

SECTION 13 34 19
METAL BUILDING SYSTEMS

Specifier: These Specification Contains the following optional content. Remove as required:

- LEED Projects (Green)
- Domestic Content Projects (Red)
- Florida Projects (Orange)
- Factory Mutual Projects (Purple)
- Material Traceability (Blue)

PART 1 - GENERAL

1.1 SECTION INCLUDES

Specifier: Use this section carefully; restrict statements to describe components used to assemble the system

- A. Metal Building Systems Including:
1. Metal Framing Components
 2. Metal Wall Panels and Trim
 3. Metal Roof panels and trim

1.2 RELATED SECTIONS

Specifier: List the related sections that specify the installation of products specified in this specification and indicate the specific items

1.3 DESIGN REQUIREMENTS

Use this Article carefully; restrict statements to identify system design requirements only

- A. The building shall be designed by the Manufacturer as a complete system. Members and connections not indicated on the drawings shall be the responsibility of the Manufacturer and/or Contractor. All components of the system shall be supplied or specified by the same manufacturer.
- B. Governing Design Code: Structural design for the metal building system shall be performed by the manufacturer of the metal building system in accordance with the building code provided in the contract documents.
- C. Design Basis
1. Use standards, specifications, recommendations, findings, and interpretations of professionally recognized groups as basis for establishing design, drafting, fabrication, and quality criteria, practices, and tolerances, including the AISC Code of Standard Practice for Steel Buildings and Bridges.
 2. Design structures in accordance with MBMA Metal Building Systems Manual including fabrication and erection tolerances.
 3. Design structural mill sections and welded plate sections in accordance with AISC 360, ASD Method.
 4. Design the lateral force resisting systems and related components for seismic loads in accordance with AISC 341.
 5. Design cold-formed steel structural members and panels in accordance with AISI S-100.
 6. Design all bolted joints in accordance with RCSC Specification.
 7. Design roof assembly tested in accordance with UL 580 Class 90.
 8. Design Roof or Wall assembly to comply with the Florida Building Code including High Velocity Hurricane Zone of the Florida Building Code and have a valid Miami-Dade NOA.

9. Design Roof or Wall assembly to comply with the Florida Building Code and have a valid State of Florida Approval.
10. Design Roof or Wall assembly to comply Factory Mutual FM 4471 and/or FM 4881 Approval

D. Design Loads:

1. In accordance with Contract Documents and manufacturer's standard design practices.
2. Design loads include dead loads, roof live loads, wind loads, seismic loads, collateral loads, auxiliary loads, floor live loads and applied or specified loads.

1.4 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings:
 - a. Complete erection drawings with identification and assembly of building components.
 - b. Show anchor bolt settings, transverse cross-sections, sidewall, endwall, and roof framing, flashing and sheeting, and accessory installation details.
 - c. Bear seal and signature of Registered Professional Engineer responsible for metal building system design in accordance with state law.
2. Manufacturer installation manual showing:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
3. Structural Design Calculations: [___ sets] sealed and signed by a professional engineer licensed in accordance with applicable state law.
4. Buy American/ARRA Compliance Letter of Certification.
5. Documentation [including test reports] supporting Thermal Transmission Coefficients (U-factors) and Solar Heat Gain Coefficients (SHGC; for non-opaque components only) of
6. LEED Submittals: Provide Documentation for the following:
 - a. Cool Roof Rating Council (CRRC) listed.
 - b. Type III Environmental Product Declarations per ISO 14025

B. Samples:

1. Submit color chips showing manufacturer's full range of available colors and patterns for each finish product.
2. After color selection submit samples representing actual product, color, and patterns.

C. Quality Control Submittals:

1. IAS AC472 Certificate for each facility involved in the design and fabrication of the Metal Building System.
2. Certified Erector Certificate issued to the erector by the manufacturer.
3. Material Test Reports (MTR) for all steel material used in the manufacture of primary and secondary framing members,

panels and bolts specified in this section and when required by ASTM A 6/A 6M

1.5 QUALITY ASSURANCE

- A. Manufacturer and Fabricator Qualifications: Primary products furnished by single IAS AC472 accredited manufacturer/fabricator with minimum [5] [] years of experience.
- B. Erector Qualifications:
 - 1. Single installer with minimum [5] [] years of experience in installing products of same or similar type and scope.
 - 2. Installer must be certified by the metal building manufacturer.
- C. Welder Qualifications: AWS D1.1/D1.1M and/or AWS D1.3/D1.3M

1.6 WARRANTY

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal building system components that fail in materials and workmanship within one year from date of Substantial Completion.
- B. Special Weathertightness Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal building system components that fail to remain weathertight, including leaks, [without monetary limitation] [up to cost limitation of seven dollars (\$7.00) per square foot of covered area] [up to cost limitation of fourteen dollars (\$14.00) per square foot of covered area] within [5] [10] [15] [20] years from date of Substantial Completion.

1.7 ADMINISTRATION

- A. All nomenclature shall conform to the MBMA Metal Building Systems Manual.
- B. Coordination and administration of the work shall be in accordance with the MBMA Metal Building Systems Manual - Common Industry Practices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: Garco Building Systems, a subsidiary of NCI Building Systems, Inc. (www.garcobuildings.com). Acceptable manufacturers include other subsidiaries of NCI Building Systems, Inc.
- B. Substitutions: [Under provisions of Division 01] [Not permitted].

2.2 MATERIALS

- A. Buy American Act/American Reinvestment and Recovery Act (ARRA) requirements: Provide materials in compliance with the following requirements:
 - 1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a - 10d for non-ferrous products.
 - 2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA), for ferrous products.
- B. Primary Framing Steel:
 - 1. Recycled Content: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 75 percent.
 - 2. Hot-rolled shapes: ASTM A 36 or ASTM A 992 or ASTM A572, minimum yield of 36 ksi (248 MPa) or 50 ksi (345 MPa).
 - 3. Built-up sections:
 - a. Webs:

- 1) ASTM A 1011 or ASTM A1018, SS or HSLAS Class 1, Grade 55 (380) for webs 3/16 inch (4.76 mm) thick and thinner.
- 2) ASTM A 572 Grade 50 (340) or 55 (380) for webs thicker than 3/16 inch (4.76 mm).
- b. Flanges: ASTM A 529 Grade 55 (380) or ASTM A 572 Grade 50 (340) or 55 (380).
- 4. Round tube: ASTM A 500, Grade B or C with minimum yield strength of 42 ksi (290 MPa).
- 5. Square and rectangular tube: ASTM A 500, Grade B or C, minimum yield strength of 42 ksi (290 MPa).
- 6. Cold-formed C sections: ASTM A 1011, Grade 55 (380), or ASTM A 653, Grade 55 (380).
- 7. X-bracing: ASTM A 529 or A 572 for rod bracing 36 ksi (248 MPa) or 50 ksi (345 MPa), ASTM A 36 for angle bracing or ASTM A 475 for cable bracing.
- C. Secondary Framing Steel:
 - 1. Recycled Content: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 2. Purlins, girts, and eave struts: ASTM A 1011 Grade 55 (380), or ASTM A 653, Grade 55 (380).
 - 3. Finish: [G-90 Pre-galvanized] [Red Oxide] [Gray] Shop Coat. Shop coat only intended to provide temporary protection during transportation and erection.
- D. Bolts
 - 1. Rigid Frame Connections: Provide High Strength Bolts, Nuts and Washers:
 - a. Bolts: ASTM A 325 or ASTM A 490 Heavy Hex Structural Type I as required by manufacturer's design.
 - b. Washers: [ASTM F 436 Type 1 Hardened Steel] [Not Required].
 - c. Nuts: ASTM A 563 Grade C Heavy Hex.
 - d. Coating: [ASTM F 1941 Electrodeposited Yellow Zinc] [Hot-Dipped Galvanized].
 - 2. Other Connections: Provide High Strength or Machine Bolts as required by manufacturer design.
- E. Single Skin Panels:
 - 1. Recycled Content: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 - 2. Standing Seam Roof Panels:
 - a. Painted: ASTM A 792 AZ 50 SS Grade 50 Class 4
 - b. Bare: ASTM A 792 AZ 55 SS Grade 50 Class 4
 - 3. Through-Fastened Roof and Wall Panels:
 - a. Painted: ASTM A792 AZ 50 SS Grade 80 Class 1
 - b. Bare: ASTM A 792 AZ 55 SS Grade 80 Class 1

Specifier: Gauge alone is an insufficient way to specify thickness for cold-formed steel coil material due to outdated standards which have built-in tolerances greater than current coil steel manufacturing technology requires. However, much of the construction industry continues to specify thickness by gauge alone, which allows for possible gamesmanship in material thickness specification by allowing manufacturers to intentionally use tolerances to reduce supplied minimum thickness. To ensure the material provided meets the intended specification, it is recommended that the gauge designations be used only as descriptors that reference a minimum uncoated decimal thickness defined explicitly in a shared area of the specification as shown below. Specifying material by gauge alone will default to outdated standards being used to provide a minimum or nominal thickness.

4. Thickness:
 - a. 26 gauge: 0.0172 inch (0.437 mm) minimum uncoated thickness.
 - b. 24 gauge: 0.0212 inch (0.538 mm) minimum uncoated thickness.
 - c. 22 gauge: 0.0272 inch (0.690 mm) minimum uncoated thickness.
5. Finish:
 - a. Exterior Paint:

Specifier: When specifying insulated panels, it is generally advisable to specify a maximum U-factor on the basis of the prescriptive requirements of the applicable energy code and have the contractor coordinate with other disciplines once the supplier is selected and thickness is determined. Alternatively, thickness can be specified below and then have the contractor verify code compliance via a trade-off calculation using acceptable compliance software such as ComCheck (<http://www.energycodes.gov/comcheck>) once the supplier is selected as the U-factor will not match ASHRAE requirements exactly in this case. It is not recommended to specify insulation R-value since there is no nationally recognized standard for determining the R-value of IMPs and not all manufacturers report equivalent R-values due to different handling of the effects of joints, air films, temperature differentials, etc. Determination of U-factor of generic assemblies is addressed in Appendix A of ASHRAE 90.1 and this generally leads to comparable numbers between manufacturers. Retain item d or e below as appropriate here and similarly below.

Specifier: Retain one or more of the following three finish paragraphs as applicable to the project. Coordinate with Warranty article in Part 1.

- 1) Modified Silicone-Polyester Two-Coat System (SMP): 0.20 - 0.25 mil primer with 0.7 - 0.8 mil color coat. Basis of Design: Signature 200.
 - 2) Fluoropolymer Two-Coat System (PVDF): 0.2 - 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat. Basis of Design: Signature 300.
 - 3) Fluoropolymer Two-Coat Metallic System (PVDF Metallic): 0.2 - 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF metallic fluoropolymer color coat. Basis of Design: Signature 300 Metallic.
- b. Interior Paint: 0.5 mil total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

6. Maximum U-factor: _____ BTU/hour-square foot-degree F.
7. Air Infiltration: Maximum air infiltration of 0.04 cubic feet per minute per square foot of specimen area when tested to ASTM E 1680 at a pressure differential of +/- 1.57 psf (75 Pa).
8. Water Infiltration: No uncontrollable water leakage when tested to ASTM E 1646 at a 20 psf (955 Pa) pressure differential when sprayed with 5 gallons of water per hour per square foot (203 liters per square meter) of specimen area.
9. FM Approvals Rating: Provide FM 4881 Approved panels on the basis of the following ratings. Identify materials with FM Approvals markings:
 - a. Hail: Severe.
 - b. Wind: Class + ____/- ____, Zone H.

F. Insulated Metal Wall Panels

Specifier: Although FM Approvals requirements are not required for the majority of projects, the International Building Code does reference FM Approval Standard 4880 in Chapter 26 to qualify foam plastics for the thermal barrier exemption and requires them to be labeled when that exemption is exercised.

1. Labeling: Labeled through [a nationally recognized program] [FM Global], identifying the manufacturer, product name and model and product listings required in this section.
2. Panel Core: Foamed in-place, Zero Ozone Depletion Potential polyurethane or polyisocyanurate.
3. Fire Resistance:
 - a. FM 4880 Class 1 Approval with no height restrictions.
 - b. Flame Spread and Smoke Developed Index: The Flame Spread Index shall not exceed 25 and the Smoke Developed Index shall not exceed 450 when tested to ASTM E 84.
4. Panel Strength: Determine and certify panel allowable strengths as follows:
 - a. Positive Loading (Toward Panel Supports): Determine in accordance with ASTM E 72.
 - b. Negative Loading (Away from Panel Supports): Determine in accordance with ASTM E 1592.
5. U-Factor Determination: ASTM C 1363 conducted in accordance with ASHRAE 90.1 Section A9.3.2 or by Finite Element Modeling per ASHRAE 90.1 Section A9.4 and using core insulation thermal conductivity (k-factor) determined using ASTM C 518 conducted at 75-degree F mean temperature in the calculation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean surfaces prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for best result for substrate.

3.2 INSTALLATION

- A. Install system in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Fit members square against abutting components.
- C. Position members plumb, square, and level.
- D. Temporarily brace members until permanently fastened.
- E. Do not splice load bearing members.
- F. Align and adjust various members forming parts of a complete frame or structure after assembly but before fastening.
- G. Welding to conform to AWS D1.1.
- H. Fasten panels to supports.
- I. Install trim to maintain visual continuity of system.
- J. Install joint sealant and gaskets to prevent water penetration.
- K. Flash penetrations through roofing with metal trim to match panels

3.3 PROTECTION

- A. Protect installed products until completion of project.

3.4 ADJUSTMENT

- A. Touch up, repair, or replace damaged products before Substantial Completion.