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Standard Guide for Security of Tank Farm Installations for Compliance with Spill Prevention, Control and Countermeasure Plan (SPCC) Regulations[1]

This standard is issued under the fixed designation E2942; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

Federal Regulation 40 CFR 112.3 requires an owner or operator of certain onshore or offshore facilities that have tanks used for storing oil to prepare a written Spill Prevention Control and Countermeasure Plan (SPCC Plan). The SPCC Plan must include a description of the security measures that are implemented at the facility to prevent unauthorized access to oil handling, processing, and storage areas. Such security measures may involve fencing, lighting and other more sophisticated systems.

The SPCC rule defines Tier I and Tier II facilities. The owner/operator of Tier I and certain Tier II facilities may prepare and self-certify the SPCC Plan. Refer to United States Environmental Protection Agency - Office of Solid Waste and Emergency Response Spill Prevention, Control and Countermeasure (SPCC) Rule - Stream-lined Requirements for Tier I and Tier II Qualified Facilities for aid in determining if a particular facility is a qualified Tier I or Tier II facility. If the requirements for self-certification are not met then the SPCC Plan must be certified by a Professional Engineer (P.E.) Some states do not permit self-certification of SPCC Plans and thus requires that all SPCC Plans be certified by a Professional Engineer (P.E.) The owner/operator should check with the state engineering licensing board to find out if it prohibits SPCC Plan self-certification.

1. Scope*

1.1 This guide covers fencing and lighting only. More sophisticated security systems may be appropriate for the facility but discussion of these types of systems is beyond the scope of this document.

1.2 The information included in this guide is intended for petroleum bulk storage facilities. It is not intended for use with retail fueling and other motor fueling facilities, refineries, chemical plants, docks, oil production facilities, or electric power generation, transmission, distribution and service center facilities. Fencing, lighting or other security measures designed to prevent unauthorized access to the bulk storage facility may be components of Best Management Practices (BMPs) that the facility uses to prevent releases of petroleum to storm water discharges. There are several different types of fencing and lighting that can be effective. The intent of this document is to outline a method for providing security fencing and lighting that has been effectively used. There are other fencing and lighting methods that may be adequately effective. Some facilities may be considered adequately secure without fencing or lighting. An analysis of the threat level should be made to determine the type of security system to employ.

1.3 Any facilities must meet local, state, and federal building, architectural, hazardous material handling and storage, and fire protection codes.

1.4 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This test method is under the jurisdiction of ASTM Committee E50 on Environmental Assessment, Risk Management and Corrective Action and is the direct responsibility of Subcommittee E50.01 on Storage Tanks.

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***A Summary of Changes section appears at the end of this standard**

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

A123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

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

A567/A567M Specification for Castings, Iron, Cobalt, and Nickel-Base Alloy, for High Strength at Elevated Temperatures (Withdrawn 1987)[3]

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

F626 Specification for Fence Fittings

F900 Specification for Industrial and Commercial Steel Swing Gates

F1043 Specification for Strength and Protective Coatings on Steel Industrial 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

2.2 *American National Standards Institute/American Petroleum Institute*[4]

ANSI/API Standard 780 Security Risk Assessment Methodology for the Petroleum and Petrochemical Industries

2.3 *Chain Link Fence Manufacturers Institute:*[5]

CLF–SFR0111 Security Fencing Recommendations The Tested and Proven Performance of Security Grade Chain Link Fencing Systems

CLF-WLG 0110 Chain Link Fence Wind Load Guide for Selection of Line Post and Line Post Spacing

CLF-PM0610 Product Manual

2.4 *United States Department of Transportation:*[6]

AC150/5370 – 10F

Item F-161 – Wire fence With Steel Posts (Class C and D Fence)

Item F-162 – Chain Link Fence Item

F-163 – Wildlife Deterrent Fence

2.5 *United States Environmental Protection Agency:*

Federal Regulation 40 CFR 112 Oil Prevention Pollution Office of Solid Waste and Emergency Response – Spill Prevention, Control, and Countermeasure (SPCC) Rule – Streamlined Requirements for Tier I and Tier II Qualified Facilities

2.6 *Federal Standards:*[7]

Federal Specification RR-F-191K/GEN Fencing, Wire and Post Metal (And Gates, Chain Link Fence Fabric, and Accessories-(General Specification)

RR-F-191/1 Fencing, Wire and Post, Metal (Chain-Link Fence Fabric)

RR-F-191/2 Fencing, Wire and Post, Metal (Chain- Link Fence Gates)

RR-F-191/3 Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails, and Braces)

RR-F-191/4 Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

2.7 *Lighting:*

NFPA 70 National Electric Code – Introduction, Chapter 1, Chapter 2, Chapter 3, Chapter 4, Article 410 –

International Building Code Section 1205

Illumination Society of North America

United States Environmental Protection Agency 40 FR 112 Oil Pollution Prevention

3. Terminology

3.1 *Definitions:*

3.1.1 *foot candle*—is a non-SI unit of illuminance or light intensity, abbreviated fc, lm/ft^2, ft-c.

3.1.1.1 *Discussion*—The SI unit is lux. One foot candle is approximately equal to 10.764 lux.

4. Threat Level

4.1 The first step is for the owner to investigate and determine the perceived threat level. From that determination a judgment on the type and extent of fencing and the type and extent of lighting can be made. Helpful references are detailed in Section 2 above. Contacting the Department of Homeland Security (DHS) to obtain a security analysis and a vulnerability study may be helpful. Further contacting the local police department or sheriff for guidance on security strategies in the local area based on familiarity with the threat characteristics of the area will be helpful.

4.2 Another document that may be useful in identifying the threat level and evaluating the risk involved is ASNI/API Standard 780 – Security Risk Assessment Methodology for the Petroleum and Petrochemical Industries.

5. Fencing Systems

5.1 The reference documents describe fencing systems that are more secure and fencing systems that are less secure. The owner should perform a risk analysis and determine the appropriate fencing system for the facilities to be protected.

NOTE 1—Some fence types may be restricted by local codes.

6. Fencing Details

6.1 A chain-link fence is one type of fencing that has been used successfully with the type of facilities described in 1.2.

[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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[5] Chain Link Fence Manufacturers Institute (CLFMI) 10015 Old Columbia Rd. Suite B215 Columbia, MD 21046. http://www.chainlinkinfo.org

[6] United States Department of Transportation, 1200 New Jersey Avenue, SE Washington, DC 20590 855-368-4200, https://www.transportation.gov

[7] DLA Document Services Building 4/D 700 Robbins Avenue Philadelphia, PA 19111-5094 http://quicksearch.dla.mil/

There are other fencing details that will provide adequate security Refer to Appendix X1 for typical chain-link fence details.

7. Illumination

7.1 The illumination values included in Appendix X2 have been used successfully for these types of facilities. The owner should determine if other illumination values are better suited to the facilities involved.

7.2 Facilities should be equipped with lights to prevent acts of vandalism and to allow facility personnel to discover discharges that occur at night.

NOTE 2—Lighting may not be helpful for security where a perpetrator has no fear of being caught and there are no patrols or other surveillance.

7.3 The lighting system used to provide the required illumination levels should be designed to provide the average illumination when the lighting is in operation.

8. Keywords

8.1 fencing; lighting; SPCC plan; tank farm security; tank farm security fencing; tank farm security lighting

APPENDIXES

(Nonmandatory Information)

X1. CHAIN-LINK FENCING DETAILS

INTRODUCTION

This appendix covers chain-link fencing details. It is being provided for reference only. There are other details of chain-link fence construction that may be better suited for a particular installation.

X1.1 Type of Fence

X1.1.1 Chain-link fabric, 72 in. high, with tubular top rail, bottom tension wire, and guard top.

X1.1.2 The guard top is three strands of barbed wire on 45 degree extension arm turned inside.

X1.1.3 If a wildlife deterrent fence is deemed necessary, refer to United States Department of Transportation, AC150/5370 Item F-163 for typical details.

X1.2 Materials

NOTE X1.1—Zinc coated (hot dipped galvanized) materials are specified below. Some jurisdictions may have regulations prohibiting zinc coated (hot dipped galvanized) material where zinc is regulated in stormwater runoff.

X1.2.1 *Chain-Link Fabric:*

X1.2.1.1 The chain-link fabric should be zinc coated (hot dipped galvanized) per Specification A392, Class 2, 2 in. mesh, and of No. 9 gauge steel wire.

(1) The fabric should be weaved before galvanizing.

X1.2.2 *Barbed Wire:*

X1.2.2.1 The barbed wire should be zinc coated (hot dipped galvanized) per Specification A121 Class 3, and should be fabricated from two strands of No. 12 ½ gauge steel wire with four point No. 14 gauge aluminum barbs spaced on 5 in. centers.

X1.2.3 *Bottom Tension Wire:*

X1.2.3.1 The bottom tension wire should be zinc coated (hot dipped galvanized) per Specification A817, Type II, Class, and of No. 7 gauge steel coil tension wire.

X1.2.4 *Top Rail:*

X1.2.4.1 The top rail should be 1.660 in. O.D. Specification F1043 and Specification F1083 Group 1A Regular grade with Type A external and internal galvanized coatings pipe with galvanized sleeve type couplings.

NOTE X1.2—Omitting the top rail can make the fence more difficult to climb. In this Case a 7 – gauge coil spring wire can be installed in place of the top rail.

X1.2.4.2 One coupling in every five should have a 6 in. sleeve to accommodate temperature take up expansion and contraction.

X1.2.5 *Bracing:*

X1.2.5.1 Brace rail should be 1.666 in. OD per Specification F1043 and Specification F1043 Group 1A standard weight galvanized pipe with ⅜ in. diameter galvanized truss rods and truss tighteners.

X1.2.6 *Line Posts:*

X1.2.6.1 Line posts should be NPS 2 (2.375 in. O.D.) Specification F1043 and Specification F1083 Group 1A standard weight galvanized pipe.

X1.2.7 *Terminal Posts:*

X1.2.7.1 Terminal posts (end, pull, and corner posts) should be NPS 2½ (2.875 in. OD.) Specification F1043 and Specification F1083 Group 1A standazrd weight galvanized pipe.

X1.2.8 *Barbed Wire Extension Arms:*

X1.2.8.1 *Line Post:*

(1) Barbed wire extension arms should be fabricated of pressed steel or malleable iron per Specification F626 Type 1 galvanized in accordance with Specification A123.

(2) Extension arms should be able to withstand a minimum pull down of 300 lb at the end of the arm.

X1.2.8.2 *Terminal Posts:*

(1) Barbed wire arms should be fabricated of 11 gauge (minimum) pressed steel or heavy malleable iron base with 11 gauge (minimum) pressed steel per Specification F626 Type I.

(2) Extension should be galvanized per Specification A123.

(3) Extensions should be able to withstand a minimum pull down weight of 300 lb and of the force of the barbed wire stretched to proper tension.

(4) Extensions should be securely fastened to post.

X1.2.9 *Gate Posts:*

X1.2.9.1 Gate posts should be Specification F1043 and Specification F1043 Group 1A Regular Grade standard weight galvanized pipe.

X1.2.9.2 The size of the gate post shall be determined from the maximum width of single leaf gates or by one leaf of double leaf gates per Specification F900.

X1.2.10 *Tension Bars and Bands:*

X1.2.10.1 Tension bars for pulling the fence fabric to terminal posts should be ¾ in. steel bars, hot dipped galvanized in accordance with Specification F626.

X1.2.10.2 Bands for fastening tension bars to terminal posts should be 11 gauge by 1 in. wide steel, hot dipped galvanized in accordance with SpecificationF626.

X1.2.11 *Gates:*

X1.2.11.1 *Swing Gates:*

(1) The frame should be NPS 1½ (1.900 in.) OD Specification F1083 and Specification F1043 Group 1A Regular Grade standard weight galvanized pipe with galvanized pressed steel or galvanized malleable iron corner ells, riveted or bolted or welded corners.

(2) The internal bracing should be NPS 1 (1.666 in. OD) Specification F1083 and Specification F1043 Group 1A Regular Grade standard weight galvanized pipe with ⅜ in. diameter galvanized adjustable truss. Bottom hinge should be galvanized malleable pivot type.

(3) Top hinge should allow the gate to swing 90 degrees to 180 degrees.

(4) The gate should be complete with padlocking device, center rest, and semi-automatic catch to secure the gate in the open position.

X1.2.12 *Slide Gates:*

X1.2.12.1 Slide gates may be the suppliers standard for width of opening and vertical clearance required per Specification F1184.

X1.3 Installation

X1.3.1 Installation shall meet Specification A567/A567M.

X1.3.2 *Posts:*

X1.3.2.1 Posts are set to line and grade in concrete of sufficient depth to ensure that the fence will remain straight, not be overturned by wind or other external forces.

X1.3.2.2 Line posts and terminal post footings shall be four times the largest post section up to 4 in. OD and three times for larger outside diameters and set at least 36 in. deep.

X1.3.2.3 The concrete should be rounded off to a smooth appearance approximately 2 in. above soil.

X1.3.3 *Fabric:*

X1.3.3.1 The fabric should be fastened to the top rail with No. 9 gauge aluminum tie wires on 24 in. centers.

X1.3.3.2 The fabric should be fastened to the line posts with No. 6 gauge galvanized clip on 14 in. centers or No. 9 galvanized wire on 12 in. centers.

X1.3.3.3 The bottom of the fabric should be set at the top of the concrete.

X1.3.4 *Bottom Tension Wire:*

X1.3.4.1 The bottom tension wire should be fastened to the fabric with No.1 gauge galvanized hog clips on 24 in. centers.

X1.3.5 *Tension Bars:*

X1.3.5.1 The tension bars should be fastened to the terminal posts with No. 11 gauge by 1 in. wide galvanized tension bars and ⅜ in. diameter galvanized carriage bolts on approximately 14 in. centers.

X1.3.6 *Line Posts:*

X1.3.6.1 The line posts should be evenly spaced with a maximum spacing of 10 ft centers and meet the CLF-WLG 0110 Wind Load Guide requirements.

X1.3.7 *Bracing:*

X1.3.7.1 Bracing should be installed midway between the top rail and the ground from each terminal post to the first line post.

X1.3.7.2 Braces should be securely fastened to posts by heavy galvanized pressed steel connections.

X1.3.7.3 Braces should be trussed from the line post back to the terminal post with ⅜ in. diameter galvanized steel rods.

X1.3.8 *Fencing Layout:*

X1.3.8.1 Fencing should essentially follow the contour of the natural grade.

X1.3.8.2 When a space of 6 in. or more occurs between the bottom of the Chain-link fabric and the ground then intermediate posts should be set at the low point. Tightly stretched barbed wire should be used to close the space between the bottom of the chain-link fabric and the ground. There should be sufficient strands of barbed wire to limit the clear opening above the ground and between the strands to 3 in.

X1.3.9 *Fence Grounding:*

X1.3.9.1 Fences in areas crossed by high voltage power lines should be grounded.

X1.3.9.2 Place one ground connection at the point where the power lines crosses.

X1.3.9.3 Additional ground connections should be placed 300 ft on either side of the power line crossing.

X1.4 Other Information

X1.4.1 Listed below are additional ASTM documents related to fencing that may be useful:

A116 Specification for Metallic-Coated, Steel-Woven Wire Fence Fabric

A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

A428/A428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles

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

A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire

F552 Terminology Relating to Chain Link Fencing
F668 Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-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 Standard Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used With Chain-Link Fence
F1712 Specification for Steel Chain-Link Fencing Materials Used for High Security Applications (Withdrawn 2015)[3]
F1999 Practice for Installation of Rigid Poly(Vinyl Chloride) (PVC) Fence Systems
F2611 Guide for Design and Construction of Chain Link Security Fencing

X2. ILLUMINATION LEVELS

X2.1 Table X2.1 identifies lighting levels that have been used successfully at the types of facilities described in 1.2. There are other lighting levels that may be more appropriate for a particular facility.

TABLE X2.1 Lighting Levels

Location	Foot Candles	Elevation
Pump Areas – (outdoor)	2	Ground
Pipeways	2	Ground
Walkways and Platforms	2	Floor
Roadways	0.4 to 1 d epending on activity	Ground
Stairways	2	Steps
General Areas	2	Ground
Gates	2	Ground

SUMMARY OF CHANGES

Committee E50 has identified the location of selected changes to this standard since the last issue (E2942–15) that may impact the use of this standard.

(1) 2.2 Reference for ANSI/API Standard 780 inserted.
(2) 4.2 Reference for ANSI/API Standard 780 inserted.
(3) Previous sections 2.2 through 2.6 were renumbered as 2.3 through 2.7.