

SECTION 32 31 20
LOUVER AND CORRUGATED FENCING & GATES

PART 1 - GENERAL

1.01 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- E. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2023.
- F. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.
- G. ASTM D1654 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2024.
- H. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2024).
- I. ASTM D3359 - Standard Test Methods for Rating Adhesion by Tape Test; 2023.
- J. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016 (Reapproved 2023).
- K. BHMA A156.1 - Standard for Butts and Hinges; 2021.
- L. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals; 2024, with Errata (2025).
- M. SSPC-SP 5/NACE No.1 - White Metal Blast Cleaning; 2006.
- N. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.
- O. UL 1034 - Standard for Safety Burglary-Resistant Electrical Locking Mechanisms; Current Edition, Including All Revisions.

1.02 1.01 SECTION INCLUDES

- A. Louver fences and gates.
- B. Corrugated and perforated fences and gates.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete.
- B. Section 09 91 13 - Exterior Painting

1.03 REFERENCE STANDARDS

- A. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.
- B. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2010).
- C. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test; 2009e2. 2011.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.
 3. Installation methods.
- B. Shop Drawings:
1. Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Installer's Qualification Statement.
- D. Manufacturer's Warranty.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced with type of construction involved and materials and techniques specified and approved by fence manufacturer.

1.06 DELIVERY, STORAGE AND HANDLING

1. Store materials in a manner to ensure proper ventilation and drainage. Protect against damage, weather, vandalism and theft.

1.07 WARRANTY

- A. Finish: 2 years.

PART 2 - PRODUCTS

8.01 2.01 PERFORMANCE REQUIREMENTS

- A. Wind Loading:
1. Fence Height: 0 to 15 feet as per drawings.
 2. Wind Exposure Category: B.
 3. Design Wind Speed: 117 mph.
 4. Design Wind Pressure: Components and cladding wind loading using parameters shown in general notes of the structural drawings.
 5. Limit deflection of fence framing to the more stringent of L/200 or the fence manufacturer's deflection criteria.

2.02 FENCES

- A. Louver Fences
1. Aluminum material:
 - a. Comply with the following standards for the forms and types of aluminum for the required items of work.
 - b. Alloy and Temper: Provide alloy and temper as indicated or as otherwise recommended by the aluminum producer or finisher.
 - c. Aluminum Extrusions, Bars and Shapes: Alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B221 for 6063-T6.
 2. Aluminum Finish
 - a. High Performance Coating: AA-C12C42R1x, cleaned with inhibited chemicals, conversion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.
 - b. Fluorocarbon Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer colorcoat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-98.
 - c. Custom color and gloss.
 3. Fences panels: Complete factory-fabricated system of posts and panels, accessories, fittings, and fasteners; powder coated finished, and having the following performance characteristics:
 - a. Fences shall be fabricated of die formed perforated and radius sections of 1/8" thick aluminum.

- b. Fence panel perforation shall be 1/4 inch round hole on 1/2" staggered centers, consisting of 40% open area.
 - c. Fence shall be Polaris fence, as manufactured by Ametco, or approved equal.
- B. Corrugated and perforated fences
- 1. Aluminum material:
 - a. Comply with the following standards for the forms and types of aluminum for the required items of work.
 - b. Alloy and Temper: Provide alloy and temper as indicated or as otherwise recommended by the aluminum producer or finisher.
 - c. Aluminum Extrusions, Bars and Shapes: Alloy and temper recommended by aluminum producer or finisher for type of use and finish indicated, and with not less than the strength and durability properties specified in ASTM B221 for 6063-T6.
 - 2. Aluminum Finish
 - a. High Performance Coating: AA-C12C42R1x, cleaned with inhibited chemicals, conversion coated with an acid-chromate-fluoride-phosphate treatment, and painted with organic coating specified below. Apply finish in strict compliance with paint manufacturer's instructions using a licensed applicator.
 - b. Fluorocarbon Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer colorcoat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-98.
 - c. Custom color and gloss.
 - 3. Fence panels: Perforated aluminum corrugated panels, 60 degree staggered hole pattern, 23%-27% Open Area, BWR 360, as manufactured by Hendrick Metal, PAC Clad, McNichols, Amico, or approved equal
 - 4. Fence posts shall be constructed of steel posts, bars, plates and braces of the sizes shown on the Drawings.

2.03 GATE

- A. The gate shall be set complete with heavy duty hinges (allowing for opening of 180 degrees), latch, catch, gate keeper, locking device, gate stop, keys, and all other materials necessary for a complete installation. Hinges shall be painted on both sides and be fully welded to the post. Gates shall be locked immediately after installation.
- B. Gate configuration, gate frame height, and gate opening width shall be per drawing. Steel frames and bracing shall be fabricated from steel tubing as indicated on drawings. Any modification of section size or thickness must be verified by submission of design calculations by a qualified engineer.
- C. Hardware:
 - 1. Gate hinges shall be BHMA A156.1, Grade 1, suitable for exterior use.
 - a. Full surface, triple weight, antifriction bearing.
 - b. Material: Wrought steel, forged steel, cast steel, or malleable iron; galvanized.
 - c. As manufactured by MCMMASTER-CARR 5"x3" heavy duty, stainless steel, and 2,000 lbs capacity, or approved equal.
 - 2. Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than 5 feet wide.
 - 3. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.
 - 4. Provide cane bolts for pairs of gates. Cane bolts shall be fabricated from 3/4 in diameter round steel bar, hot-dip galvanized after fabrication. Finish to match gates. Provide stainless steel gatestop as indicated on drawing to receive cane bolts in both open and closed positions
 - 5. Gate padlocks shall be American Lock Co. #701 DL, telephone (800) 426-0206, or equal, with two and one half inch body diameter, 5 pin tumbler, cadmium plated hardened steel

shackles 7/16 inch diameter, one inch clearance. Locks shall be keyed alike. Each lock shall be furnished with two keys, non-removable in an unlocked position.

- a. Deliverables: The Contractor shall supply one (1) extra padlock for every five (5) gates installed. i.e. 1 to 5 gates installed supply 1 extra padlock, 6-10 gates installed supply 2 extra padlocks, etc. Lock keys shall be labeled and left with the Development Superintendent.
6. Cadmium plated or electro-galvanized steel chain shall be made from links that are 5/16" in diameter by 1 3/8" long. The chain shall be 9 inches long and shall be used to fasten the body of the lock to the gate. Contractor shall not weld the chain to the locks on Compactor Area Double Gates.
7. Panic hardware shall be super-heavy-duty panic and fire exit hardware, completely weatherized conforming to UL 1034-34 Temperature Section 34, UL 1034-54 Dust Section 54, MIL-STD 810F, Method 506.4 (driving rain test); and MIL-STD 810F, Method 509.4 (salt fog test). All exposed surfaces shall be PVD metal coated.
 - a. Manufacturer shall be Advantex 40xW Series Narrow Stile Weatherized Rim Exit Device by DETEX Inc., or approved equal.
- D. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay
- E. Through Bolts: HSS Through bolt fasteners to conform to ASTM A307, Grade B and galvanized in compliance with ASTM A153/A153M. Through bolt for HSS to be finger tight. Do not crush HSS wall. Threads secured by peening, Jam nuts, or Loctite 263 (red) threadlocker.
- F. Expansion Bolts for Gate Frame shall be 3/8" diameter, galvanized Holo-Bolt Manufactured by Lindapter or approved equal.

2.04 POSTS

- A. Line Posts: As indicated on drawings, any modification of section size or thickness must be verified by submission of design calculations by a qualified engineer.
- B. End and Corner Posts: As indicated on drawings, any modification of section size or thickness must be verified by submission of design calculations by a qualified engineer.
- C. Swing Gate Posts: As indicated on drawings, any modification of section size or thickness must be verified by submission of design calculations by a qualified engineer.
- D. Non-shrink grout for mounting shall meet ASTM C1107 and CRD 621 with minimum compressive strength of 7000 psi @ 28 days when testing in accordance with ASTM C109 or CRD C-621. It shall be mixed to a proper consistency for application. Contractor shall follow the Manufacturer's instructions and guidelines. Non-shrink General Purpose Grout, Product 1585-01 by Quikrete Inc. or SikaGrout 212 by Sika Corp or equal product shall be used.

2.05 MISCELLANEOUS MATERIALS

- A. A. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Section 033000 "Cast-in-Place Concrete" with a minimum 28-day compressive strength of 4000 psi, 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size or dry, packaged, normal-weight concrete mix complying with ASTM C387/C387M mixed with potable water according to manufacturer's written instructions.
- B. B. Non-shrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M and specifically recommended by manufacturer for exterior applications.

2.06 GROUNDING MATERIALS

- A. Comply with requirements of Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Grounding Conductors: Size as indicated on Drawings. Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 1. Material above Finished Grade: Copper
 2. Material on or below Finished Grade: Copper.

3. Bonding Jumpers: Braided copper tape, 1-5/8 inch wide and 1/16 inch thick, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
- C. Grounding Connectors and Grounding Rods: Comply with UL 467.
 1. Connectors for Below-Grade Use: Exothermic-welded type.
 2. Grounding Rods: Copper-clad steel.
 3. Size: 5/8 by 96 inches
 - a. 2.07 STEEL FINISHES
 - D. Surface Preparation: Clean surfaces according to SSPC-SP 5/NACE No.1, "White Metal Blast Cleaning." After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.
 - E. Powder Coating: Immediately after cleaning, apply manufacturer's standard two-coat finish consisting of epoxy primer and TGIC polyester topcoat to a minimum total dry film thickness of not less than 8 mils 0.01 inch. Comply with coating manufacturer's written instructions.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.
 - F. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that are exposed after assembly and installation, and to concealed surfaces.
 - G. Shop-Painted Finish: Comply with Section 099113 "Exterior Painting." and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.
 2. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard TGIC polyester powder-coat finish to a minimum dry film thickness of 2 mils 0 inch.
 3. Color and Gloss: As selected by Architect from manufacturer's full range
 - H. Powder Coating: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat finish consisting of zinc-rich epoxy prime coat and TGIC polyester topcoat to a minimum dry film thickness of 2 mils (0 inch). Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of 4 mils (0 inch).
 1. Color and Gloss: As selected by Architect from manufacturer's full range
 2. Comply with surface finish testing requirements in ASTM F2408 except change corrosion resistance requirement to 3000 hours without failure.
 - I. High-Performance Coating: Apply epoxy primer, polyurethane intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 1. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

PART 3 - EXECUTION

14.01 3.01 EXAMINATION

- A. Do not begin installation until substrates, curbs, footings and walls have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.

- D. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

14.02 3.02 PREPARATION

- A. Clean all surfaces thoroughly prior to installation.
- B. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
- C. Construction layout and field engineering are specified in Section 017300 "Execution."

14.03 3.03 INSTALLATION

- A. Install fences by setting posts as indicated and fastening fence panel to steel angle / fence post as per drawing.
- B. Verify that posts are set plumb, aligned, and at correct height and spacing.
- C. The fence posts shall be installed in the proper size steel plates in concrete curbs, concrete footings, concrete walls or pavement as shown on the Detail Drawings.
- D. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.04 ERECTION TOLERANCES

- A. Maximum Variation From Plumb: 1/8 inch.
- B. Maximum Offset From Indicated Position: 1 inch .
- C. Minimum distance from property line: 6 inches .

3.05 CLEANING

- A. Clean jobsite of excess materials; scatter excess material from post hole excavations uniformly away from posts. Remove excess material if required.
- B. Clean fence with mild household detergent and clean water rinse well. .
- C. 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.
- D. Touch up scratched surfaces using materials recommended by manufacturer. Match touchup paint color to fence finish.

3.06 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

3.07 ADJUSTING

- A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware, and other moving parts.

3.08 DEMONSTRATION

- A. Train owner's personnel to adjust, operate, and maintain gates.

END OF SECTION 32 31 20