

SECTION 13120 - STEEL BUILDING SYSTEMS

PART 1 - GENERAL

1.01 SECTION INCLUDES:

- A. Pre-engineered building and components including the following:
 - 1. Structural steel frame.
 - 2. Roof covering system including exterior roof panels, panel attachments, sealants, mastics, trim and flashings.
 - 3. Exterior wall system including wall panels, panel attachments, sealants, mastics, trim and flashings.

- B. Wall accessories including the following:
 - 1. Louvers; see mechanical for size.

1.02 RELATED SECTIONS

- A. Section - Cast-in-Place Concrete: Foundations and anchor bolts.

- B. Section 09900 - Paints and Coatings: Finish painting of structural members, doors, roof curbs, and factory prime painted miscellaneous items.

1.03 REFERENCES

- A. AWS D1.1 - Structural Welding Code; American Welding Society.

- B. Factory Mutual (FM): Wind classification rating system.

- C. IAS AC472 International Accreditation Services.

- D. NAIMA 202 - Standard for Flexible Fiber Glass Insulation Used in Metal Buildings; North American Insulation Manufacturers Association.

- E. UL 580 - Tests for Wind Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.

- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.

- G. Canadian Welding Bureau: A660 Certification.

1.04 DEFINITIONS

- A. Building Width: Measured from outside to outside of sidewall girts. Typically edge to edge of concrete.
- B. Building Length: Measured from outside to outside of end wall girts. Typically edge to edge of concrete.
- C. Building Line: Outside face of steel/girt.
- D. Building Eave Height: Measured from the top of the eave member at the outside of the sidewall girt line to the bottom of the sidewall column base plate or to finished floor if columns are on grout or recessed below finished floor.
- E. Bay Spacing: Measured from centerline to centerline of primary frames for interior bays and from centerline of the first interior frame to outside of end wall girts for end bays.
- F. Roof Pitch: The ratio of the vertical rise to the horizontal run (i.e. 1:12 = 1 inch of rise for every foot of horizontal dimension).

1.05 SYSTEM DESCRIPTION

- A. General:
 - 1. Provide metal building frame, metal wall panels, metal roof panels, accessories and miscellaneous materials for a complete enclosure including supports for building components specified in other sections.
 - 2. Design structural systems according to professionally recognized methods and standards and legally adopted building codes.
 - 3. Design under supervision of professional engineer licensed in the jurisdiction of the Project.
- B. Design Requirements:
 - 1. Bay size: see drawings.
 - 2. Roof pitch: see drawings.
 - 3. Building location zip code: 40701
 - 4. See structural notes plan sheet S-4.
- C. Panel Requirements:
 - 1. SSR Roof System tested and certified to meet Underwriters Laboratories UL 90 wind uplift rating.

2. Panels tested in accordance with U.S. Corp of Engineers ASTM E 1592.
3. Panel fastening meeting uplift requirements based on tested fastener values with appropriate Safety Factors.
4. Purlin strength with SSR roof panel determined and tested in accordance with AISI procedures.
5. Panel Rib panels are accepted for use by the Dade County Building Commission and are UL-60 and UL-90 certified.
6. All load and code information must be obtained directly from the Authority Having Jurisdiction.

D. Performance Requirements:

1. System to withstand gravity and lateral loads in compliance with contract documents.
2. Refer to contract drawings for additional concentrated loads to pre-engineered building hanger beams and support jacks.
3. Allowable Deflections: Deflection/drift criteria shall follow recommendations outlined in AISC Design Guide 3 and MBMA Serviceability recommendations.
4. Metal wall panels (interior and exterior) shall not to be used as shear elements. Specify if metal wall and girt assembly require specific deflection constraints
5. Construct assembly to 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 (37 degrees C) in a 24 hour period.
6. Design and fabricate wall and roof systems free of distortion or defects detrimental to appearance or performance. Some oil canning in rolled panels especially in the flats of the panel is normal and is not cause for rejection.

- E. Serviceability Criteria: Deflection limits for major components based on VP Buildings standards unless otherwise noted. Deflection requirements on hangars with sliding or fabric doors need to be included for the door support frames both from dead load deflection in inches and uplift deflection in inches. This may differ from the building due to the specific door requirements and should be supplied to eliminate future deflection issues.

1.06 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Design Data: Provide detailed design criteria and calculations prepared by a licensed structural engineer.
- C. Certification: Manufacturer certification that the building conforms to the contract documents and manufacturer's standard design procedures.

- D. Shop Drawings: Show building layout, primary and secondary framing member sizes and locations, cross-sections, and product and connection details.
 - 1. Anchor Bolt Installation Drawings.
- E. Information on manufactured products to be incorporated into the project.
- F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.
- H. Certificates: Welder certifications

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 5 years experience in the actual production of specified products.
 - 1. Member of the Metal Building Manufacturer's Association (MBMA).
 - 2. Primary manufacturer of frames, secondary steel, roof and wall sheeting, and trim.
- B. Installer Qualifications - Firm experienced in application or installation of systems similar in complexity to those required for this project, plus the following:
 - 1. Acceptable to or licensed by manufacturer.
 - 2. 3 years experience with systems.
 - 3. Successfully completed not less than 5 comparable scale projects using this system.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.09 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

- A. Manufacturer shall warranty installed system for the periods described herein, starting from Date of Substantial Completion or ninety days from delivery, whichever comes first, against all the conditions indicated below. When notified in writing from Owner, manufacturer/installer shall, promptly and without inconvenience and cost to Owner, correct said deficiencies.
 - 1. Materials and Workmanship Warranty:
 - a. Warranty Period: 3 years, standard.
 - 2. SSR/SLR Standard Weathertight Endorsement:
 - a. Warranty Period: 20 years.
 - 3. Finish Warranty:
 - a. Finish coating shall not peel, blister, chip, crack or check in finish, and shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D 4214.
 - b. Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D 2244.
 - 1. Panel finish: 25 years.
 - 4. Performance Warranty: Furnish written warranty, stating sheet metal roofing system and flashing (flashing under premium warranty only) under this Section will be maintained in watertight condition and defects resulting from the following items will be corrected without cost to Owner for a period of 20 years.
 - a. Faulty workmanship.
 - b. Defective materials including sealants and fasteners.
 - c. Water infiltration.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Varco Pruden Buildings, which is located at: 3200 Players Club Circle ; Memphis, TN 38125; Toll Free Tel: 800-238-3246; Tel: 901-748-8000; Email: [request info \(vpsales@vp.com\)](mailto:request info (vpsales@vp.com)); Web: www.vp.com
- B. Substitutions: Reviewed equal.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.02 STRUCTURAL STEEL FRAMING

- A. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. Provide a clear span that supports the loads at bay spacing indicated. Roof pitch at 1:12; Lean-to @ Office, roof pitch 2:12.
- B. Primary Framing: Continuous Beam (CB Series) solid web framing utilizing tapered or uniform depth beams or girders supported on tapered or uniform depth columns. Locate interior columns where indicated and designed to support loads at bay spacing indicated.
- C. End Wall Framing: Corner posts, end posts and rake beams.
- D. End Wall Framing: Half-loaded full frames.
- E. Steel Surface Preparation: SSPC-SP 2.

2.03 SECONDARY FRAMING

- A. Purlins: Zee-shaped; depth as required; with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
 - 1. As required.
- B. Girts: Zee- or Cee-shaped; depth as required, with minimum yield strength of 60,000 psi (410 MPa); simple span or continuous span as required for design. G-30 galvanized standard material. Welded members are manufacturer's standard primer.
 - 1. As required.
- C. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design but in most cases, 50 ksi.
- D. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design but in most cases 60 ksi.

2.04 MISCELLANEOUS FRAMING

- A. Base Angles: 2 inch by 3 inch by 0.060 inch galvanized steel angles, with minimum yield strength of 55 ksi (380 MPa), anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 4 feet on center and not more than 6 inches from the end of any angle member. Anchors are not provided by the metal building manufacturer.
- B. Door Headers and Jambs: Zee- or Cee-shaped; depth as required; with minimum yield strength of 60 ksi (410 MPa).

2.05 ROOF COVERING SYSTEM

- A. Roof Panels: SSR Standing Seam Roof Panels; 24 inches wide net coverage, with 3 inches high major ribs formed at the panel side laps, formed for field seaming using electrically operated seaming machine.
1. Side joints: Factory applied sealant for field seaming.
 2. Material: Galvalume steel.
 3. Thickness: 24 gage.
 4. See drawings for roof slopes.
 5. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, field-seamed into place to form a double-fold 360 degree seam.
 6. Length: Continuous from eave to ridge up to 52 feet in length.
 7. End laps, where required: 4 inches wide, located at a support member.
 8. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-5/8 inches of panel movement in either direction from center of clip to compensate for thermal effects.
 9. Ridge assembly for high end of slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.
 10. Rake edge of roof shall be attached to the building structure in a manner which will allow thermal expansion of the SSR roof panels along the gables and will provide the uplift resistance required by code.
 11. The KXL paint system is a PVDF finish applied to the galvalume surface to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard. Office roof to have painted KXL finish while the Warehouse roof @ Building #1 and Storage Buildings #2 & #3 will be galvalume (unpainted).
 12. Exposed fasteners are stainless steel capped painted to match the selected color from the VP color chart or special ordered if a special color roof is provided.

2.06 WALL COVERING SYSTEM

- A. Wall Panels: Panel Rib; 36 inch wide net coverage, with 1-3/16 inch high major ribs at 12 inches on center with minor ribs spaced between the major ribs.
1. Material: Galvanized steel, with G90/Z275 coating.
 2. Thickness: 26 gage; all buildings.
 3. Side laps: Two fully overlapping major ribs secured together with 1/4 inch diameter color-matched carbon steel fasteners.
 4. Length: Continuous from sill to eave up to 43 feet in length.
 5. End laps, where required: 4 inches wide, located at a support member.
 6. Crimp panels at the base to achieve no gaps against the foundation greater than 1/16 inch and notch to match roof panel configuration at the eave.
 7. Cut panels square at each end.
 8. Cut panels square at each end; provide base trim at sill and closure plugs.

9. The KXL paint system is a PVDF finish applied to the zinc or zinc aluminum coated steel to give a long life color that resists fading and chalking. KXL is a 1 mil nom. PVDF finish with 70 percent Kynar 500 or Hylar 5000 standard.
10. Certification includes IAS Miami-Dade County Florida product approval.

2.07 INSULATION

A. Schedule:

1. Roof insulation; Nominal values.
 - a. Office and Main Building R-value: 29 – see wall sections.
2. Wall Insulation: Nominal values.
 - a. Office – not applicable (by others)
 - b. Main Building – R-value: 19 – see wall sections.

B. Blanket Insulation: Glass fiber, with factory laminated facing material

1. Glass fiber: Odorless, neutral colored, long filament, flexible resilient, produced in compliance with NAIMA 202-96.
2. Flame spread Index: The composite of fiberglass and facing shall have surface burning characteristics not to exceed 25 flame spread when tested in accordance with UL 723 or ASTM E 84 test methods.
3. Smoke Developed Index: not to exceed 50 smoke development when tested in accordance with UL 723 or ASTM E 84 test methods.
4. UL Classified.
5. WMP-30 (PSK-HD) Facing: White polypropylene film metallization fiberglass and polyester scrim, .0015 thick, 0.02 perms (1.15 ng/Ns). Kraft= natural 30#. Tri-directional fiberglass/polyester and facing meeting Flame Spread of 25 or less, Smoke Developed of 50 or less, when tested in accordance with UL 723.
6. Provide facing 3 inches wider than blanket on both edges as minimum. Provide long tabs for long tab banded system on Office roof.
7. Width: As required for installation.

C. Thermal Blocks required on Warehouse roof of Building #1: High density, 3/4 inch thick expanded polystyrene, for installation over the purlin.

D. Thermal Blocks: Superblock required on Office roof. 1 inch by 3-1/2 inch extruded polystyrene thermal spacer strips capped by 22 gage galvanized channels, with swaged end for interconnection along the purlin run, metal tabs at 2 feet on center at SSR clip locations, and pre-punched fastener holes.

2.08 WALL ACCESSORIES

A. Wall Openings: Cold-formed sheet metal framing concealed with manufacturer's standard colored trim.

2.09 ROOF ACCESSORIES

- A. Eave Gutters: Roll-formed 26 gage steel sheet, with gutter straps, fasteners and joint sealant; manufacturer's standard color.
 - 1. Downspouts: 29 gage 4 inches by 5 inches in 10 foot lengths, with downspout elbows and downspout straps; same color as wall panels unless specified otherwise.
- B. Ridge Ventilators: 24 gage Galvalume, with damper with chain and worm gear operator and bird screen, and base configured to match roof panel.
 - 1. Throat opening: 12 inches.
 - 2. Connect individual vents to form continuous ridge vent.

2.10 MATERIALS

- A. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ASTM A 572/A 572M, A 529/A 529M, A 1011 or A 36/A 36M Modified 50, with minimum yield strength of 55,000 psi (380 MPa).
- B. Galvanized Structural Steel Material for Use in Roll Formed or Press Broken Secondary Structural Members: ASTM A 563, with minimum yield strength of 60,000 psi (410 MPa).
- C. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ASTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 MPa).
- D. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch both sides.
- E. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ASTM A 500, ASTM A 572/A 572M or ASTM A 36/A 36M as applicable; with minimum yield strengths required for the design.
- F. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325 bolts and ASTM A563 Grade C nuts.
- G. Bolts and Nuts Used with Secondary Framing Members: High Strength ASTM A 325 Bolts and ASTM A 563 Grade C nuts.
- H. Panel Fasteners:
 - 1. For Galvalume and KXL finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.
 - 2. For wall panels: Coated carbon steel.
 - 3. Color of exposed fastener heads to match the wall panel finish.
 - 4. Concealed Fasteners: Self-drilling type, of size as required.
 - 5. Provide fasteners in quantities and location as required by the manufacturer.

- I. Flashing and Trim: Match material, finish, and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.
- J. Plastic Parts: Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butadiene-Styrene).
 - 1. ABS: Minimum 1/8 inch thick.
 - 2. Color: Manufacturer's standard color.
- K. Sealants, Mastics and Closures: Manufacturer's standard type.
 - 1. Provide at roof panel end laps, side laps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gun grade sealant at side laps and end laps.
 - 2. Provide at wall panel rakes, eaves, transitions and accessories.
 - 3. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.
 - 4. Tape mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.
 - 5. Gun grade sealant: Non-skinning synthetic Elastomeric based material; gray or bronze.

2.11 FABRICATION

- A. Fabrication: Fabricate according to manufacturer's standard practice.
 - 1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.
 - 2. Welding operators and processes: Qualified in accordance with AWS D1.1.
 - 3. Field connections: Prepare members for bolted field connection by making punched, drilled, or reamed holes in the shop.
- B. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

2.12 FINISH

- A. Schedule of Finishes:
 - See Architectural Plan Sheets.
- B. Shop Coat: Manufacturer's standard rust inhibitive primer paint; manufacturer's gray primer.
 - 1. Finish all structural steel members using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.
- C. KXL Pre-Painted Finish: 1 mil 70 percent Kynar 500, Hylar 5000 coating on exterior surface.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and or timely completion.
 - 1. Verify foundations are properly installed, to correct dimensions and within acceptable tolerances.
 - 2. Verify location of covered or built-in work.
 - 3. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Framing Erection: Erect framing in compliance with AIS Specification and the latest edition of the MBMA metal building systems manual.
- 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. Locate braced bays as required by manufacturer.

3.03 ERECTION OF FRAME

- A. Install in accordance with manufacturer's instructions.
- B. Do not erect frames without complete installation of tie beams and anchorages.
- C. Set column base plates with non-shrink grout to full plate bearing.
- D. Do not field cut or alter structural members without written approval.
- E. After erection, prime bolts, welds, abrasions, and surfaces not primed with primer used in shop painting.

3.04 INSTALLATION OF WALL AND ROOF SYSTEM

- A. Install in compliance with manufacturer's instructions.
- B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Fasten cladding system to structural supports, aligned level and plumb.
- D. Locate end laps over supports. End lap panels according to manufacturer's recommendations. Place sidelaps over adjacent panel and mechanically seam or stitch fastener per erection guidelines.

- E. Provide expansion joints where indicated.
- F. Use concealed fasteners.
- G. Install sealant and gaskets to prevent weather penetration.
- H. Install system free of rattles, noise due to thermal movement, and wind whistles.
- I. Install door frames, service doors, overhead doors, window and glass, and gutter system in compliance with manufacturer's instructions.
- J. Seal wall and roof accessories watertight and weathertight with sealant in compliance with building manufacturer's standard procedures.
- K. Rigidly support and secure gutters and downspouts. Joint lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.
- L. Tolerances:
 - 1. Framing Members: 1/4 inch from level; 1/8 inch from plumb.
 - 2. Racking: 1/8 inch from true position. Provide shoring to maintain position prior to cladding installation.

3.05 FIELD QUALITY CONTROL

- A. Testing by Contractor:
 - 1. Roof installation inspection by roof manufacturer's representative; as required as part of warranty provision.
- B. Testing by Owner:
 - 1. High Strength Bolted Connections: Specification for Structural Joints Using ASTM A 325 or A 490 Bolts, with minimum testing of bolted connections per the arbitration inspection procedure.
 - 2. Welded Connections: AWS. Visual inspection of 100 percent of welds. Ultrasonic inspection of 50 percent of full and partial penetration welds. A rejection rate greater than 5 percent will increase the inspection to 100 percent.
 - 3. General Testing: For materials and installed tolerances.

END OF SECTION