - 3. Coordinate installation of work within or attached to framing system.
  - 4. Embed Plates: Coordinate with steel or concrete.
  - 5. Clash detection of MEP.

Klover will install panels at project location or provide installation by manufacturer approved installers.

- B. Preinstallation Coordination Meeting Attendees and Procedures:
  - 1. Conduct meeting, [1-week] [2-weeks] [\_\_\_\_\_] minimum, before starting Work of this Section.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of prefabricated wall assembly.
  - 1. Framing components, sizes, materials, finishes, and accessories.
  - 2. Post-installed anchors.
- B. Shop Drawings:
  - 1. Framing layout, components, connections, fastenings, and details.
    - a. Show control lines laying out how the wall will be positioned.
  - 2. Components for supporting Work of other Sections.
  - 3. Method of attaching CFMF to other construction elements.
    - a. Show location of embed plates for shear wall attachment to construction not by panel manufacturer.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Delegated Design Submittals:
  - 1. Structural analysis and calculations for loadings and stresses of framing.
- B. BIM Model, minimum 400 level of design.

### 1.5 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Welding: Current certificates for required welding processes.
    - a. AWS D1.1 - Structural Welding Code - Steel.
    - b. AWS D1.3 - Structural Welding Code - Sheet Steel.
  - 2. Licensed Professionals: Engineer licensed in State where project is located who specializes in design of CFMF framing assemblies.
  - 3. Panel Manufacturer Qualifications: [5 years] [\_\_\_\_\_] experience fabricating wall assemblies.
- B. Mockup: Provide prefabricated panel assembly for wall mockup containing a minimum of one window framed opening using materials and methods intended for use on the Project.
  - 1. Approved mockup establishes work results standard.
  - 2. Approval of mockup does not constitute approval of deviations from the Contract Documents unless Architect specifically approves such deviations in writing.
  - 3. Approved mockup will [not] remain part of finished work.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements:
  - 1. Handle wall panels to prevent racking or other distortion. Unload panels by crane.
  - 2. Protect components from corrosion.
  - 3. Store components elevated above grade, protected from precipitation and storm water runoff.
  - 4. Store and handle to prevent deformation and damage to coatings.

## 1.7 FIELD MEASUREMENTS

- A. Verify locations of adjacent construction before fabrication of panels.

## 1.8 WARRANTY

- A. Manufacturer's Warranty materials and workmanship.
  - 1. Warranty Period: 2 years from date of delivery.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE

- A. Delegated Design: Steel stud framing designed by manufacturer's engineer registered in state of project location.
  - 1. Base design calculations on AISI publications "Cold-Formed Steel Design Manual" and "Cold-Formed Steel Framing Design Guide."
  - 2. Design framing to accommodate construction tolerances, deflection of building structure, and clearances for openings.
  - 3. Select structural grade and thickness of base steel and component spacings for indicated framing member depths.
- B. Structural Load Criteria: See Structural Drawings.

Retain deflection limits if required for project. For example, use L/720 for brick cladding to limit the movement of brick and prevent failure of brick. For lightweight cladding, L/240 may be used. L/360 can be used for tile or stone facing. It is important to coordinate deflection limits with cladding type.

- C. Deflection Limits: SSMA "Product Technical Guide."
  - 1. Exterior Walls: Maximum [L/240] [L/360] [L/600] [L/720] without sheathing.
- D. Structural Movement: See Structural Drawings for [structural steel deflection and column shortening] [wind movement] [concrete creep].
- E. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and [ASTM C955] [AISI S200 and ASTM C955, Section 8] [AISI S240]. [NOTE to specifier: Use ASTM C955 for IBC 2009 and 2012, Use AISI S200 and ASTM C955, Section 8 for IBC 2015, Use AISI S240 for IBC 2018.]

- F. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 2.2 STANDARD SYSTEM PANELS

- A. Manufacturers:
  - 1. Basis of Design: Klover Prefabrication PA Inc.; 215-536-7706; <https://kloverprefab.com>.
- B. Curtain Wall Panels: Manufacturer; engineered steel stud framing for shop-fabricated panelization.
  - 1. Sill and head track: C-stud track with lip return flanges precision cut to receive vertical studs. Dimpled flanges to prevent fastener head interference with sheathing.
  - 2. Studs: Formed with crimped ends swaged into sill and head track.
  - 3. Bridging: Continuous channel.
- C. Load Bearing Wall Panels: Manufacturer, engineered steel stud framing for shop-fabricated load-bearing panelization.
  - 1. Sill and head track: C-stud track with lip return flanges precision cut to receive vertical studs. Dimpled flanges to prevent fastener head interference with sheathing.
  - 2. Studs: Formed with crimped ends swaged into sill and head track.
  - 3. Bridging: Continuous channel.
  - 4. HSS members as required to support structure.
- D. Shear Wall Panels:
  - 1. End Posts: Hollow Steel Section [HSS Distribution Header Beam, as required for project conditions].
  - 2. Diagonal Strapping: Welded Shear Wall Flat Strapping.
- E. Infill Panels: Formed sheet steel, thickness determined by performance requirements.
- F. Framing Members and Components - General: AISI S240.
- G. Steel Sheet: ASTM A1003.
  - 1. Grade: [ST33H] [ST50H] [Selected for performance requirements].
  - 2. Metallic Coating: AISI S240, [CP60] [CP90].
- H. Studs: C-shaped with flange returns, web punched for utility access, in depths noted on [shop drawings] [or] [Drawings].

Klover's studs are 6.25 inches to accommodate the special fit between studs and structural members.

- 1. Depth: 6.25 inches
  - 2. Flange Width: 2 inches
- I. Bottom Track: Channel shape, punched, returned and notched, flanges.
  - 1. Base Metal Thickness: Same as studs.
  - 2. Flange Width: 2 inches
- J. Top Track: Provide the following:
  - 1. Channel shape, punched, returned and notched flanges, with clips that accommodate plus or minus 1/2 inch movement of overhead structure without damage to framing.

- K. Bracing, Furring, Bridging, and Web Stiffeners: Formed sheet steel, thickness determined by performance requirements.
- L. Plates, Gussets, and Clips: Formed sheet steel, thickness determined by performance requirements specified.

Klover manufactures 6-1/4 inch studs but can provide studs in other sizes as required. Use the CUSTOM SYSTEM PANELS section below for sizes other than 6 inch. If not required, then delete section 2.3.

## 2.3 CUSTOM SYSTEM PANELS

- A. Manufacturers:
  - 1. Basis of Design: Klover Prefabrication PA Inc.; 215-536-7706; <https://kloverprefab.com>.
- B. Curtain Wall Panels: Manufacturer; engineered steel stud framing for shop-fabricated panelization.
  - 1. Sill and head track: C-stud track with straight flanges to receive vertical studs.
  - 2. Studs: Formed to fit snug into sill and head track.
  - 3. Bridging: Continuous channel.
- C. Load Bearing Wall Panels: Manufacturer, engineered steel stud framing for shop-fabricated load-bearing panelization.
  - 1. Sill and head track: C-stud track with straight flanges to receive vertical studs.
  - 2. Studs: Formed to fit snug into sill and track.
  - 3. Bridging: Continuous channel.
  - 4. HSS members as required to support structure.
- D. Shear Wall Panels:
  - 1. End Posts: Hollow Steel Section [HSS Distribution Header Beam, as required for project conditions].
  - 2. Diagonal Strapping: Welded Shear Wall Flat Strapping.
- E. Infill Panels: Formed sheet steel, thickness determined by performance requirements.
- F. Framing Members and Components - General: AISI S240.
- G. Steel Sheet: ASTM A1003.
  - 1. Grade: [ST33H] [ST50H] [Selected for performance requirements].
  - 2. Metallic Coating: AISI S240, [CP60] [CP90].
- H. Studs: C-shaped with flange returns, web punched for utility access, in depths noted on [shop drawings] [or] [Drawings].
  - 1. Depth: [4 inches] [8 inches] [See Drawings] [\_\_\_\_] inches nominal.
  - 2. Flange Width: [See Drawings] [1-3/8 inches] [1-5/8 inches] [2 inches] [2-1/2 inches] [Selected for performance requirements].
- I. Bottom Track: Channel shape with straight flanges.
  - 1. Base Metal Thickness: Same as studs.
  - 2. Flange Width: [See Drawings] [1-3/8 inches] [1-5/8 inches] [2 inches] [2-1/2 inches] [Selected for performance requirements].
  - 3. Subject to performance requirements.

- J. Top Track: Provide the following:
  - 1. Channel shape with straight flanges and clips that accommodate plus or minus 1/2 inch movement of overhead structure without damage to framing.
  - 2. Subject to performance requirements.
- K. Bracing, Furring, Bridging, and Web Stiffeners: Formed sheet steel, thickness determined by performance requirements.
- L. Plates, Gussets, and Clips: Formed sheet steel, thickness determined by performance requirements specified.

## 2.4 PANEL MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: [ST33H (ST230H)] [ST50H (ST340H)] [As required by structural performance].
- B. Fasteners: ASTM C1513; self-drilling, self-tapping screws, hot-dip galvanized.
- C. Welding Electrodes: AWS D1.3/D1.3M; type required for materials being welded.

## 2.5 INSTALLATION MATERIALS

- A. Field Panel Attachments. See Section 055000 "Metal Fabrications."
- B. Powder-Actuated Anchors: Tested per ASTM E1190 to sustain load equal to 10 times design load without failure.
- C. Galvanizing Repair Paint: SSPC Paint 20.
- D. Shims: Load-bearing, [high-density plastic] [or] [metal].

## 2.6 FABRICATION

Klover uses BIM models to guide computer controlled roll-forming machines to provide precision fabrication of wall panels. Their framing connections are swaged and dimpled for a precise and tight fit subject to performance requirements.

- A. Fabricate assemblies of sizes and profiles required using jigs to achieve an accurate, uniform size and shape.
- B. For windows and door openings, provide a 1/2 inch shim space total.
- C. Fabricate custom size indicated for support or anchorage of other construction.
- D. Diagonally brace wall panels indicated for shear construction.
- E. Fabricate bracing components to transfer loads to building primary structure.

- F. Install supplementary framing for support or anchorage of wall-supported construction elements.
- G. Cut framing members by sawing or shearing. Do not torch.

Klover can install masonry veneer brick anchors accurately aligned with the studs for secure anchorage. The next two lines may be removed if no brick veneer is required.

- H. Furnish masonry veneer brick anchors.
- I. Attach adjustable masonry veneer anchors for brick. Install anchors over self-healing membrane.
- J. Exterior Wall Framing: Shop fabricate panels for site installation with welded connections.
- K. Design and fabricate shop-built panels to withstand handling and erection stresses; provide lifting points.
- L. Weld built up members together with 2 inch length weld at 24 inches o.c., unless otherwise indicated.
- M. Insulate in the factory built-up members that will be inaccessible in the field.
- N. Apply galvanizing repair paint to shop welds.
- O. Fabrication Tolerances:
  - 1. Size: Maximum 1/8 inch deviation in 10 ft, non-cumulative.
  - 2. Squareness: Maximum 1/8 inch deviation between diagonals.
  - 3. Member Spacing: Maximum 1/8 inch deviation, non-cumulative.

## 2.7 PANEL ACCESSORIES

- A. Sheathing: Refer to Section 061600 "Sheathing."

Klover can apply self-adhered sheet membrane air and water barrier (permeable or impermeable) in the factory under controlled conditions. Membrane to match field installed assemblies.

- B. Self-adhering Sheet Membrane Air Barrier: Refer to Section 072715 "Nonbituminous Self-Adhering Sheet Air Barriers."

Klover can apply exterior rigid insulation in the factory under controlled conditions. Insulation to match field installed assemblies.

- C. Continuous Insulation: Refer to Section 072100 "Thermal Insulation."
- D. Cladding Supports: Refer to cladding section.

## 2.8 SOURCE QUALITY CONTROL

- A. Prefabricator must have a current ICC-ES approval report for the manufacture of cold-formed steel non-load bearing and load bearing wall framing members (studs, tracks, deflection tracks) and joists.
- B. Executed copies of the prefabricator's current quality control manual for the procurement and manufacture of cold formed steel studs and track must be maintained at the manufacturing facility and provided to ICC-NTA, LLC.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Verify substrates and attachment conditions are correctly located and comply with installation tolerances.

### 3.2 INSTALLATION

- A. Installation Standard: AISI "North American Standard for Cold-Formed Steel Framing.
- B. Install wall framing to form plumb, plane surfaces suitable for sheathing or other finishes.
- C. Field Welding: AWS D1.3.
  - 1. Minimum Thickness: Do not weld components less than 43 mils in thickness.
- D. Install securely to supporting structure.
  - 1. Screw, bolt, or weld panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- E. Shop-Fabricated Assemblies: Handle wall panels to prevent racking or other distortion.
- F. Weld panels to embedded weld plates.
- G. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- H. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- I. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- J. Fasten hole reinforcing plate per approved engineering design over web penetrations that exceed size of manufacturer's standard punched openings.
- K. 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 must not exceed minimum fastening requirements of sheathing or other finishing materials.
- L. Install load bearing shims between the underside of wall bottom track or rim track and top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction as required.
- M. Installation by Klover or Klover approved third party with minimum 5 years' experience installing pre-fabricated light gauge wall panels on projects of similar size and scope.

### 3.3 FIELD QUALITY CONTROL

- A. Refer to Structural Drawings and General Structural Notes for Inspection Requirements.
- B. Owner will engage a testing and inspecting agency to perform field tests and inspections and to prepare test reports. The testing agency will report test results in writing to Contractor and Architect.
- C. Remove and replace work that does not comply with specified requirements.
- D. Retesting of Failed Tests: Performed at Contractor expense.

### 3.4 REPAIRS AND PROTECTION

- A. Apply galvanizing repair paint to welds and to damaged metallic coatings, per ASTM A780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in manner acceptable to manufacturer and installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

### 3.5 CLEANING

- A. Cleaning:
  1. Remove wastes and rubbish from track and other horizontal members.
  2. Remove mud and other soiling from framing.

**END OF SECTION**