Chain-Link Fence and Steel Fence Barriers

Abstract

This section details the specifications and requirements for the installation of chain-link fences and associated barriers. This document outlines detailed specifications and rigorous standards for installing chain-link and steel fence barriers, emphasizing compliance with industry norms and ensuring high-quality installations. It covers the requirements for various components, including posts, rails, braces, and the integration of concrete structures, specifying materials like 9-gauge galvanized steel wire and zinc-coated razor wire. These materials must meet standards such as ASTM A392 for the fabric and ASTM A121 for the razor wire, ensuring durability and effectiveness. Additionally, the document details the installation process, from setting posts in precise alignments to applying tension wires and ensuring all elements like concrete foundations and electrical grounds are included and correctly installed. Dimensional tolerances are strictly maintained to ensure uniformity, and all hardware used must meet specified strength and quality standards.The guidelines are designed to facilitate the installation of secure, stable, and consistent fencing solutions.

Related Work

Concrete Reinforcement: Involves the integration and support of concrete structures within the fencing installation.

Precast Structural Concrete: Utilization of precast concrete components.

Material Certification

Certification of all materials used in the fencing project is required to ensure compliance with industry standards.

Installation and Measurement

General Requirements: The installation includes setting up posts, rails, braces, electrical grounds, and jersey barriers. The application of tension wires, ties, and concertina razor wire is also included.

Measurement Units: The fence will be measured in meters. This measurement will encompass all materials, labor for installation, testing, grading, compacting, and all other tasks necessary to complete the work.

Incidental Components:

Concrete foundations

Wildlife deterrent mesh

Electrical grounds

Tension wires and ties

Concertina razor wire

Plastic mesh (specific to certain sections)

All these components are considered incidental to the fence installation, meaning they are required but not separately measured or billed. The entire installation process is designed to ensure a fully functional and secure perimeter barrier.

Specification for Chain-Link Fencing

Fabric

- **Material**: The fabric is made from 9-gauge galvanized steel wire, woven into a 2-inch (50 mm) mesh.
- **Standards**: Complies with ASTM A392, Class 2.

Razor Wire

- **Construction**: Consists of 2-strand 12-1/2 gauge zinc-coated wire with razor barbs.
- **Compliance**: Meets ASTM A 121, Class 3, Chain Link Fence Grade specifications.

Posts, Rails, and Braces

- **Materials and Standards**: Must adhere to ASTM F-1043 or ASTM F1083. Options include:

    1. **Galvanized Tubular Steel**: Coatings conform to External coating Type B and internal coating Type B or D.
    2. **Aluminum Alloy or Composite**: For use with aluminum alloy fabric.
    3. **Durability Testing**: Non-galvanized steel or non-aluminum alloy materials must pass 1,000 hours of external and 650 hours of internal salt spray testing per ASTM B117, showing no more than 5% red rust.

Wire Ties and Tension Wires

- **Material Matching**: Wire ties must match the fabric in material and coating weight.
- **Specifications**: Top and bottom tension wires are 7-gauge marcelled steel, conforming to ASTM A 824, with the same coating as the fabric.

Miscellaneous Fittings and Hardware

- **Quality and Coating**: Commercial grade steel or better, with zinc coating in accordance with ASTM A 153.
- **Strength**: Must handle a load of 250 pounds (113 kg) applied vertically at the end of razor barbed wire support arms.

Concrete

- **Grade and Strength**: Commercial grade with a minimum 28-day compressive strength of 3,000 psi (20,684 kPa).

Marking

- **Identification**: Each roll of fabric will include a tag indicating the base metal type (steel, aluminum, or aluminum alloy), coating type, wire gauge, roll length, and manufacturer's name. Posts, wire, and other fittings will similarly be marked.

Precast Structural Concrete

- **Specifications**: Complies with Section 03410, except it should have a 28-day compressive strength of 35 MPa.

Concrete Reinforcement

- **Reference**: Adheres to Section 03200 - Concrete Reinforcement.

Mortar

- **Components**:
    - **Aggregate**: Meets CSA A82.56 standards.
    - **Cement**: Conforms to CAN/CSA-A8.

Permissible Dimensional Tolerances of Fence Barriers

Cross-Sectional Tolerances

- Variation Limits: Cross-sectional dimensions can deviate from the design by no more than 6 mm.
- Vertical Alignment: The vertical centerline should not be out of plumb by more than 6 mm.

Longitudinal Tolerances

- Section Variation: Longitudinal dimensions may not vary from the design by more than 6 mm over any 3-meter section of the barrier.
- Overall Section Tolerance: The total variation should not exceed 20 mm per barrier section.

Anchoring

- Specifications: The location for anchoring is determined by the supplier.

Physical Requirements of Fence Barriers

Compressive Strength

- **Standard**: Must meet ASTM C39 for the compressive strength of cylindrical concrete specimens.

Concrete Finishing

- **Finish Quality**: The finish should be comparable to that of a steel form and must be uniform across all sections included in the contract lot.
- **Producer's Discretion**: The specific type of finish is at the producer’s option.

Lifting Devices

- **Placement**: Lifting devices should not be cast into the side surfaces of the barrier products.

Anchorage

- **Purpose**: To prevent lateral movement of the barriers.
- **Methods**: Can include dowels, keyway joints, or interlocking devices as specified by the Airport Authority or Consultant.

Steel Reinforcement

- **Handling and Delivery**: The design of the reinforcement should facilitate safe handling, delivery, and placement of the sections without causing damage.
- **Construction**: Reinforcement should be assembled as a cage with adequate mat and bar to maintain its shape during casting.
- **Concrete Cover**: Minimum of 50 mm, except for end sections which may have less.

Concrete Design Strength

- **Requirement**: 4,000 psi compressive strength within 28 days.

Air Entrainment

- **Standard Air Content**: Unless otherwise specified, concrete should have an air content of 5% ±1%, as measured by ASTM test methods C173 or C231.

Basis of Acceptance of Fence Barriers

Strength Properties

- **Testing Standard**: Cylinders are tested according to ASTM C39.
- **Requirements**: Average compressive strength values (fc) from daily tests must meet or exceed the specified design strength.

Dimensional Properties

- **Criteria**: Includes cross-sectional and longitudinal dimensions, along with the location and positioning of anchoring devices and reinforcement.

Manufacturer's Data

1. Chain-Link Fencing Components
2. Accessories
3. Gate Operator

Certificates of Compliance

1. Fabric
2. Posts
3. Braces
4. Framing
5. Rails
6. Tension Wires

Clearing Fence Line

- **Preparation**: Remove all trees, brush, stumps, logs, and other debris within a minimum width of 500mm on each side of the fence centerline before fencing operations begin.

Installing Posts

- **Installation Details**: Posts should be set on concrete barriers at specified dimensions and depths, spaced no more than 3m apart, and embedded at least 400 mm into the concrete. Ensure proper alignment with a minimum of 75 mm concrete coverage on all sides.
- **Additional Procedures**:
    - Posts may be welded to a galvanized plate, then bolted to the concrete barrier.
    - Alternate connection details must be approved by the Airport Authority.
    - Posts must be set plumb and to the required grade and alignment.
    - Do not disturb posts or install materials on them for 7 days after setting.
    - Fill remaining drilled holes with grout made from one part Portland cement to two parts mortar sand.

Installing Braces

- **Configuration**: Install horizontal brace rails with diagonal truss rods and turnbuckles at all terminal posts or where fence alignment changes by more than 30 degrees.

Installing Fabric

- **Attachment**: Firmly attach wire fabric to posts and braces as specified.
- **Tensioning and Alignment**: Stretch all wire taut and install to required elevations, generally following the ground contour.

- **Clearance**: Maintain fence fabric clearance between 25 mm and 100 mm from the top of the concrete barrier.
- **Grading**: Perform grading as necessary for a neat appearance.

Electrical Grounds

- **Installation Locations**: Construct electrical grounds where power lines pass over the fence and at intervals of 500 feet (150 meters).
- **Details**: Install a copper-clad rod, 3 meters long and at least 20 mm in diameter, driven vertically until the top is 150 mm below the ground surface. Attach a No. 6 solid copper conductor to the rod and fence to ensure grounding of each fence element.
- **Cost**: Ground rod installation is considered incidental to fence construction and is not a separate pay item.