

## SECTION 13 34 19

### METAL BUILDING SYSTEMS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes pre-engineered, shop fabricated structural steel building frame; insulated metal wall and sloped roof system including soffits, gutters and downspouts.
- B. Related Sections:
  - 1. Section 03 10 00 - Concrete Forming and Accessories: Execution requirements for placement of anchor bolts base plates specified in this section in concrete.
  - 2. Section 07 90 00 - Joint Protection.

##### 1.2 REFERENCES

- A. American Institute of Steel Construction:
  - 1. AISC S335 - Specification for Structural Steel Buildings Allowable Stress Design, and Plastic Design.
  - 2. AISC S342L - Load and Resistance Factor Design Specification for Structural Steel Buildings.
- B. ASTM International:
  - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - 3. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - 4. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - 5. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
  - 6. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - 7. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
  - 8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 9. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
- C. American Welding Society:
  - 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
  - 2. AWS D1.1 - Structural Welding Code - Steel.
- D. Metal Building Manufacturers Association:
  - 1. MBMA - Low Rise Building Systems Manual.
- E. SSPC: The Society for Protective Coatings:
  - 1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

### 1.3 SYSTEM DESCRIPTION

- A. Single span rigid frame with straight columns.
- B. Primary Framing: Rigid frame of rafter beams and columns, end wall columns, and wind bracing.
- C. Secondary Framing: Purlins, girts, eave struts, flange bracing, sill supports, clips, and other items detailed.
- D. Wall System: Preformed metal panels of vertical profile, with sub-girt framing/anchorage assembly, insulation, liner sheets, and accessory components.
- E. Roof System: Preformed metal panels of upslope profile, with sub-girt framing/anchorage assembly, insulation, and accessory components.
- F. Roof Slope: 1 inch in 12 inches, main roof; 1/4 inch in 12 inches, lean-tos.

### 1.4 DESIGN REQUIREMENTS

- A. Thermal resistance of Installed Wall System: R-Value of 13 minimum.
- B. Thermal Resistance of Installed Roof System: R-Value of 19 minimum.
- C. Design members to withstand dead load, applicable snow load, vertical and horizontal seismic loads, and design loads due to pressure and suction of wind calculated in accordance with applicable code.
- D. Maximum allowable deflection: 1/180 of span with imposed loads for exterior wall and roof system.
- E. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.
- F. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 100 degrees F.
- G. Size and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance.

### 1.5 PERFORMANCE REQUIREMENTS

- A. Provide components of each type from one manufacturer compatible with adjacent materials.
- B. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M, desiccant method water method.

### 1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers, and loads, ; wall and roof system dimensions, panel layout, general construction details, anchorages and method of anchorage, method or installation;

framing anchor bolt settings, sizes, and locations from datum, and foundation loads; indicate welded connections with AWS A2.4 welding symbols; indicate net weld lengths; provide professional seal and signature.

- C. Product Data: Submit data on profiles of framing and cladding members, component dimensions, fasteners, and performance characteristics .
- D. Samples: Submit two samples of precoated metal panels for each color selected, 3 x 5 inch in size illustrating color and texture of finish.
- E. Manufacturer's Instructions: Submit preparation requirements, anchor bolt placement and setting requirements.
- F. Erection Drawings: Indicate members by label, assembly sequence, and temporary erection bracing.

### **1.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of concealed components and utilities.

### **1.8 QUALITY ASSURANCE**

- A. Perform Work in accordance with AISC S335, AISC S342L, and MBMA Low Rise Building Systems Manual.
- B. Insulation Installed in Concealed Locations Surface Burning Characteristics:
  - 1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- C. Insulation Installed in Exposed Locations Surface Burning Characteristics: 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

### **1.9 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Erector: Company specializing in performing Work of this section with minimum three years documented experience and approved by manufacturer.
- C. Design structural components, develop shop drawings, and perform shop and site work under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of North Carolina.

### **1.10 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

## **1.11 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for pre-engineered building systems and components.
- C. Furnish twenty year warranty to include coverage for exterior pre-finished surfaces color coat against chipping, cracking or crazing, blistering, peeling, chalking, or fading. Include coverage for weather tightness of building enclosure elements after installation.

## **PART 2 PRODUCTS**

### **2.1 PRE-ENGINEERED BUILDINGS**

- A. Manufacturers:
  - 1. Butler Manufacturing Co.
  - 2. Lester Building Systems.
  - 3. Trachte Building Systems, Inc.
  - 4. Varco-Pruden Buildings.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.

### **2.2 COMPONENTS - FRAMING**

- A. Structural Steel Members: ASTM A529/A529M Grade 50.
- B. Structural Tubing: ASTM A500/A500M, Grade B.
- C. Plate or Bar Stock: ASTM A529/A529M Grade 50.
- D. Anchor Bolts: ASTM A307 Grade A, galvanized.
- E. Bolts, Nuts, and Washers: ASTM A325 galvanized.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Primer: SSPC Paint 20, Red Oxide.
- H. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

### **2.3 COMPONENTS - WALL AND ROOF SYSTEM**

- A. Sheet Steel: ASTM A792/A792M; AZ50 aluminum-zinc alloy coating; 0.030 inch thick.
- B. Insulation: Roll glass fiber type, faced with reinforced white vinyl.
- C. Joint Seal Gaskets: Manufacturer's standard type.
- D. Fasteners: Manufacturer's standard type, high performance organic coating, finish to match adjacent surfaces when exterior exposed.

- E. Bituminous Paint: Asphaltic type.
- F. Sealant: Manufacturer's standard type, as specified in Section 07 90 00, non-staining, elastomeric, skinning.
- G. Roof Curbs: Insulated metal same as roofing, inch thick, designed for imposed equipment loads, anchor fasteners to equipment, counterflashed to metal roof system.
- H. Trim, Closure Pieces, Caps, Flashings, and Facias: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

## **2.4 FABRICATION - FRAMING**

- A. Fabricate members in accordance with AISC Specification for plate, bar, tube, or rolled structural shapes.
- B. Anchor Bolts: Formed with bent shank, assembled with template for casting into concrete.
- C. Provide framing for door openings.

## **2.5 FABRICATION - WALL AND ROOF SYSTEMS**

- A. Siding: Minimum 0.024 inch metal thickness, ribbed profile, 2 inch deep, concealed fastener type, male/female edges, 16 inch coverage.
  - 1. Varco-Pruden Tech Four Wall Panel or equivalent.
- B. Roofing: Minimum 0.024 inch metal thickness, standing seam profile, 2 inch deep, concealed clip type, lapped edges with factory sealant, field seamed, 16 inch coverage.
  - 1. Varco-Pruden SLR Roof Panel or equivalent.
- C. Liner: Minimum 0.024 inch metal thickness, V crimped profile, lapped V edges.
- D. Soffit Panels: Minimum 0.024 inch metal thickness, V crimped profile, unperforated.
- E. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.
- F. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with 0.024 inch thick sheet.
- G. Flashings, Closure Pieces, Fascia, and Caps: Same material and finish as adjacent material, profile to suit system.
- H. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

## **2.6 FABRICATION - GUTTERS AND DOWNSPOUTS**

- A. Fabricate of same material and finish as roofing metal.
- B. Form gutters and downspouts of profile and size to collect and remove water. Fabricate with connection pieces.

- C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.
- D. Fabricate support straps of same material and finish as roofing metal, color as selected.

## **2.7 FACTORY FINISHING**

- A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.
- B. Galvanizing for Nuts, Bolts and Washers: ASTM A153/A153M.
- C. Interior Surfaces of Wall Roof Components and Accessories: Precoated enamel on steel of modified silicone finish, color as selected from manufacturer's standard range.
- D. Exterior Surfaces of Wall and Roof Components and Accessories: Precoated steel of fluoropolymer finish, color as selected from manufacturer's standard range.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

### **3.2 ERECTION - FRAMING**

- A. Erect framing in accordance with AISC Specification.
- B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.
- C. Set column base plates with non-shrink grout to achieve full plate bearing.
- D. Do not field cut or alter structural members without approval of Engineer.
- E. After erection, prime welds, abrasions, and surfaces not shop primed.

### **3.3 ERECTION - WALL AND ROOFING SYSTEMS**

- A. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- B. Fasten cladding system to structural supports, aligned level and plumb.
- C. Use concealed fasteners.
- D. Install insulation and vapor retarder utilizing insulated spacers for attachment. Place wire mesh under vapor retarder for support between framing members.
- E. Install sealant and gaskets to prevent weather penetration.

**3.4 ERECTION - GUTTER AND DOWNSPOUTS**

- A. Rigidly support and secure components. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- B. Apply bituminous paint on surfaces in contact with cementitious materials.
- C. Slope gutters minimum 1/8 inch/ft.
- D. Connect downspouts to storm sewer system.

**3.5 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
- C. Siding and Roofing: 1/8 inch from indicated position.

**END OF SECTION**