

## Section 2830

### Fencing

#### **PART 1: General**

- 1.1 *General Description of Work* - Extent of chain link fences and gates is indicated on drawings.
- 1.2 *Related Documents* - Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.3 *Quality Assurance* - Provide chain link fences and gates as complete units controlled by a single source including necessary erection accessories, fittings, and fastenings.

#### **PART 2: Products**

- 2.1 *General* - Dimensions indicated for pipe, roll-formed, and H-sections are outside dimensions, exclusive of coatings.
  - 2.1.1 *Available Manufacturers* - Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
    - 2.1.1.1.1 PVC Thermal Fused Galvanized Steel Fencing and Fabric:
      - 2.1.1.1.1.1 American Fence Corp.
      - 2.1.1.1.1.2 Anchor Fence, Inc.
      - 2.1.1.1.1.3 United States Steel
      - 2.1.1.1.1.4 PVC Thermal Fused Barbed Type:
        - 2.1.1.1.1.5 American Fence Corp.
        - 2.1.1.1.1.6 Man Barrier Corp.
- 2.2 *Steel Fabric* -
  - 2.2.1 *Fabric* - No. 9 ga. core (0.148" + 0.005") size steel wires, 2" mesh, with top and bottom selvages with a minimum breaking strength of 1290 pounds. Furnish one-piece fabric widths for fencing up to 12" high.
  - 2.2.2 *Fabric Undercoat* - Galvanized, with not less than 0.30 oz. zinc per sq. ft. of surface.
  - 2.2.3 *Fabric Finish* - Minimum 7 mil polyvinyl chloride (PVC) plastic resin thermal fusion bonded finish over galvanized steel wire. Color shall be manufacturer's standard dark green color selection.
- 2.3 *Fence Framing and Accessories* -

- 2.3.1 *Steel Framework, General* - Galvanized steel with not less than 1.8 oz. zinc per sq. ft. of surface.
  - 2.3.2 *Fittings and Accessories* - Galvanized malleable cast iron or pressed steel with the thermal fused PVC coating colored the same as the fence fabric.
  - 2.3.3 *Steel Framework Finish* - Provide framework, fittings and accessories in accordance with manufacturer's standard thermally bonded polyvinyl chloride (PVC) plastic resin finish over galvanizing, not less than 10-15 mils thick. Color to match chain link fabric.
  - 2.3.4 *End, Corner and Pull Posts* - 2.875" OD (3" nom.) steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.
  - 2.3.5 *Line Posts* - Space 10' o.c. maximum, unless otherwise indicated, of following minimum sizes and weights. Use 6' fabric height, 2.375" OD (2-1/2" nom.) steel pipe, 3.65 lbs per lin. ft. or 2.25" x 1.875" H-sections, 2.64 lbs. per lin. ft.
  - 2.3.6 *Gate Posts* - 4" O.D. Schedule 40 with 10-15 mils of fusion bond PVC to match fence mesh color.
  - 2.3.7 *Top Rail* - Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post. Post shall be 1.66" OD pipe, 2.27 lbs. per ft. or 1.625 x 1.25" roll-formed sections, 1.35 lbs. per ft.
  - 2.3.8 *Tension Wire* - 7-gage, coated coil spring wire and thermal fused PVC coated finish to match fabric. Locate at bottom of fabric.
  - 2.3.9 *Wire Ties* - Thermal fused PVC coated 9 ga. galvanized steel or 9 ga. aluminum wire, to match fabric color.
  - 2.3.10 *Post Brace Assembly* - Manufacturer's standard adjustable brace at end and 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" diameter rod and adjustable turnbuckle.
  - 2.3.11 *Post Tops* - Provide weather tight closure cap with loop to receive tension wire or top rail; one cap for each post.
  - 2.3.12 *Stretcher Bars* - One-piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.
  - 2.3.13 *Stretcher Bars Bands* - Space not over 15" o.c., to secure stretcher bars to end, corner, pull and gate posts.
  - 2.3.14 *Concrete* - Provide concrete consisting of Portland cement, aggregates, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi using at least 4 sacks of cement per cu. yd., 1" maximum size aggregate, maximum 3" slump, and 2% to 4% entrained air.
- 2.4 *Aluminum Cantilever Slide Gates* - All gates shall be cantilever slide gates. Exception must be approved in writing by ECUA.

#### 2.4.1 Fabrication –

2.4.1.1 Fabricate framework of gates from 6061-T6 alloy aluminum with a thermal fusion PVC coating finish to match fence framework. Assemble gate frames by welding or with special fittings and rivets, for rigid connections, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories. Vertical stiffening members shall be of 2-inch (min.) square fabrication weighing 0.94 lbs/ft spaced to subdivide the gate into square panels. Diagonal bracing between vertical stiffeners shall be with 1-1/4 inch square fabrication. The gate frame shall be fabricated with 2" square aluminum members weighing 0.94 lb. /ft., 2" x 4" aluminum members weighing 1.71 lbs./ft. and a one (1) piece aluminum track/frame member weighing a minimum of 4.338 lbs./ft. and whose 2" square frame member has a top and bottom wall thickness of not less than 0.25 inches and vertical wall thickness of 0.141 inches, or greater. The leading 2" square frame member shall be fabricated with a full height internal stiffening member of at least 1.66 inch diameter, weighing 2.27 lbs./ft.

2.4.1.2 The gate truck assembly shall be a swivel type, zinc die cast with four (4) factory sealed and permanently lubricated ball bearing rollers. The rollers shall be 2" diameter by 9/16" in width equipped with two (2) side rollers to prevent lateral movement. Truck assemblies shall be mounted on the post brackets using 7/8" diameter ball bolts with a 1/2" shank.

2.4.1.3 Provide same fabric as for fence, unless otherwise indicated. Install stretched fabric continuously within the anchoring channel provided in the top and bottom track of the fabricated gate frame and secure with required hardware.

2.4.1.4 Where barbed wire is indicated above gates, extend end members of gate frames 1'-0" above to member and prepare to receive 3 strands of wire. Provide necessary clips for securing wire to extensions.

2.4.2 *Gate Hardware* - Provide gate hangers, latch brackets, guide assemblies and stop hardware and accessories of aluminum, malleable iron or galvanized steel after gate fabrication.

### **PART 3: Execution**

3.1 *Installation* - Do not begin installation and erection before final grading is completed, unless otherwise permitted.

#### 3.1.1 *Excavation* -

3.1.1.1 Drill or hand excavate (using post hole digger) holes for posts to diameters and spacings indicated, in firm, undistributed or compacted soil.

3.1.1.2 If not indicated on drawings, excavate holes for each post to minimum diameters as recommended by fence manufacturer, but not less than 4 times larger cross-section of post.

- 3.1.1.3 Unless otherwise indicated, excavate hole depths approximately 3" lower than post bottom, with bottom of posts set not less than 36" below finish grade surface.
- 3.1.2 *Setting Posts* -
  - 3.1.2.1 Center and align posts in holes 3" above bottom of excavation.
  - 3.1.2.2 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. Unless otherwise indicated, extend concrete footings 2" above grade and trowel to a crown to shed water.
- 3.1.3 *Top Rails* - Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.
- 3.1.4 *Center Rails* - Provide center rails where indicated. Install in one piece between posts and flush with post on fabric side, using special offset fittings where necessary.
- 3.1.5 *Brace Assemblies* - Install braces so posts are plumb when diagonal rod is under proper tension.
- 3.1.6 *Tension Wire* -
- 3.2 Install tension wires before stretching fabric and tie to each post cap with not less than 6 ga. PVC coated galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.
  - 3.2.1 *Fabric* - Leave approximately 2" between finish grade and bottom selvage, unless otherwise indicated. 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.
  - 3.2.2 *Stretcher Bars* - Thread through or clamp to fabric 4" o.c., and secure to posts with metal bands spaced 15" o.c.
  - 3.2.3 *Barbed Wire* - Pull wire taut and install securely to extension arms and secure to end post or terminal arms in accordance with manufacturer's instructions.
  - 3.2.4 *Barbed Tape* - Install barbed tape in configurations indicated in accordance with manufacturer's recommendations and securely fasten to fencing to prevent movement or displacement.
  - 3.2.5 *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 lubricate where necessary.
  - 3.2.6 *Tie Wires* - Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts, with wire ties spaced 12" o.c. Tie fabric to rails and braces, with wire ties spaced 24" o.c. Tie fabric to tension wires, with hog rings spaced 24" o.c.

- 3.2.7 *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.
- 3.3 *Coating Repair* - Any damaged PVC coating shall be touched up with vinyl paint recommended by the fence/gate manufacturer and applied to a cleaned and prepared surface in accordance with the manufacturer's requirements.

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