

# Engineering Standard

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SAES-O-101

12 October 2005

## Standard Security Fence – Category I

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## Saudi Aramco DeskTop Standards

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## 1 Scope

- 1.1 This Standard covers mandatory requirements governing the design and installation of Category I, Security Perimeter Fencing for Saudi Aramco's vital industrial facilities per [SAES-O-100](#), paragraph 1.1.2.
- 1.2 This Standard shall be used in conjunction with Safety and Security Directive No. 1 (SSD/1) of the Saudi Arabian Government Supreme Commission for Industrial Security.

## 2 Conflicts and Deviations

- 2.1 All conflicts between Standards, Requisitions for Material, related Specifications, Codes, Forms, Drawings and other documents shall be resolved as per [SAES-O-100](#), paragraph 4.4.
- 2.2 Any deviations from the provisions of this Standard shall be resolved as per [SAES-O-100](#), paragraph 4.4.

## 3 Amendments

Per letter number 41/16084 (8/3/80) received from the Supreme Commission for Industrial Security, SSD/1 shall be amended as follows:

- 3.1 Paragraph 2 shall read: "PVC insulator to cover the chain link must be used and the PVC color must be either dark green, or black."
- 3.2 Subparagraph 9-A shall read: "The chain link must be wrapped with galvanized wire of an exterior circumference of 4.75 mm (3/16 in) including the PVC cover. The nucleus diameter of 3.5 mm (0.14 in) for a network 50 mm (2 in) in size."
- 3.3 Subparagraph 10-A-4, fourth line, "38 mm" shall read: "0.38 m."

## 4 References

All referenced Specifications, Standards, Codes, Forms, Drawings and similar material shall be of the latest issue (including all revisions, addenda and supplements) unless stated otherwise.

### 4.1 Saudi Aramco References

Saudi Aramco Engineering Standards

[SAES-M-006](#)

*Saudi Aramco Security and General Purpose  
Fencing*

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<a href="#"><u>SAES-M-100</u></a>	<i>Saudi Aramco Building Code</i>
<a href="#"><u>SAES-O-100</u></a>	<i>General Requirements Safety &amp; Security</i>
<a href="#"><u>SAES-O-105</u></a>	<i>Gates in Perimeter Fences</i>
<a href="#"><u>SAES-O-108</u></a>	<i>Locks Used on Security Doors, Perimeter Fences and Emergency Exits</i>
<a href="#"><u>SAES-O-113</u></a>	<i>Security Lighting System</i>
<a href="#"><u>SAES-O-114</u></a>	<i>Check-point Lighting</i>
<a href="#"><u>SAES-O-116</u></a>	<i>Automatic Control of Entry</i>
<a href="#"><u>SAES-O-117</u></a>	<i>Gate House and Vehicle Lock</i>
<a href="#"><u>SAES-O-123</u></a>	<i>Automatic Control of Entry</i>
<a href="#"><u>SAES-O-124</u></a>	<i>Turnstiles Used in Control of Entry</i>
<a href="#"><u>SAES-P-111</u></a>	<i>Grounding</i>
<a href="#"><u>SAES-Q-001</u></a>	<i>Criteria for Design and Construction of Concrete Structures</i>

#### Saudi Aramco Materials System Specification

<a href="#"><u>09-SAMSS-098</u></a>	<i>Precast Concrete Fence Posts</i>
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#### Saudi Aramco Standard Drawings

<a href="#"><u>AB-036745</u></a>	<i>Lighting Pole, Tapered Seamless Aluminum, 3- meter for Standard Security</i>
<a href="#"><u>AB-036750</u></a>	<i>Gate House - Steel Bending Details</i>
AA-036754 Sht. 1	<i>Standard Security Fence Category I - Plan, Elevation &amp; Foundations</i>
AA-036754 Sht. 2	<i>Standard Security Fence Category I - Concrete Post Details</i>
AA-036754 Sht. 3	<i>Standard Security Fence Category I - Miscellaneous Details</i>
AA-036755 Sht. 1	<i>Standard Security Fence Category I - Drive Gate and Walk Gate Details</i>
AA-036755 Sht. 2	<i>Standard Security Fence Category I - Locking Device and Drop Bolt Details for Gates</i>
<a href="#"><u>AB-036756</u></a>	<i>Standard Security Fence Category I - Steel Bending Details Fence Category I</i>
AE-036757 Shts. 1-4	<i>L/M for Category I, Security Perimeter Fencing</i>

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<i>AA-036759 Sht. 1</i>	<i>Gate House - (1 and 2-man) - Floor Plan, Roof Plan and Elevation</i>
<i>AA-036759 Sht. 2</i>	<i>Gate House - (1, 2, 3 and 4-man) - Elevation, Sections and Details</i>
<i>AA-036759 Sht. 3</i>	<i>Gate House - (3 and 4-man) - Floor Plan, Roof Plan and Elevation</i>
<i>AA-036759 Sht. 4</i>	<i>Gate House - Windows, Door and Security Mesh Schedule and Details</i>
<i>AA-036759 Sht. 5</i>	<i>Gate House - Foundation and Reinforcing Details</i>
<i>AA-036759 Sht. 6</i>	<i>Gate House and Vehicle Lock - Layout and Sections</i>
<i>AA-036759 Sht. 7</i>	<i>Gate House - Power Grounding and Lighting Layout</i>
<i>AA-036759 Sht. 8</i>	<i>Hammam Near Gate House</i>
<i>AB-036760 Sht. 1</i>	<i>Perimeter and Area Lighting, Typical Layout, Part of Plant Area</i>
<i>AB-036760 Sht. 2</i>	<i>Elementary Diagram of Power and Control Circuits for Security Lighting</i>
<i>AE-036818 Shts. 1-5</i>	<i>L/M for Gate Houses</i>
4.2	Safety and Security Directives
	<i>SSD/1</i> <i>Standard Security Fence</i>
	<i>SSD/13</i> <i>Security Lighting System</i>
4.3	Industry Codes and Standards
	British Standards Institution
	<i>BS 1881</i> <i>Method of Testing Concrete</i>
	American Society for Testing and Materials
	<i>ASTM A153</i> <i>Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware</i>

## 5 Commentary

Certain clarifications have resulted from applying SSD/1 to Saudi Aramco projects. The following items reflect a general understanding reached with representatives of the Supreme Commission for Industrial Security and should be verified through liaison by

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the Proponent with the General Manager of Industrial Security Operations and the Manager of Consulting Services Department in case there are conflicts with other company engineering standards and materials specifications, standard drawings or Industry Codes.

## 5.1 Design

5.1.1 Security fencing per SSD/1 shall be used for all vital facilities regardless of location, unless otherwise agreed to in writing by the Secretariat of the Supreme Commission for Industrial Security.

5.1.2 Two roads are required for patrolling the security fence.

A road is required both inside and outside the security fence and is to be level and a minimum of 4.6 m wide with a marl cap, i.e., no paving is necessary. The inside road shall be a minimum of 11 m from the security fence. The outer road can be anywhere within the 16 m clear zone. (Refer to Sketch 1)

5.1.3 The security fence must be a minimum of 60 m from the nearest vital equipment. Vital equipment is defined in [SAES-O-100](#), paragraph 1.1.3.

5.1.4 If the facility is built on an elevated pad, 1.5 m or higher, the security fence must be 30 m from the toe of the berm. The slope from the toe of the berm to the security fence should not exceed 0.3 m in 30 m. The slope from the security fence to 30 m past the security fence should not exceed 0.3 m in 6.1 m.

5.1.5 The clear zone requirement specified in SSD/1, paragraph 8 shall be increased from 15 m to 16 m to provide a 1-m clearance between the security lighting pole and the edge of the patrol road. (See attached Sketch 1.)

5.1.6 All flowlines and hydrocarbon transmission lines entering/exiting vital facilities (per [SAES-O-100](#) paragraph 1.1.3) are required to be buried 18 m on either side of the security fence. Stout guardrails shall be installed at the transition point where the pipeline enters/exits the ground to prevent vehicle damage to the pipeline. (Refer to attached Sketch 1.)

5.1.7 Gravity feed lines, e.g., flare lines, which cannot be buried will be reviewed on a case-by-case basis per [SAES-O-100](#), paragraph 4.4.2.

5.1.8 Table 1 indicates security fencing requirements for some Saudi Aramco vital facilities (see Note 2).

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- 5.1.9 Type V cement shall be used for posts, footings and channels. The minimum 28-day concrete cube strength for footings and channels shall be not less than 13.8 MPa. All concrete shall be mixed, placed and cured as per [SAES-Q-001](#), Criteria for Design and Construction of Concrete Structures.
  - 5.1.10 The gate sill mentioned in SSD/1, paragraph 21 shall be of reinforced concrete with minimum dimensions of 125 mm wide by 225 mm high. (Reference to sketch attached to SSD/5.)
  - 5.1.11 Vinyl-clad galvanized barbed wire shall be used in lieu of galvanized barbed wire. Vinyl-clad galvanized barbed wire shall consist of two twisted strands of not lighter than 12-½ gage {or nominal diameter of 2.51 mm (0.099 in)} and wire with four barbs (points) of aluminum wire not lighter than 14 gage {or nominal diameter of 2.03 mm (0.080 in)} spaced 12.7 cm (5 in) apart. The barbs shall be wrapped so as to interlock with both main strands of wire.
  - 5.1.12 Fencing line wire, stirrup wire, tying wire, barbed wire and wire fabric shall be PVC coated per SSD/1, paragraph 9 and paragraph 5.1.11 of this Standard.
  - 5.1.13 Fence post fittings shall be galvanized in accordance with ASTM A153.
  - 5.1.14 Flare areas and burn pits shall be fenced per [SAES-M-006](#), Type IV or better.
  - 5.2 Materials
    - 5.2.1 The following Lists of Material (L/M) should be used for reserving fencing materials in the SAMS system:
      - AE-036757 Sht. 1 L/M for Category I, Security Perimeter Fencing*
      - AE-036757 Sht. 2 L/M for Category I, Security Perimeter Fencing*
      - AE-036757 Sht. 3 L/M for Category I, Security Perimeter Fencing*
      - AE-036757 Sht. 4 L/M for Category I, Security Perimeter Fencing*
    - 5.2.2 The following Lists of Material (L/M) should be used for reserving gate house material in the SAMS system:
      - AE-036818 Sht. 1 L/M for Gate Houses*
      - AE-036818 Sht. 2 L/M for Gate Houses*
      - AE-036818 Sht. 3 L/M for Gate Houses*
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*AE-036818 Sht. 4 L/M for Gate Houses*

*AE-036818 Sht. 5 L/M for Gate Houses*

### 5.3 Installation

- 5.3.1 Top and bottom line wires shall be attached to the fabric by wire ties spaced 150 mm on center. All other line wire shall be attached to the fabric by wire ties spaced 450 mm on center.
- 5.3.2 Security fencing shall be lighted per SSD/13, Security Lighting System.
- 5.3.3 Grounding of SSD/1 type fences shall be in accordance with the requirements of [SAES-P-111](#).

#### **Revision Summary**

12 October 2005 Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.

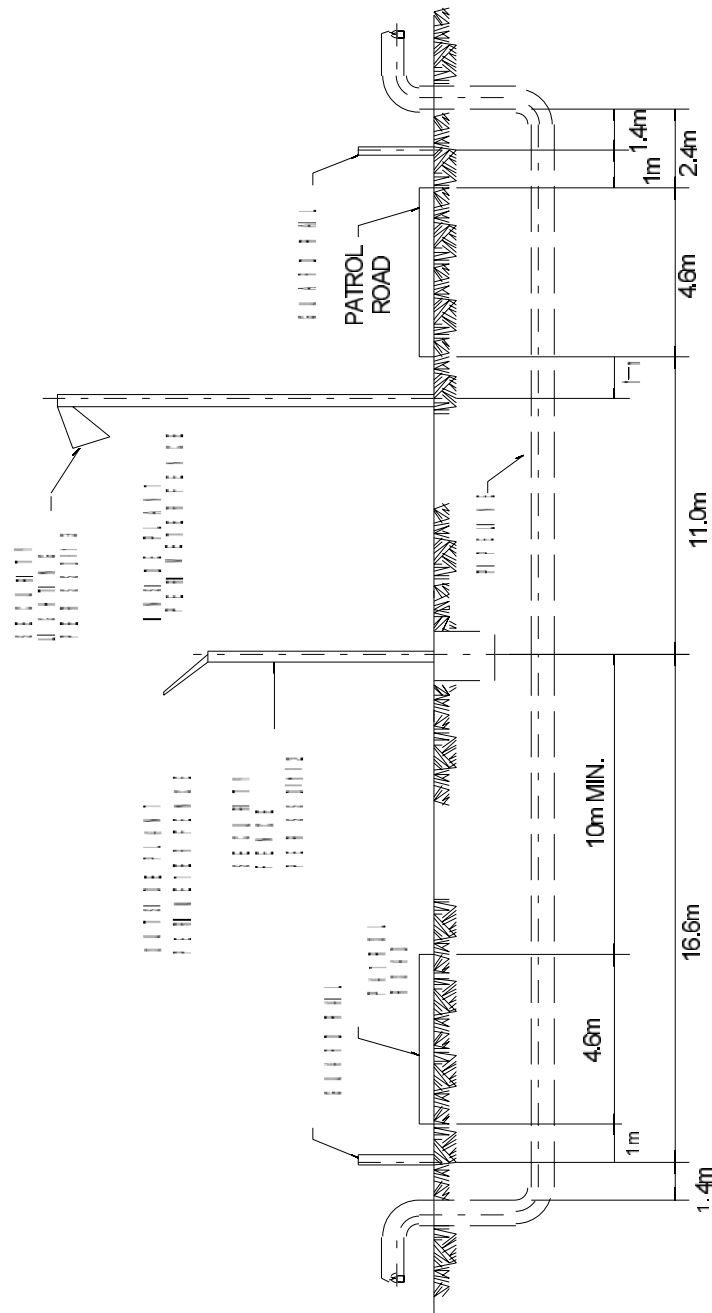
**Table 1 – Security Fencing Requirements**

<b>FACILITY (Paragraph)</b>	<b>Type of Fence (5.1.1)</b>	<b>16-m (53-ft) Clear Zone (5.1.5)</b>	<b>60-m (200-ft) Clear Zone (5.1.3)</b>	<b>Patrol Roads (5.1.2)</b>	<b>Incoming/ Outgoing Pipe Burial (5.1.6)</b>
Launcher Receiver Stations for Hydrocarbon Lines	SSD/1	Required	See Note 3	See Note 4 Required	Required
Water Injection Plant	SAES- M-006 Type I	Required	Required	Required	Required
Metering Stations for Hydrocarbon Pipelines	SSD/1	Required	See Note 3	See Note 4 Required	Required
GOSP's	SSD/1	Required	Required	Required	Required
Data Acquisition Stations	SSD/1	Required	Required	Required	Not Applicable
Communication Facilities	SSD/1	Required	Required	Required	Not Applicable
Gas Plants	SSD/1	Required	Required	Required	Required
Harbor Facilities	SSD/1	Required	Required	Required	Required
Communication Towers	SSD/1 See Note 1	Required	Required	Required	Not Applicable

**Notes:**

- (1) Guyed tower masts for communication sites require separate SSD/1 security fencing for each guy if not included in perimeter security fence for tower.
- (2) Vital facilities which require SSD/1 security fencing are not limited to those indicated in the above table.
- (3) Required only for launchers/receivers stations and gas metering stations located within the main industrial facility security fence.
- (4) A marl cap road surface is not required for these patrol roads.





**SKETCH 1**  
**Security Road Crossing**  
**(not to scale)**