

**SECTION 323119
DECORATIVE METAL FENCES AND GATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Decorative metal fences and gates.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 312316 - Excavation.

1.03 REFERENCE STANDARDS

- A. ASTM G101, Standard Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels, current standard.
- E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels, current standard.
- F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- G. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.
- I. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2020.
- J. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints 2002 (Reapproved 2017).
- K. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments 2008, with Editorial Revision (2017).
- L. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates 2016.
- M. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) 1993 (Reapproved 2019).
- N. ASTM D3359 - Standard Test Method for Rating Adhesion by Tape Test 2017.
- O. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets 2016.
- P. CLFMI WLG 2445 - Wind Load Guide for the Selection of Line Post and Line Post Spacing 2018.
- Q. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.
- R. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- S. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- T. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- U. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Schedule and conduct a pre-installation meeting one week before starting work of this section. Attendees shall include, but are not limited to:
 - 1. Contractor.
 - 2. Manufacturer's representative.
 - 3. Architect.
 - 4. Owner's representative.
 - 5. Other subcontractors of adjacent work.

1.05 SUBMITTALS

- A. [See Section 013000 - Administrative Requirements for submittal procedures.] **OR** [See Division 01, Administrative Requirements for submittal procedures.]
- B. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.
 - 1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Design Calculations: For high wind load areas, provide calculations for fence panels and accessory selection as well as line post spacing and foundation details. See CLFMI WLG 2445 for line post and spacing guidance.
- D. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, anchors and accessories.
- E. Design Data: Submit comprehensive structural analysis of design for the specified loads and structural attachments. Stamp and sign calculations by professional engineer.
- F. Samples: Submit two (2) of each item below:
 - 1. If requested, provide up to six different powder coat samples for submittal review.
 - 2. (3 inch by 6 inch samples of powder coat) **OR** [2 inch by 2 inch Kynar color chips or anodized aluminum samples].
 - 3. Pattern Sample: [Submit 12 inch by 12 inch flat panel, without finish] **OR** [Submit **[Insert number of panels]** full size panel samples]. Pattern scaling may vary depending on selection.
- G. Test Reports: If required, submit test reports from an independent testing agency showing compliance with specified design and performance requirements.
- H. Manufacturer's Installation Instructions.
- I. Manufacturer's storage and handling instructions.
- J. Sustainable Design Submittals:
 - 1. In accordance with Division 01 sustainable design requirements.
OR
 - 2. Submit Product Data for Credits **[Insert Sustainable Design program credits here]**
 - 3. For products having recycled content, documentation indicating percentages by weight of post consumer and pre-consumer recycled content. Include statement indicating costs for each product having recycled content.
- K. Maintenance Data: Manufacturer's instructions for care and cleaning.
- L. Designer's Qualification Statement.
- M. Manufacturer's Qualification Statement.
- N. Installer's Qualification Statement.
- O. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

- P. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines [_____].
- Q. Field Inspection Records: Provide installation inspection records that include post settings, framework, fittings and accessories, gates, and workmanship.
- R. Manufacturer's Warranty.

1.06 QUALITY ASSURANCE

- A. Verification and Coordination:
 - 1. Verify actual locations of walls and other construction contiguous with the work of this Section using field measurements before fabrication. Indicate measurements on Shop Drawings.
 - 2. Embedded Anchor Plates and Structural Connections: Coordinate support sizes and locations.
- B. Engineering:
 - 1. System to be engineered by manufacturer for standard loading criteria and geometry layout.
 - 2. Custom Systems: Structural design to be performed by the manufacturer or a Registered Structural Engineer licensed in the State in which the Project is located.
 - 3. Engineering for assembly will be provided by manufacturer.
 - 4. Structural attachment or connections to be engineered by the Engineer of Record for the Project.
- C. Installer to supply manufacturer with existing field dimensions of structure, bracket locations, and any other conditions that affect the location of work.
- D. Installer Qualifications: Company specializing in installation of decorative metal fence and gate systems with a minimum of five years of documented experience and certified or approved by manufacturer.
- E. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than ten years of documented experience.
- F. Fabricator Qualifications: Company specializing in fabrication of products of the type specified in this Section with a minimum of 8 years of documented experience and sufficient production capacity to produce the required units within the Project schedule.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original protective coverings and packaging with corresponding labels and identifying information.
- B. Protect materials against damage during transit, delivery, storage, and installation at site. Protect against bending, warping, twisting or surface damage. Store in accordance with manufacturers written instructions and in a dry location.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Warranty: Manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.
- D. Warranty on FEVE and PVDF finishes: Manufacturer's standard ten year warranty on finish. Twenty year warranty optional. Not all colors are available with extended warranties.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Decorative Metal Fences and Gates:
 - 1. BOK Modern, Inc.; **[Insert product style name here]**; www.bokmodern.com
 - 2. [Substitutions: See Section 016000 - Product Requirements.] **OR** [See Division 01, Administrative Requirements for substitution procedures]

2.02 DECORATIVE METAL FENCES AND GATES

- A. Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; finished with coating and having the following performance characteristics:
 - 1. Provide fence meeting the Test Load and Coating Performance requirements of ASTM F2408 for [] class.
- B. Decorative Fence System:
 - 1. Fence Panels: [] high by [] long.
 - a. Attach panels to posts with manufacturer's standard panel brackets and recommended fasteners.
 - b. Posts: Manufacturer's standard tubes.
 - c. Rails: Manufacturer's standard channels.
 - d. Pickets: Manufacturer's standard; tubes.
 - 1) Style: [].
 - 2) Integrally Formed Finial: [].
 - e. Fasteners: Manufacturer's standard bolts, screws, and washers; factory finish fasteners to match fence.
 - f. Accessories: Aluminum castings, extrusions and cold-formed strips; factory finished to match fence.
 - 2. Color: As selected by Architect from manufacturer's standard range.
 - 3. Color: Manufacturer's standard, factory applied [].
- C. Decorative Metal Gates:
 - 1. Gate Panels: Manufacturer's standard decorative metal fence panels.
 - 2. Posts: [Rectangular] **OR** [Solid plate blade], [] inch ([] mm) square.
 - 3. Rails and Frame: Insert type of metal here; [] inches by [] inches ([] mm by [] mm).
 - 4. Hardware:
 - a. Latch: Manufacturer's standard mechanism; factory finished galvanized steel.
 - b. Truck Assembly: Manufacturer's standard, self-aligning, wheeled truck assembly supporting weight of gate plus 2,000 pound (910 kg) reaction load; provide number of truck assemblies per gate recommended by manufacturer.
 - c. Guide Wheel Assembly: Manufacturer's standard, adjustable, dual wheel assembly; provide number of guide wheels per gate recommended by manufacturer.
 - 5. Operation: Manual.
 - 6. Color: As selected by Architect from manufacturer's standard range.
 - 7. Color: Manufacturer's standard, factory applied [].

2.03 SPECIALITY HARDWARE

- A. Hinges: Finished to match fence components.
 - 1. Closing: [].
 - 2. Mechanism: [].
 - 3. Material: [].
 - 4. Mounting: [].
 - 5. Brackets: [].
 - 6. Bearings: [].
- B. Latches: Finished to match fence components.
 - 1. Mechanism: [].

2. Locking: [_____].
 3. Material: [_____].
 4. Mounting: [_____].
 5. Brackets: [_____].
- C. Rollers: Finished to match fence components.
1. Load Rating: [_____] pounds ([_____] kg).
 2. Groove: [_____].
 3. Material: [_____].
 4. Bearings: [_____].
 5. Mounting: [_____].
 6. Brackets: [_____].

2.04 MATERIALS

- A. Metal Surfaces: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations or blemishes; unless allowed for specific metal types and .
- B. Perforated Aluminum Sheet: AA5052-H32, [0.125-inch (3.17 mm)] [0.1875-inch (4.76 mm)] [Insert custom thickness] thick.
- C. Perforated Stainless Steel Sheet: ASTM A240/A240M, [Type 304] [Type 316L], [0.062- inch (1.57 mm)] [Insert custom thickness] thick.
- D. Perforated Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel Type B, [0.074-inch (1.88 mm)] [Insert custom thickness] thick.
- E. Perforated Corten Steel Sheet: ASTM A242/A242M, [0.074-inch (1.88 mm)] [Insert custom thickness] thick.
- F. Laser Cut Proprietary Pattern: [As selected by the Architect from manufacturer's full library] OR [Insert name of custom design and pattern scale here].
- G. Concealed Structural Supports: Aluminum, or steel coated for corrosion resistance and dissimilar metal isolation.
- H. Fasteners: ASTM F593 stainless steel or ASTM A307 carbon steel.
- I. Stainless Steel Tensioning Tubes: ASTM A276/A276M.

2.05 FABRICATION

- A. Fabricate assemblies to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish and anchorage, but not less than required to support structural loads.
- B. Fabricate in accordance with approved shop drawings and manufacturers written instructions. Form work true to line and level with accurate angles and surfaces.
- C. Assemble in the shop to greatest extent possible to minimize field splicing and assembly.
- D. Cut, drill and laser cut metals cleanly and accurately. Remove burrs and ease edges; unless allowed for specific metal types and . Remove sharp or rough areas on exposed surfaces.
- E. Cut, reinforce, drill and tap as indicated to receive finish hardware, screws and similar items.
- F. Use grommets, bushings and washers or methods as recommended by the manufacturer for separation of dissimilar metals.

2.06 FINISHES

- A. Comply with NAAMM's MFM for recommendations for applying and designating finishes.
 1. Appearance of Finished Work:
 - a. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples.
 - b. Noticeable variations in same piece are not acceptable except for steel and anodized aluminum.

- c. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.
- B. Finishes for Aluminum; Anodized :
 - 1. Clear Anodic Finish: AAMA 611, AA-M10C22A41 CLASS I, Architectural Class 1, 0.7 to 1.2 mil coating thickness.
 - 2. Color Anodic Finish: AAMA 611, AA-M10C22A44 CLASS II, Architectural Class 1, 0.7 to 1.2 mil coating thickness.
 - a. Color: As selected by Architect from manufacturers full range
 - b. Color [_____].

Finishes for Aluminum; Powder Coating to meet AAMA 2604:

 - 3. Pretreat according to manufacturers instructions and AAMA 2604 to withstand a minimum of 2000 hours (ASTM B117) or 1500 hours (ASTM G85) salt spray testing.
 - 4. Apply Architectural Grade AAMA 2604 compliant topcoat at a minimum of 2.5 mils and process according to manufacturer's recommendations.
 - 5. Color and Gloss: [As selected by Architect from manufacturer's full range of choices]

Finishes for Aluminum; Fluoropolymer Coating to meet AAMA 2605:

 - 6. Pretreat according to manufacturer's instructions and AAMA 2605 to withstand a minimum of 3000 hours (ASTM B117) or 2000 hours (ASTM G85) salt spray testing.
 - 7. Apply standard available colors, high volume RAL, or high volume custom color matches in single coat powder finish containing no less than 100% FEVE (fluorinated ethylene vinyl ether) at a minimum of 2.0 mils and process according to manufacturer's recommendations.
 - 8. Apply custom color matches for low volume as a 2-coat 70% min. PVDF (poly vinylidene fluoride) resin fluoropolymer powder or liquid system including specially formulated inhibitive primer where required by manufacturer and top color coat to total dry film thickness of 2-3 mils.
 - 9. Apply specifically available pallet colors only as a 3-coat system including clear fluorocarbon topcoat using 70% min. PVDF (poly vinylidene fluoride) resin fluoropolymer liquid to total dry film thickness of 2-3 mils.
- C. Finishes for Steel:
 - 1. Mill finish.
 - 2. Powder Coating:
 - a. Pretreat according to AAMA 2604 to withstand a minimum of 2000 hours (ASTM B117) or 1500 hours (ASTM G85 Annex A2).
 - b. Apply zinc rich primer for steel at minimum of 2.0 mils 50 percent or less cure to ensure proper inter coat adhesion to topcoat.
 - c. Apply AAMA 2604 compliant topcoat at a minimum of 2.0 mils and process according to manufacturer's written recommendations.
 - d. Color and Gloss: As selected by Architect from manufacturers standard range.
- D. Stainless Steel:
 - 1. Polished Finishes:
 - a. Grind and polish surfaces to produce uniform finish free of cross scratches.
 - 2. Mill finish with no additional treatment to surfaces.
 - 3. Orbital sanding
- E. Pre-grained #4 finish on available gauge material.
- F. Cor-ten or weathering steel unfinished mill material with no significant scratches or gouges.

2.07 ACCESSORIES

- A. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
- B. Non-Weld Mechanical Fittings: In-line aluminum fittings, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.

- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.
- D. Universal Bracket:
 - 1. Stainless steel 2-part bracket. System installed per manufacturer's instructions.
 - 2. Finish: Powder coat.
 - 3. Color: As selected by Architect from manufacturers standard range.
 - 4. Manufacturer: BOK Modern, Inc.; www.bokmodern.com.
- E. Anchors and Fasteners:
 - 1. Select fasteners of type, grade and class required to product connections for anchoring metal panels to other types of construction indicated and capable of withstanding design loads.
 - 2. Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 3. Do not use metals that are corrosive or non-compatible with materials joined. Avoid fastening dissimilar materials and separate with isolating hardware where necessary.
 - a. For anchorage to concrete, provide inserts to be cast into concrete for bolt anchors.
 - b. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
 - c. For anchorage to stud walls, provide backing plates for bolt anchors.
 - d. Posts: Provide adjustable flanged brackets.
 - 4. Exposed Fasteners: No exposed bolts or screws.
- F. Carbon Steel Bolts and Nuts: ASTM A307.
- G. Hydraulic Expansion Cement: ASTM C1107/C1107M.
- H. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch (0.4 mm) dry film thickness per coat complying with ASTM D1187.
- I. Sealant: Silicone; black.
- J. Finish Touch-Up Materials: As recommended by manufacturer for field application.
- K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Do not proceed with installation until all conditions are satisfactory.
- D. Notify Architect immediately of conditions that would prevent satisfactory installation.
- E. Do not proceed with work until detrimental conditions have been corrected.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

- A. Comply with Drawings and manufacturer's written instructions.
- B. Set fence posts in accordance with the manufacturer recommended spacing.
- C. When cutting rails immediately seal the exposed surfaces by:

1. Removing metal shavings from cut area.
 2. Apply AAMA 2604 architectural grade primer for compatible top coat system.
 3. Apply two coats of AAMA 2604 top coat system.
 4. Failure to seal exposed surfaces in accordance with manufacturer's instructions will negate manufacturer's warranty.
- D. Space gate posts according to the manufacturers' drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected.
1. Base type and quantity of gate hinges on the application, weight, height, and number of gate cycles.
 2. Identify the necessary hardware required for the application on the manufacturer's gate drawings.
 3. Provide gate hardware by the manufacturer of the gate and install in compliance with manufacturer's recommendations.
- E. Excavate post holes in accordance with Section [_____].
- F. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood or dissimilar metals, with a heavy coat of bituminous paint.
- G. Universal Bracket: Install per manufacturers printed instructions.
- H. Weld connections that cannot be shop welded due to size limitations.
1. Weld in accordance with AWS D1.1/D1.1M.
 2. Match shop welding and bolting.
 3. Clean welds, bolted connections, and abraded areas.
 4. Touch up shop primer and factory-applied finishes.
 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.
- I. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.
- J. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6.3 mm).
- B. Maximum Offset From Indicated Position: 1 inch (25.4 mm).
- C. Minimum Distance from Property Line: 6 inches (152 mm).

3.05 FIELD QUALITY CONTROL

- A. Field Services: Provide the services of the manufacturer for field observation of installation.
- B. Layout: Verify that fence installation markings are accurate to design, paying attention to gate locations, underground utilities, and property lines.
- C. Post Settings: Randomly inspect three locations against design for:
 1. Hole diameter.
 2. Hole depth.
 3. Hole spacing.
- D. Fence Height: Randomly measure fence height at three locations or at areas that appear out of compliance with design.
- E. Gates: Inspect for level, plumb, and alignment.
- F. Workmanship: Verify neat installation free of defects.

3.06 CLEANING

- A. Leave immediate work area neat at end of work day.
- B. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.

- C. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.
- D. Remove mortar from exposed posts and other fencing material using a 10 percent solution of muriatic acid followed immediately by several rinses with clean water.
- E. Touch up scratched surfaces using materials recommended by manufacturer. Match touched-up paint color to factory-applied finish.
- F. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.07 ADJUSTING AND PROTECTION

- A. Touch-up and repair damage to exposed finishes to be indistinguishable from undamaged areas.
- B. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.
- C. Obtain approved coating for repainting surfaces from manufacturer.
- D. Return and replace items that cannot be repaired or refinished in field.
- E. Protect installed components and finishes from damage after installation.

END OF SECTION