



Chain Link Fence Manufacturers Institute Security Fencing Recommendations

(CLF-SFR0111)

Chain link fencing has been the product of choice for security fencing for over 60 years because of its strength, corrosion resistance, "see thru capabilities", ease of installation, versatility, variety of product selection and value. A chain link fence is one of the primary building blocks for a facility's perimeter security system.

The physical security barrier provided by a chain link fence chain link fence provides one or more of the following functions:

- Gives notice legal boundary of the outermost limits of a facility
- Assists in controlling and screening authorized entries into a secured area by deterring entry elsewhere along the boundary.
- Supports surveillance, detection, assessment, and other security functions by providing a zone for installing intrusion detection equipment and closed-circuit television (CCTV).
- Deters casual intruders from penetrating a secured area by presenting a barrier that requires an overt action to enter.
- Demonstrates the intent of an intruder by their overt action of gaining entry.
- Causes a delay to obtain access to a facility, thereby increasing the possibility of detection.
- Creates a psychological deterrent.
- Reduces the number of security guards required and frequency of use for each post.
- Optimizes the use of security personnel while enhancing the capabilities for detection and apprehension of unauthorized individuals.
- Demonstrates a corporate concern for facility security
- Provides a cost effective method of protecting facilities

NOTE TO SECURITY PROFESSIONALS:

We strongly encourage you to also reference the CLFMI publication: Tested and Proven Performance of Security Grade Chain Link Fencing Systems (CLF-TP0211)

With this newly-released 12-page report, security and fence professionals have the information and test data needed to specify and select security grade chain link fence systems based on the time required for forced entry penetration or its ability to protect people and property from vehicular impact. These testing results provide the data to make a well informed, logical decision.



SECURITY PLANNING:

Chain link fence enhances the goals of good security planning. In-depth security planning takes into consideration the mission and function, environmental concerns, threats, and the local area of the facility to be secured. This can be translated into an A-B-C-D method that points out the values of chain link fencing to a security program.

- A. AIDS to security. Chain link fencing assists in the use of other security equipment, such as the use of intrusion detectors, access controls, cameras, etc. Chain link fences can be employed as aids to protection in an exterior mode or an internal protected property, as a point protection, and for general protection as required.
- B. BARRIERS for security. These can be buildings, chain link fences, walls, temporary checkpoints, etc.
- C. CONTROLS support the physical security chain link fences and barriers, such as an access control system tied into vehicle gates and pedestrian portals, various level identification badges and temporary badges, security escorts, and internal procedures.
- D. DETERRENTS such as a chain link fence, guards, lighting, signage, and checkpoint control procedures are a few of the deterrents that ensure intruders will consider it difficult to successfully gain access.

When properly used, the aspects of the A-B-C-D method reinforce and support each other. Thus a chain link fence is also a deterrent, and a barrier, if need be. By combining A-B-C-D, sufficient obstacles are created to prevent an intruder from obtaining information that is being worked on during the day in the controlled access area and then is protected at night, weekends, and holidays through the implementation of the security in-depth concept.

More importantly, keep in mind that a chain link fence is the common denominator of the A-B-C-D system and will reduce overall risk, secure the environment, and reduce security costs if designed and installed properly. However, believing that a fence will eliminate all illegal access is not prudent. A fence system will only delay or reduce intrusion.

In order to ensure the effectiveness of the facility security fence program, it is recommended that a maintenance program be developed for the proper maintenance of the fence system, gates, gate operators and related access controls.

MATERIAL SPECIFICATIONS:

Material specifications for chain link fence are listed in the following:

- (CLFMI) Chain Link Manufacturers Institute Product Manual (CLF-PM0610)
- ASTM (American Society of Testing Materials) Volume 01.06
- Federal Specification RR-F-191 K/GEN, 14 May 1990
- ASTM F 1553, "The Standard Guide for Specifying Chain Link Fence" will provide the appropriate information to develop a specification document.

Framework:

The framework for a chain link fence consists of the line posts, end posts, corner posts, gateposts, and if required top, mid, bottom or brace rail. The Federal Specification and The CLFMI "Wind Load Guide for the Selection of Line Post Spacing and Size" (CLF-WLG0110) provides recommended post sizes for the various fence heights. However the latter document also provides choices of line post types, sizes and spacings to accommodate selected fence heights and fabric sizes for wind loads at various geographical project locations. The CLFMI Product Manual (CLF-PM0610), ASTM F1043 & ASTM F1083, as well as the Federal Specification, list the material specifications for the framework.

Chain Link Fabric:

The material specification for chain link fabric is thoroughly spelled out in the CLFMI Product Manual, ASTM and the Federal Specifications. The choice of chain link fabric will govern the desired security level, and the various fabric-coating choices will govern the corrosion resistance. Light gauge residential chain link fabric will not be considered in this document. Provided are only those chain link fabrics that offer a level of security, thus the gauge of wire and mesh size has been narrowed down to the following:

11 gauge (0.120" diameter)
having minimum break strength of 850 lbf

9 gauge (0.148" diameter)
having minimum break strength of 1290 lbf

6 gauge (0.192" diameter)
having minimum break strength of 2170 lbf

Mesh sizes to consider (mesh size is the minimum clear distance between the wires forming the parallel sides of the mesh) are 2" mesh, 1" mesh and 3/8" mesh. Consider the following regarding mesh size:

- The smaller the mesh size the more difficult to climb or cut.
- The heavier the gauge wire the more difficult to cut.

The various mesh sizes available in the three previously discussed gauges are listed in the order of their penetration resistance/security:

- | | |
|-------------------------------|--------------------|
| A. Extremely high security | 3/8" mesh 11 gauge |
| B. Very high security | 1" mesh 9 gauge |
| C. High security | 1" mesh 11 gauge |
| D. Greater security | 2" mesh 6 gauge |
| E. Normal Industrial security | 2" mesh 9 gauge |

Gates:

Gates are the only moveable part of a fence and therefore should be properly constructed with appropriate fittings. Chain link gate specifications are listed in the CLFMI Product Manual, ASTM and the Federal Specification.

Limiting the size of the opening increases vehicular security, it reduces the possibility of one vehicle passing another and the smaller opening reduces the open close cycle time. The cantilever slide gate is the most effective for vehicle security especially one that is electrically operated and tied into an access control system. High-speed cantilever slide gate operators are available for certain applications.

Pedestrian/personnel gates can be constructed using a basic padlock or designed with an electrical or mechanical lock or a keypad/card key system tied into an access control system. Pre-hung pedestrian gates/portals installed independent of the fence line are available to isolate the gate from fence lines containing sensor systems thus reducing possible false alarms.

DESIGN FEATURES AND CONSIDERATIONS

Some basic design features to consider that enhance security:

- **Height** - the higher the barrier the more difficult and time consuming to breach.
- **Eliminating top rail** - the omission of a rail at the top of the fence eliminates a handhold thus making the fence more difficult to climb. A 7-gauge coil spring wire can be installed in place of the top rail.
- **Adding barbed wire** - the addition of three or six strands at the top of the fence increases the level of difficulty and time to breach. When using the three-strand 45-degree arm it is recommended to angle the arm out from the secured area.
- **Bolt or rivet barbed wire arms to post** - barbed wire arms are normally held to the post by the top tension wire or top rail. For added security they can be bolted or riveted to the post.
- **Adding barbed tape** - stainless steel barbed tape added to the top and in some cases the bottom of the fence greatly increases the difficulty and time to breach.
- **Adding bottom rail** - the addition of a bottom rail that is secured in the center of the two line post using a 3/8" diameter eye hook anchored into a concrete footing basically eliminates the possibility of forcing the mesh up to crawl under the fence. The bottom of the fence with or without bottom rail should be installed no greater than 2" above grade.
- **Bury the chain link fabric** - Burying the fabric 12" or more will also eliminate the possibility of forcing the mesh up.
- **Color chain link fabric** - one of the security features of a chain link fence is visibility, allowing one to monitor what is taking place inside or outside of the fence line more efficiently. Color polymer coated chain link fabric enhances visibility, especially at night. Complete polymer coated systems, coated fabric, fittings, framework and gates, not only increases visibility, but also provides greater corrosion resistance, especially for use in areas adjacent to the seacoast.
- **Double row of security fencing** - it is not uncommon to add an additional line of internal security fencing 10 to 20 feet inside the perimeter fence. In many cases double rows of fencing are used with sensors and detectors, or with a perimeter patrol road in area between the fences.
- **Clear zone** - In wooded or high grass areas it is advisable to clear and grub a clear zone on either side of the fence to aid surveillance.
- **Internal security fencing** - many situations require the need of a separate interior fence to add another level of security for a particular building, piece of equipment, or location.
- **Peen all bolts** - this eliminates the removal of the bolt nut.
- **Addition of a sensor system** - this adds another level of security to the fence system.
- **Addition of lighting** - increases visibility as well as raises the level of psychological deterrent.
- **Signage** - installed along the fence line, signs are important to indicate private secured areas; violators may be subject to arrest, and possibly noting the presence of alarms and monitoring systems.



TYPICAL DESIGN EXAMPLE

We have chosen for our example to list the referenced specifications separately to help identify the various items that need to be specified. The specification writer may use this format or the standard CSI (Construction Specifications Institute) format in developing their document.

In developing specifications for a typical chain link fence, the design could be described as follows:

8'0" high chain link fence plus 1'0", 3 strands of barbed wire at top for a total height of 9'0", consisting of 2" mesh 6 gauge chain link fabric, * _____ o.d. or * _____ "C" line posts spaced a maximum of 10'0" o.c., 7 gauge coil spring wire at top, secured to the chain link fabric with 9 gauge hog rings spaced not greater than 12", 15/8" o.d. bottom rail secured in the center with a 3/8" diameter galvanized steel eye hook anchored into a concrete footing, chain link fabric secured to line post and rail at a maximum of 12" o.c. using 9 gauge tie wire.

* _____ o.d. end and corner posts complete with 15/8 o.d. brace rail, 3/8" truss assembly, 12 gauge tension bands secured at a maximum of 12" o.c., tension bar, necessary, fittings, nuts, bolts.

Chain link fabric shall comply with ASTM _____*
Post and brace rail shall comply with ASTM _____*
Barbed wire shall comply with ASTM _____*
Fittings, ties, nuts, bolts shall comply with ASTM _____*
Coil spring wire shall comply with ASTM _____*

** Reference is made to ASTM as an example. All chain link specifications, fabric, posts, fittings gates etc. are referenced in ASTM F 1553, Standard Guide for Specifying Chain Link Fence*

A typical design/specification for gates would be listed as follows:

Pedestrian/personnel swing gates shall have a 4'0" opening by 8'0" high plus 1'0", three strands of barbed wire on top. Gate frames shall be fabricated from 2" o.d. or 2" square members, welded at all corners. Chain link fabric shall be installed to match the fence line unless otherwise specified. Gateposts shall be * _____ o.d. complete with 1 5/8" o.d. brace rail, 3/8" diameter truss assembly, 12 gauge tension bands secured a minimum of 12" apart, necessary tension bar, fittings, nuts and bolts.

Chain link fabric shall comply with ASTM _____
Swing gates shall comply with ASTM _____
Gateposts size, o.d., shall comply with ASTM _____
Gateposts shall comply with ASTM _____
Fittings shall comply with ASTM _____

Cantilever slide gates shall be of the opening sizes as indicated on the drawings, having a height of 8'0" plus 1'0", three strands of barbed wire. (The construction and design of cantilever slide gates vary and therefore it is best to list the specific specification) Cantilever slide gates shall be constructed per ASTM F 1184, Class * _____. Chain link fabric shall match the fence line unless otherwise specified. (Cantilever slide gates require 4" o.d. gate posts, larger or smaller posts are not recommended.) The 4' o.d. gate posts shall be complete with 1 5/8" o.d. brace rail, 3/8" diameter truss assembly, 12 gauge tension bands secured a minimum of 12" apart, necessary tension bar, fittings, nuts and bolts.

4" o.d. Gatepost and 1 5/8 "o.d brace rail shall comply with ASTM _____
Fittings shall comply with ASTM _____
Chain link fabric shall comply with ASTM _____

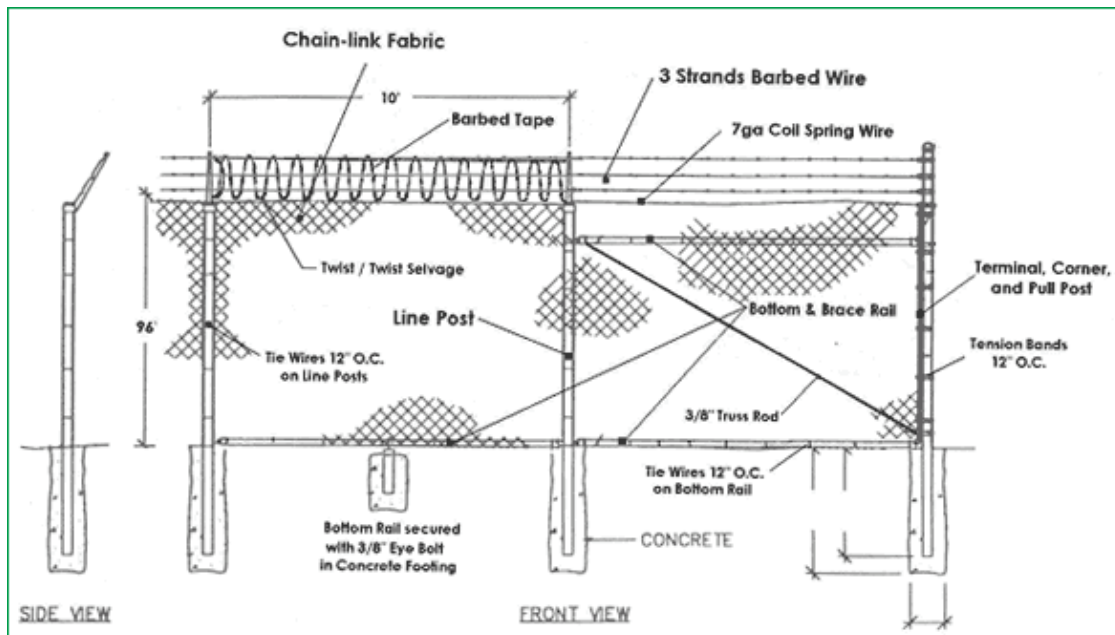


Installation:

Installation for the fence line, terminal posts and gates will vary depending on the security level required, site conditions, geographical location, soil conditions and weather conditions. The best documents to assist you in this process are ASTM F 567, "Standard Practice for Installation of Chain Link Fence" and the CLFMI "Wind Load Guide for the Selection of Line Post Spacing and Size" (CLF-WLG0110).

Project inspection:

Improper material or installation can have a dramatic effect on the required security. It is important to verify that the projects materials are in compliance with the contract specifications and that the fence has been installed properly. Procurement or facility managers may want to consider a mandatory requirement of their reviewing material certifications and shop drawings prior to start of the project. This will ensure that proper products will be installed, and that specific installation guidelines have been provided. CLFMI offers a Field Inspection Guide document to assist in this process.



Typical detail of an eight foot high with one foot, 3-strand barbed wire security fence.

Reference is made to various fence specifications; complete information can be obtained by contacting the following:

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Standardization Documents Order Desk
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