SECTION 32 31 13
CHAIN LINK FENCES AND GATES

SPEC WRITER NOTE:
1. Delete text between // _____ // not applicable to project. Edit remaining text to suit project.
2. Use this section in specifying permanent chain link fence. Specify temporary fencing, such as construction fence in Division 01.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Chain link fence, gates and accessories.

1.2 RELATED REQUIREMENTS

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this section.

A. Temporary Construction Fence: Section 01 00 00, GENERAL REQUIREMENTS.

B. Fence Color: Section 09 06 00, SCHEDULE FOR FINISHES.

C. Grounding: Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

D. // Security fences: Section 32 31 40, HIGH SECURITY FENCES AND GATES. //

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this section.

B. ASTM International (ASTM):

1. A121-13 - Metallic Coated Carbon Steel Barbed Wire.
2. A392-11a - Zinc-Coated Steel Chain-Link Fence Fabric.
3. A491-11 - Aluminum Coated Steel Chain Link Fence Fabric.
4. A817-12 - Metal-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire.
5. B429 - Aluminum-Alloy Extruded Structural Pipe and Tube.
6. F567-14a - Installation of Chain-Link Fence.
7. F626-14 - Fence Fittings.
8. F668-11 - Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain Link Fence Fabric.
9. F900-11 - Industrial and Commercial Swing Gates.

10. F1184-16 - Industrial and Commercial Horizontal Slide Gates.
11. F1664-08(2013) - Polyvinyl Chloride (PVC) and Other Conforming Organic Polymer Coated Steel Tension Wire used with Chain Link Fence.
12. F1665-08(2013) - Polyvinyl Chloride (PVC) and Other Conforming Organic Polymer Coated Steel Barbed Wire used with Chain Link Fence.
13. F2200-14 - Automated Vehicular Gate Construction.
14. F1043-16 - Strength and Protective Coatings on Steel Industrial Fence Framework.
15. F1083-16 - Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

C. Chain Link Fence Manufacturing Institute (CLFMI):
   1. Product Manual.

D. Federal Specifications (Fed. Spec.):
   1. FF-P-110J - Padlock, Changeable Combination.

E. Master Painters Institute (MPI):
   1. No. 18 - Primer, Zinc Rich, Organic.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Submittal Drawings:
   1. Show size, configuration, and fabrication and installation details.

C. Manufacturer's Literature and Data:
   1. Description of each product.
   2. Installation instructions.

SPEC WRITER NOTE: Alignment Certification requirement is for property line fencing or similar purpose requiring accurate alignment.

D. Certificates: Certify // each product complies // products comply // with specifications.
   1. Fence alignment.
   2. Zinc-coating.

E. Qualifications: Substantiate qualifications comply with specifications.
   1. Manufacturer // with project experience list //.
   2. Installer // with project experience list //.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
   a. // Project Experience List: Provide contact names and addresses for completed projects. //

B. Installer Qualifications:

1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.
   a. // Project Experience List: Provide contact names and addresses for completed projects. //

C. Welders and Welding Procedures Qualifications: // AWS D1.1/D1.1M. // AWS D1.3/D1.3M. //

1.6 DELIVERY

A. Deliver products in manufacturer's original sealed packaging.

B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, // color, // production run number, and manufacture date.

C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.7 STORAGE AND HANDLING

A. Protect products from damage during handling and construction operations.

1.8 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's one year labor and material warranty.

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 PRODUCTS - GENERAL

A. Basis of Design: Section 09 06 00, SCHEDULE FOR FINISHES.

B. Provide fences and gates from one manufacturer.

2.2 CHAIN-LINK FENCING AND GATES

A. General: Conform to CLFMI Product Manual.

SPEC WRITER NOTE: Choose the appropriate type of fabric for the project and delete the remaining choices.

B. Chain Link Fabric: // 50 mm (2 inch) mesh, 3.76 mm(0.15 inches), 1.8 m (72 inches) high, top selvage and bottom selvage // As indicated on Drawings //.

1. Zinc-Coated Steel Fabric: ASTM A392, hot dipped galvanized before or after weaving.

SPEC WRITER NOTE: In dry climates of Southwest States specify Class 1 coating. Elsewhere specify Class 2 coating. Specify heavier coating or other material for use in salt-laden or corrosive industrial atmospheres.

a. Class 1 - 366 g/sq. m (1.2 oz/sq. ft.).

b. Class 2 - 610 g/sq. m (2.0 oz/sq. ft.).

2. Aluminum-Coated Steel Fabric (Aluminized): ASTM A491.

3. Polymer Coated Steel Fabric: ASTM F668.

a. // Class 1 extruded. //

b. // Class 2a extruded and adhered. //

c. // Class 2b fused and adhered. //

d. Color: // Dark green // Olive green // Brown // Black //.

4. Fabric Selvage: K&T, Knuckle finish at one end, twist at other.

a. Fabric less than 1.8 m (72 inches) width, knuckle finish top and bottom.

C. Fence Framework:

1. Round Steel Pipe and Rail: ASTM F1043, Group IA Heavy Industrial Fence Framework, ASTM F1083 schedule 40 galvanized pipe.

SPEC WRITER NOTE: Below sizes are examples only. ASTM F1043/F1083 Group IA Schedule 40 pipe size for Fence Fabric Height over 1.8 m to 2.4 m (6ft. to 8 ft.) is 60 to 100 mm (2.375 to 4 inches).

a. Line post: 60 mm (2.375 inch) diameter.

b. End, Corner, Pull post: 60 mm (2.375 inch) diameter.

c. Brace rails, top, bottom, and intermediate rails, 42 mm (1.660 inch) diameter, 3.38 kg/m (2.27 lb./ft.).

2. Polymer Coated Framework: ASTM F668 // PVC // Polyolefin // Polyester // coating fused and adhered to the exterior zinc coating of the post or rail.

a. Coating Thickness (Minimum):

1) PVC and Polyolefin: 0.25 mm (10 mils).

2) Polyester: 0.08 mm (3 mils).

b. Color: Match fabric // dark green // olive green // brown // black //.

2.3 TENSION WIRE

SPEC WRITER NOTE: Select type of coating. ASTM A817 defines type of specified diameter for aluminized, zinc-coated, and zinc coating respectively.

A. Metallic Coated Steel Marcelled Tension Wire: ASTM A817, Type // I // II // III // 4.5 mm (0.177 inches) marcelled wire.

SPEC WRITER NOTE: Select type of coating. ASTM F1664 defines type of specified diameter for extruded, extruded and adhered, and fused and adhered coating respectively.

B. Polymer Coated Steel Tension Wire: ASTM F1664, Class // 1 // 2a // 2b // 4.5 mm (0.177 inches) wire. Wire gauge specified is the core wire gauge.

2.4 BARBED WIRE

SPEC WRITER NOTE: Insert material coating specification including type and class when applicable.

A. Metallic Coated Steel Barbed Wire: ASTM A121, // Type A, Aluminum-coated // Type Z, zinc-coated // double 2.5 mm (0.10 inches) twisted strand wire, with 4 point 2.0 mm (0.080 inches) round barbs spaced 125 mm (5 inches) on center.

SPEC WRITER NOTE: Select type of coating. ASTM F1664 defines type of specified diameter for extruded, extruded and adhered, and fused and adhered coating respectively.

B. Polymer Coated Barbed Wire: ASTM F1665, Class // 1 // 2a // 2b // 2.0 mm (0.80 inches) double twisted strand wire; zinc coated four point, 2.0 mm (0.080 inches) barbs spaced 125 mm (5 inches) on center.

2.5 FITTINGS

A. General: ASTM F626.

B. Tension and Brace Bands: Galvanized pressed steel.

C. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Boulevard Clamps, Rail Sleeves: Pressed steel galvanized.

D. Truss Rod Assembly: Steel truss rod with a pressed steel tightener.

E. Tension Bars: Galvanized steel one-piece length 50 mm (2 inches) less than the fabric height.

F. Barbed Wire Arms: Pressed steel galvanized after fabrication // Type I - three strand 45 degree arm // Type II - three strand vertical arm // Type III - V shaped six strand arm //.

G. Polymer Coated Color Fittings: Polymer coating minimum thickness 0.15 mm (0.006 inches) fused and adhered to zinc coated fittings and match color to fence system.

2.6 TIE WIRE and HOG RINGS

A. Galvanized: Minimum zinc coating 366 g/sq. m (1.20 oz./sq. ft.); 3.76 mm (0.148 inch) diameter steel wire.

B. Polymer coated; match coating, class and color to that of the chain link fabric.

2.7 GATES

SPEC WRITER NOTE: Use ASTM F2200 reference for automated vehicular gate.

A. Swing Gates: ASTM F900 // ASTM F2200 // single // double // swing type.

1. Galvanized steel:

SPEC WRITER NOTE: Pipe Group IA is hot-dipped protective zinc-coating, Group IC is galvanized before forming.

a. Frame: ASTM F1043 and ASTM F1083 // Group IA schedule 40 pipe // Group IC pipe // 48.3 mm (1.900 inches) OD. Apply galvanized repair paint on welded joints.

1) Vertical and Horizontal Spacing: Maximum 2400 mm (8 ft.).

b. Hardware:

1) Hinges: 180 degree gate hinges per leaf.

2) Positive locking gate latch, 7.9 mm (5/16 inches) thick by 44 mm (1 3/4 inches).

SPEC WRITER NOTE: Insert padlocks requirements.

3) Padlocks: // By VA // Fed. Spec. FF-P-110J //.

2. Polymer Coated Frames and Posts: Match fence. Field coat hardware with liquid polymer touch up.

B. Horizontal Slide Gates: ASTM F1184.

1. Frame: ASTM F1043 and ASTM F1083 // Group IA schedule 40 pipe // Group IC pipe // 48.3 mm (1.900 inches) OD. Apply galvanized repair paint on welded joints.

a. Vertical and Horizontal Spacing: Maximum 2400 mm (8 ft.).

SPEC WRITER NOTE: Select type of slide gates. Type I, supported only from above with opening width up to 12.2 m (40 ft.); Type II, spanning an opening lacking a top or bottom support within that opening with opening width up to 9.1 m (30 ft.) and height up to 2.4 m (8 ft.).

2. Type I: Overhead Slide.

a. Hardware:

1) Positive locking latch, 7.9 mm (5/16 inches) thick by 44 mm (1-3/4 inches) wide.

2) Provide galvanized steel drop bars for double gates.

3) Overhead Beam/Structure, Track, and Roller Assembly: Manufacturer's standard.

3. Type II: Cantilever Slide.

a. Class 1 - External Roller Design: Horizontal top and bottom steel pipe “track” members, 60 mm (2.375 inches) OD. Length of

back frame support section minimum 40 percent of the opening. Design gates to open or close by applying an initial pull force no greater 18 kg(40 lbs.).Provide safety protective guards for the top and bottom external rollers.

SPEC WRITER NOTE: Select material.

b. Class 2 - Internal Roller Design: // ASTM B429, aluminum alloy extrusion // ASTM F1043 and ASTM F1083, Group IA, Schedule 40 pipe // Group IC pipe //. Design gates to open or close by applying an initial pull force no greater than 18 kg (40 lbs.). Design internal truck assemblies to handle required forces for gate size opening and height.

4. Polymer Coated Gates and Posts: Match fence.

2.8 CONCRETE

A. Concrete: As specified in Section 03 30 00, Cast-in-Place Concrete.

2.9 FINISHES

A. Steel Paint Finish:

1. Powder-Coat Finish: Manufacturer's standard two-coat finish system as follows:
   a. One coat primer.
   b. One coat thermosetting topcoat.
   c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
   d. Color: Refer to Section 09 06 00, SCHEDULE FOR FINISHES.

B. Finish exposed surfaces after fabrication.

C. Aluminum Anodized Finish: NAAMM AMP 500.

1. Clear Anodized Finish: AA-C22A41; Class I Architectural, 0.018 mm (0.7 mil) thick.
2. Color Anodized Finish: AA-C22A42 or AA-C22A44; Class I Architectural, 0.018 mm (0.7 mil) thick.
3. Clear Anodized Finish: AA-C22A31; Class II Architectural, 0.01 mm (0.4 mil) thick.
4. Color Anodized Finish: AA-C22A32 or AA-C22A34; Class II Architectural, 0.01 mm (0.4 mil) thick.

2.10 ACCESSORIES

A. Primers:

SPEC WRITER NOTE: Retain barrier coating to separate dissimilar metals and to separate metals from cementitious materials.

B. Barrier Coating: ASTM D1187/D1187M.

C. Welding Materials: AWS D1.1/D1.1M, type to suit application.

D. Galvanizing Repair Paint: MPI No. 18.

E. Touch-Up Paint: Match shop finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Examine and verify substrate suitability for product installation.

B. Protect existing construction and completed work from damage.

C. Remove existing // fences // and // gates // to permit new installation.

1. Retain existing // fences // and // gates // for reuse.
2. Dispose of // other // removed materials.

D. Apply barrier coating to // steel // and // aluminum // surfaces in contact with // dissimilar metals // and cementitious materials // to minimum 0.7 mm (30 mils) dry film thickness.

3.2 INSTALLATION

A. Layout fence and locate position of post.

B. Installation:

1. General: Comply with ASTM F567.
2. Framework:
   a. Posts: Set plumb in concrete footings with 600 mm (24 inches) minimum depth.
      1) Minimum Footing Diameter: Four times largest cross section of post, up to 100 mm (4 inches) O.D. and three times largest cross section of post greater than 100 mm (4 inches). O.D.
      2) Provide larger footings for gate posts. Top of post concrete footing, // at grade // 150 mm (6 inches) below grade // crowned to shed water away from the post.
      3) Space line posts not exceeding 3 m (10 ft.) on center.
   b. Top rail: Install 6.4 m (21 ft.) lengths of rail continuous thru line post or barb arm loop top. Splice rail using top rail sleeves minimum 150 mm (6 inches) long.
      1) Secure rail to terminal post by brace band and rail end.

2) Field cut and secure bottom rail or intermediate rail to line posts with boulevard bands or rail ends and brace bands.

3) Provide mid rail for fences 3.7 m (12 feet) high or higher.

c. Terminal posts: Brace and truss end, corner, pull and gate posts for fence 1.8 m (6 ft.) and higher and for fences 1.5 m (5 ft.) in height without top rail.

d. Tension wire: Install tension wire 100 mm (4 inches) up from bottom of fabric. Fences without top rail, install tension wire 100 mm (4 inches) down from the top of the fabric.

1) Stretched taut tension wire independently, between terminal posts and secure with brace band.

2) Secure tension wire to chain link fabric with 3.76 mm (0.15 inch) hog rings 450 mm (18 inches) on center and to each line post with tie wire.

3) Install top tension wire through barb arm loop for fences with barbed wire and no top rail.

C. Chain Link Fabric:

1. Install fabric // outside // inside // of the framework with ground clearance of 50 mm (2 inches) maximum.
2. Stretch fabric between terminal posts and secure with tension bar.
3. // Wrap tie wire around the post or rail. Attached to fabric wire picket on both sides. // Wrap tie wire around post 360 degrees. // Cut off and bend excess wire to prevent injury.

D. Gate:

1. Swing Gates: Comply with ASTM F567. // Inward // Outward // swing. Gates plumb in closed position with 75 mm (3 inches) bottom clearance. Install electrically operated gates according to manufacturer’s instructions.
2. Horizontal Slide Gates: Install according to manufacturer’s instructions.

E. Barbed Wire: Stretched taut between terminal posts. Secure in slots provided on the line post barb arms. Attach each strand to the terminal post with a brace band. Indicate type of barb arm, Type // I //, // II // or // III // and direction // inward // outward // for installation of Type I arm.

F. Nuts and Bolts:

1. Bolts: Install carriage bolts with head on the secure side of the fence. Peened over all bolts shall be to prevent removal of the nut.

G. Electrical Grounding:

1. Grounding: Grounding, when required, as specified in Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.

H. Touch up damaged factory finishes.

1. Repair galvanized surfaces with galvanized repair paint.
2. Repair painted surfaces with touch up primer.

3.3 CLEANING

A. Clean exposed fence surfaces. Remove contaminants and stains.

3.4 PROTECTION

A. Protect fence from // traffic and // construction operations.

B. Repair damage.

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