

**SECTION 02821  
CHAIN LINK FENCES AND GATES**

**PART I GENERAL**

**1.1 SECTION INCLUDES**

- A. Installation of chain link fences and gate units provided by single source including erection accessories, fittings, and fastenings.
- B. Refer to architectural building plans for fencing attached to building.

**1.2 RELATED SECTIONS**

- A. Construction Drawings.
- B. Section 2800 Site Furnishings.
- C. Section 02200 Earthwork.
- D. Section 03300 Concrete.

**1.3 REFERENCE STANDARDS**

- A. American Society for Testing and Materials (ASTM) latest edition
  - 1. A 116 Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric
  - 2. A 53/A 53 M Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses
  - 3. A 121 Zinc-Coated (Galvanized) Steel Barbed Wire
  - 4. A 123 Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
  - 5. A 153 Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 6. A 392 Zinc-Coated Steel Chain-Link Fence Fabric
  - 7. A 428 Weight of Coating on Aluminum-Coated Iron or Steel Articles
  - 8. A 491 Aluminum-Coated Steel Chain Link Fence Fabric
  - 9. A 1011 Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled, Sheet and Strip Commercial Quality
  - 10. A 585 Aluminum Coated Steel Barbed Wire
  - 11. C 94 Ready-Mixed Concrete
  - 12. F 668 Polyvinyl Chloride (PVC) Coated Steel Chain Link Fence Fabric
  - 13. F 567 Installation of Chain-Link Fence
  - 14. F 573 Residential Zinc-Coated Steel Chain Link Fence Fabric
- B. Chain Link Fence Manufacturers Institute (CLFMI) latest edition Product Manual
- C. FS RR-F-191 – Fencing Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories)

**1.4 PROJECT RECORD DOCUMENTS**

- A. Accurately record actual locations of property perimeter posts relative to property lines and easements.

## 1.5 SUBMITTALS

- A. Product Data: Submit manufacturers specifications and installation instructions for each item which is factory fabricated.
- B. Shop Drawings: Submit shop drawings showing location of each item dimensions, plans, and elevations, large scale details, attachment device and other components and compliance with ASTM standards and specified bending strengths.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of following or approved equal:
  - 1. Allied Tube and Conduit Corp.
  - 2. Anchor Fence, Inc.
  - 3. United States Steel

### 2.2 MATERIALS

- A. Fabric:
  - 1. No. 9 gage, 0.148" ± 0.00", finished size galvanized steel wires, 2-inch mesh, top and bottom selvages twisted and barbed conforming to ASTM A392, A491, F668, or F573.
  - 2. **Fence Fabric shall be Polyvinyl Chloride-Coated steel fabric conforming to the requirements of ASTM F 668 Specification RR-F-00191. Color shall be as selected by Architect from manufacturer's full range, complying with ASTM F 934.**
  - 3. Furnish 1-piece fabric widths for fencing.
- B. End, Corner, and Pull Posts: Galvanized steel, minimum sizes and weights conforming to ASTM A120 as follows:
  - 1. Up to 6'-0" Fabric Height: 2.5" pipe (2.375-inch OD), 3.12 pounds per lineal foot, or 3.5-inch x 3.5-inch roll-formed section, 4.85-pounds per lineal foot.
  - 2. Over 6'-0" Fabric Height: 3.0" pipe (2.875-inch OD), 4.85 pounds per lineal foot, or 3.5-inch x 3.5-inch roll-formed section, 4.85 pounds per lineal foot.
- C. Line Posts: Galvanized steel, minimum sizes and weights conforming to ASTM A120 as follows:
  - 1. Up to 6'-0" Fabric Height: 2.0" pipe (1.90-inch OD), 2.28 pounds per lineal foot or 1.875-inch x 1.625-inch C-section, 2.28 pounds per lineal foot.
  - 2. Over 6'-0" to 8'-0" Fabric Height: 2.5" pipe (2.375-inch OD), 3.12 pounds per lineal foot or 2.25-inch x 1.875-inch H-section, 2.64 pounds per lineal foot.
  - 3. Over 8'-0" Fabric Height: 3.0" pipe (2.875-inch OD), 4.85 pounds per lineal foot or 2.25-inch x 1.875-inch H-section, 3.26 pounds per lineal foot.
- D. Gate Posts: Galvanized steel posts for supporting single gate leaf or 1 leaf of double gate installation, for nominal gate widths conforming to ASTM A120 as follows:

1. Up to 6'-0": 3.0" pipe (2.875-inch OD), 4.85 pounds per lineal foot, or 3.5-inch x 3.5-inch roll-formed section, 4.85-pounds per lineal foot.
  2. Over 6'-0" to 13'-0": 4.00-inch OD pipe, 9.11 pounds per lineal foot.
- E. Top Rail: Rails 1.66-inch OD, 1.84-pounds per lineal foot or 1.625-inch x 1.25-inch roll-formed sections, 1.35 -pounds per lineal foot; galvanized steel, manufacturer's longest lengths conforming to ASTM A120.
- F. Couplings: Expansion type, approximately 6-inches long, for each joint.
- G. Attaching Devices: Provide means for attaching top rail securely to each gate corner, pull, and end post.
- H. Sleeves: Galvanized steel pipe not less than 6-inches long with inside diameter not less than ½ inch greater than outside diameter of pipe. Provide steel plate closure welded to bottom of sleeve of width and length not less than 1 inch greater than outside diameter of sleeve.
- I. Tension Wire: 7 gage galvanized steel, coated coil spring wire, located at bottom of fabric conforming to ASTM A116.
- J. Wire Ties: Class 1 galvanized steel, no less than 9 gage.
- K. Post Brace Assembly: Manufacturer's standard adjustable brace at end of gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375-inch diameter rod and adjustable tightener.
- L. Post Tops: Galvanized steel, weather tight closure cap for each tubular post. Furnish caps with openings to permit passage of top rail.
- M. Stretcher Bars: Galvanized steel, 1 piece lengths equal to full height of fabric, with minimum cross-section of 3/16-inch x 3/4-inch. Provide 1 stretch bar for each gate and end post, and 2 for each corner and pull post.
- N. Stretch Bar Bands: Manufacturer's standard
- O. Gate Cross-bracing: 3/8-inch diameter galvanized steel adjustable length truss rods.
- P. Ready Mix Concrete: ASTM C94, mix design as follows:
1. Mix concrete and deliver in accordance with ASTM C94.
  2. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following:
    - a. Compressive Strength: 3,500 psi, minimum at 28 days, unless otherwise indicated on Construction Drawings.
    - b. Slump Range: 1 to 3 inches at time of placement
    - c. Air Entrainment: 5 to 8 percent
- Q. Water: Clean
- R. Swinging Gate Hardware:

1. Hinges: Size and material to suit gate size, non-lift-off type, offset to permit full 180-degree gate opening. Provide a pair of 1 1/2-inch hinges for each leaf over 6'-0" nominal height.
  2. Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.
- S. Double Gates Hardware: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors set in concrete, to engage center drop rod or plunger bar. Include locking device and padlock eye as integral part of latch, using 1 padlock for locking both gate leaves.
- T. Sliding Gate Hardware: Provide manufacturer's standard heavy-duty track, ball-bearing hanger sheaves, overhead framing and supports, guides, stays, bracing, and accessories as required.

### **PART 3 EXECUTION**

#### **3.1 GATE FABRICATION**

- A. Fabricate swing gate perimeter frames of 1.90-inch OD pipe, galvanized steel. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space frame members maximum of 8'-0" apart.
- B. Assemble gate frames by welding or special fittings and rivets, for rigid connections. Install same fabric as for fence with stretcher bars at vertical edges. Install diagonal cross-bracing on gates as required ensuring rigid frame without sag or twist. Bars may be used at top and bottom edges. Attach stretchers to gate frame at 15 inches o.c. maximum.
- C. Attach hardware to provide security against removal or breakage.

#### **3.2 FINISH**

- A. Fabric Finish: Galvanized, ASTM A 392, Class I, with not less than 1.2 oz zinc/sq. ft of surface.
- B. Framing: Galvanized steel, ASTM A 120 or A 123, with not less than 1.8 oz zinc/sq. ft of surface.
- C. Hardware and Accessories: Galvanized, ASTM A 153 with zinc weights in accordance with Table I.

#### **3.3 CONCRETE MIXING**

- A. Mix materials to obtain concrete with minimum 28-day compressive strength of **3,500** psi; 1-inch maximum size aggregate, maximum 3-inch slump, and **5 -8** percent entrained air.

#### **3.4 INSTALLATION**

- A. Comply with recommended procedures and instructions of fencing manufacturer. Provide secure, aligned installation with line posts spaced at 10'-0" o.c. maximum.
- B. Grade Set Posts: Drill or hand excavate using posthole digger in firm undisturbed or compacted soil.

- C. Excavate hole for each post to minimum diameter recommended by fence manufacturer but not less than 4 times the largest cross-section of post. Excavate hole depths not less than 36 inches below finish grade surface.
- D. Center and align posts in holes with bottom of posts 3-inches above bottom of excavation.
- E. Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations. Extend concrete footing 2-inches above grade and trowel crown to shed water.
- F. Sleeve Set Posts: Anchor posts by means of pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonshrink, non-metallic grout, mixed and placed to comply with grout manufacturer's directions.
- G. Top Rails: Run rail continuously, bending to form radius for curved runs. Provide expansion couplings as recommended by manufacturer.
- H. Center Rails: Provide center rails where indicated. Install in 1 piece between posts and flush with post on fabric side, using special offset fittings where necessary.
- I. Brace Assemblies: Install braces so posts are plumb when diagonal rod are under proper tension.
- J. Tension Wire: Install tension wires through post cap loops before stretching fabric and tie to each post cap with not less than 6 gauge galvanized wire. Fasten fabric to tension wire using 11 gauge galvanized steel hog rings spaced 24-inches o.c.
- K. Fabric: Leave approximately 2 inches between finish grade and bottom selvage. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.
- L. Stretcher Bars: Secure at end, corner, pull, and gate posts by threading through or clamping to fabric at 4 inches o.c. and secure to posts with metal bands spaced at 15 inches o.c.
- M. Tie Wires:
  - 1. Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly when ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing.
  - 2. Tie fabric to line posts with wire ties spaced 12 inches o.c. Tie fabric to rails and braces with wire ties spaced 24 inches o.c. Tie fabric to tension wires with hog rings spaced 24-inches o.c.
  - 3. Manufacturer's standard procedure will be accepted if of equal strength and durability.
- N. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.
- O. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubrication.

### **3.5 MISCELLANEOUS INSTALLATION**

- A. Use U-shape tie wires, conforming to the diameters of pipe, that clasp the pipe and fabric firmly with ends twisted at least 2 full turns.
  - 1. Bend ends of exposed wires to minimize hazards to persons or clothing.
  - 2. Install nuts for fasteners on tension bands and hardware bolts on the side of the fence opposite the fabric. The ends of bolts, once secure and checked for smooth operation, shall be peened to prevent removal of nuts.
  - 3. Repair coatings damaged in the field with methods and techniques as recommended by the manufacturer.

### **3.6 WARRANTY**

- 1. A guarantee shall be furnished for all materials, installation, and workmanship to be free of defects for a period of 1 year from date of acceptance unless noted otherwise in the contract documents. Any defect in installation or workmanship shall be repaired, and defective materials shall be replaced during the guarantee period without any cost to the Owner.

**END OF SECTION 02821**