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Standard Guide for Design and Construction of Chain Link Security Fencing[1]

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1. Scope

1.1 This guide provides the material and installation standards for selection in the design of a security chain link fence system. The proper material selection, system installation and layout can substantially increase the difficulty to penetrate; thereby, increasing the intrusion delay time.

1.2 This guide does not purport to address all of the physical protection security concerns. It is the responsibility of the user of this standard to establish the appropriate design for the level of physical protection required and determine the applicability of regulatory requirements or limitations prior to use.

1.3 It is recommended that Guide F1553 be followed for the format of this guide.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

A491 Specification for Aluminum-Coated Steel Chain-Link Fence Fabric

A817 Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire

A824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence

F552 Terminology Relating to Chain Link Fencing

F567 Practice for Installation of Chain-Link Fence

F626 Specification for Fence Fittings

F668 Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric

F900 Specification for Industrial and Commercial Swing Gates

F934 Specification for Colors for Polymer-Coated Chain Link Fence Materials

F1043 Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

F1184 Specification for Industrial and Commercial Horizontal Slide Gates

F1345 Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric

F1553 Guide for Specifying Chain Link Fence

F1664 Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence

F1665 Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used With Chain-Link Fence

F1910 Specification for Long Barbed Tape Obstacles

F1911 Practice for Installation of Barbed Tape

F2200 Specification for Automated Vehicular Gate Construction

2.2 *Chain Link Fence Manufacturers Institute:*

WLG 2445 Guide for the Selection of Line Post and Spacing for Chain Link Fence[3]

2.3 *U. S. Department of Defense:*

UFC 4-010-01 United Facilities Criteria, DOD Minimum Antiterrorism Standards for Buildings[4]

2.4 *U.S. Department of State:*

SD-STD-02.01, Revision A, March 2003 Test Method for Vehicle Crash Gate Testing of Perimeter Barriers and Gates[5]

3. Terminology

3.1 Definitions, see Terminology F552.

4. Summary of Practice

4.1 Chain link fence systems can be designed to provide greater levels of security by selecting products and configurations that increase the difficulty to penetrate and in turn

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Chain Link Fence Manufacturers Institute, 10015 Old Columbia Road, Suite B-215, Columbia, MD 21046, http://www.chainlinkinfo.org.

[4] Available electronically from United Facilities Criteria (UFC) Index, http://65.204.17.188//report/doc_ufc.html

[5] Available from the U.S. Department of State, Bureau of Diplomatic Security, Office of Physical Security Programs, Physical Security Division, SA-14, Washington, DC 20259–1403.

increase delay time. Some examples; increase the height of the fence, the configuration of chain link mesh size and wire gauge, securing the bottom of the fence via bottom rail or burying the chain link mesh, adding barbed wire to the top or barbed tape to the top, side or bottom of the fence, selecting stronger framework, adding multiple fence lines to create isolation zones, adding slats to the fencing to restrict visibility when required. Adding anti ram cable systems to resist vehicle penetration into a protected perimeter.

5. Part 1—General

5.1 List the scope of work included; the performance requirements of the overall project security design criteria, the performance design criteria for the fence system, referenced contract documents, fence design and detail drawings, material specifications, related site work, site drawings with the specific fence layout, product and data submittals, certifications, site preparation, contractor qualifications, warranties and the fence integration with other security products.

5.1.1 Fence placement can be critical and should be well thought out and defined by the contract specifications and drawings. Placement should be coordinated with the grading plan to ensure it does inhibit drainage flow by location or debris buildup.

5.1.2 Consideration should be given to the fence location to provide the proper offset to protect a building or provide a clear zone from trees, underbrush, buildings and structures. Qualifying Federal building sites require specified fence set back distances from the building in compliance with the DoD Minimum Antiterrorism Standards for Buildings, UFC 4-040-01.

5.1.3 Consideration should be given during design of the fence to ensure it will properly support the application of added intrusion detection devices. An integrated system using lighting with video surveillance requires a specific fence layout, for example, the fence must be located to avoid blocking the view or reduce shadows.

5.1.4 Signage posted along the fence line should always be a consideration.

6. Materials and Sizes

6.1 *Chain Link Fabric*:

6.1.1 There are many chain link mesh design configurations; those to be considered for security fencing, in order of difficulty to penetrate are listed in Table 1.

6.1.2 Select the chain link mesh configuration from Table 1; choose the type of coating required from one of the following:

6.1.2.1 Zinc-Coated Steel in accordance with Specification A392, select Class 1 or Class 2 coating.

NOTE 1—⅝-in. [16-mm], ½-in. [13-mm] and ⅜-in. [10-mm] smaller mesh sizes are not listed in Specification A392.

6.1.2.2 Aluminum Coated Steel in accordance with Specification A491.

6.1.2.3 Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel in accordance with Specification F1345, Class 2.

6.1.2.4 Polyvinyl Chloride (PVC) and other Organic Polymer-Coated Steel in accordance with Specification F668, Class 2b. Select the color as listed in Specification F934.

6.2 *Fence Framework*:

6.2.1 *Line Posts*:

Fences designed to provide increased security levels are generally of greater heights and utilize smaller mesh sizes, both of these factors result in added wind load resistance. Line post selection and the spacing of the posts should be designed to meet the anticipated wind loads based on the site geographical location and weather conditions. Increased post sizes or specific post spacing may be required to compensate for wind loading or increased security. The Chain Link Fence Manufacturers Institute's, Guide for the Selection of Line Posts and their Spacing, WLG 2445, guides the designer through the process to select the post size and post spacing. After calculating the post spacing and post dimensions select the post specification and protective coating from Specification F1043, Table 3, Heavy Industrial Fence Framework or Specification F1083.

6.2.1.1 *Terminal Posts*:

(end, corner, or pull) are to be in accordance with Specification F1043, Table 3, Heavy Industrial Fence Framework or Specification F1083. Select the terminal post size based on the line post size in accordance with Table 2.

6.2.1.2 *Rails*:

Top, intermediate and terminal post brace rails when specified shall be in accordance with Specification F1043, Table 3, Heavy Industrial Fence Framework or Specification F1083.

6.2.1.3 Polymer-coated framework, specify the type of coating in accordance with Specification F1043 and the color in accordance with Specification F934.

6.3 *Barbed Wire*:

TABLE 1 Security Chain Link Mesh Configurations

Security Chain Link Fabric Considerations	Mesh Size and Gauge
Standard Industrial Commercial Chain Link Mesh	2 in. mesh 9 gauge
Bolt cutters required for heavier 6 gauge wire	2 in. mesh 6 gauge
Smaller mesh size increases difficulty to climb and time to cut thru	1 ¾ in. mesh 9 gauge
Bolt cutters required for heavier 6 gauge wire	1 ¾ in. mesh 6 gauge
1 in. mesh increases difficulty to climb and increases time to cut thru	1 in. mesh 11 gauge
9 gauge wire increases cutting time to that of 11 gauge, above	1 in. mesh 9 gauge
Small mesh sizes eliminates finger hold for climbing	⅝ in. mesh 11 gauge
Small mesh requires special equipment is to cut through	½ in. mesh 11 gauge
Penetration time is increased to cut through small mesh	⅜ in. mesh 11 gauge
Metric Equivalents: 2 in. [50 mm,] 1¾ in. [44.45 mm], 1 in. [25 mm], ⅝ in. [16 mm], ½ in. [13 mm], ⅜ in. [10 mm]	
6ga. 0.192 in. [4.88 mm], 9 ga. 0.148 in. [3.76 mm], 11 ga. 0.120 in. [3.05 mm]	