



# Engineering Standard

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SAES-O-202

4 July 2013

Security Fencing

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Document Responsibility: Safety and Security Standards Committee

## Saudi Aramco DeskTop Standards

### Table of Contents

1	Introduction.....	<a href="#">2</a>
2	Conflicts and Deviations.....	<a href="#">2</a>
3	References.....	<a href="#">2</a>
4	General Requirements.....	<a href="#">3</a>

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Revised paragraphs are indicated in the right margin

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Page 1 of 8

## 1 Introduction

- 1.1 This Standard covers mandatory requirements governing the design and installation of security perimeter fencing for Saudi Aramco industrial facilities classified under [SAES-O-201](#), Section 4.2.
- 1.2 This Standard shall be used in conjunction with Security Directive SEC-02 issued by the High Commission for Industrial Security (HCIS), Ministry of Interior, Government of Saudi Arabia. The details of the requirements can be found in SEC-02.

## 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-201](#), Section 2.
- 2.2 Any deviations from the provisions of this Standard shall be resolved as per [SAES-O-201](#), Section 2.

## 3 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.

### 3.1 Saudi Aramco References

#### Saudi Aramco Engineering Standards

<a href="#">SAES-M-006</a>	<i>Saudi Aramco Security &amp; General Purpose Fencing</i>
<a href="#">SAES-O-201</a>	<i>Application of Security Directives</i>
<a href="#">SAES-O-204</a>	<i>Security Lighting</i>
<a href="#">SAES-O-205</a>	<i>Integrated Security System</i>
<a href="#">SAES-O-206</a>	<i>Security Devices</i>
<a href="#">SAES-P-111</a>	<i>Grounding</i>

#### Saudi Aramco Standard Drawing

<a href="#">AB-036677-001</a>	<i>An Overview of Saudi Aramco Security and General Purpose Fencing</i>
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### 3.2 Industry Codes and Standards

#### American Society for Testing and Materials

*ASTM F2656-07 Test Method for Vehicle Crash Testing of Perimeter Barriers*

*ASTM F567 Standard Practice for Installation of Chain-Link Fence*

#### Security Directives

*SEC-01 Application of Security Directives*

*SEC-02 Security Fencing*

*SEC-03 Security Gate*

*SEC-04 Security Lighting*

*SEC-05 Integrated Security System*

*SEC-06 Security Devices*

## 4 General Requirements

4.1 The design and installation of security perimeter fencing shall be based on the security classification of the facility. Security classifications are specified in [SAES-O-201](#).

4.2 All areas where SAES-O-202 required elements are installed shall be graded and cleared of all vegetation and maintained in this state. The clear zones shall have a 2% slope, away from the facility, to ensure proper water drainage.

4.3 Facilities with a security classification of Class 1 shall be protected with a Category 1 fencing system complying with the requirements stipulated in Section 4.3 of SEC-02, as applicable. This system shall consist of an outer clear zone, a crash rated barrier, an inner anti-personnel fence and an inner clear zone as summarized below.

For exact design details refer to SEC-02.

4.3.1 The outermost clear zone shall be at least 15 m wide. It shall contain an asphalted patrol road at least 4.6 m wide followed by a clear zone.

4.3.2 The outermost clear zone shall be followed by a certified, crash rated barrier. The barrier shall meet or exceed the requirements of ASTM F2656 M50-P1.

If terrain, or other considerations, allows use of a lower rated barrier the concurrence of HCIS shall be obtained to use a lower rated barrier specified in Section 4.4 of [SAES-O-206](#).

The clear zone associated with this barrier shall extend 800 m-15 m inside the anti-vehicle barrier. The 800 m clearance is required when the surrounding area is vacant at the time the facility is designed and constructed while 15 m is the minimum clearance.

- 4.3.3 The crash rated barrier clear zone shall be followed by a 3 m high anti-personnel chain-link fence. Each pole on the fence shall be reinforced with a brace pole on the inside. The fence shall have three rolls of concertina, one roll on the top, one roll on the top front and one roll on the bottom front.
- 4.3.4 Intrusion sensors shall be installed in a 7.5 m area on the inside of the anti-personnel fence. This shall incorporate at least two types of sensing technologies and cameras for the intrusion detection and assessment system as specified in [SAES-O-205](#). At least one of the sensors shall be capable of detecting vertical and lateral movement within the field. Cameras in this area shall be at a maximum distance of 7.5 m from the inside of the anti-personnel fence.
- 4.3.5 The lighting system shall be installed after the intrusion sensors at a maximum distance of 3 m behind the cameras in compliance with [SAES-O-204](#).
- 4.3.6 The lighting system is followed by the internal interface layer. This area includes an internal clear zone at least 5 m wide followed by a 4.6 m wide asphalted inner patrol road. A standard Type-III fence (Saudi Aramco Drawing [AB-036677-001](#)), as specified in [SAES-M-006](#), shall be installed in the clear zone. The distance of the fence from the lighting system is at the designer's discretion but it should be adequate to not intrude into the lighted area, obstruct any sensors and allow space for maintenance vehicles and activities on the lighting system.

- 4.4 Facilities with a security classification of Class 2 shall be protected with a Category 2 fencing system complying with the requirements stipulated in Section 4.4 of SEC-02, as applicable. This system shall consist of an outer clear zone, an anti-personnel fence and an inner clear zone as summarized below.

For exact design details refer to SEC-02.

- 4.4.1 The outer clear zone shall be at least 15 m wide. It shall contain an asphalted outer patrol road at least 4.6 m wide.
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- 4.4.2 The outer clear zone shall be followed by a 3 m high anti-personnel chain-link fence. Each pole on the fence shall be reinforced with a brace pole on the inside to improve anti-vehicle characteristics. The fence shall have three rolls of concertina, one roll on the top, one roll on the top front and one roll on the bottom front.

If required by the risk assessment required by [SAES-O-201](#), additional anti-vehicle barriers shall be installed.

- 4.4.3 Intrusion sensors shall be installed in a 7.5 m area on the inside of the anti-personnel fence. This shall incorporate at least two types of sensing technologies and cameras for the intrusion detection and assessment system ([SAES-O-205](#)). At least one of the sensors shall be capable of detecting vertical and lateral movement within the field. Cameras in this area shall be at a maximum distance of 7.5 m from the inside of the anti-personnel fence.

- 4.4.4 The lighting system shall be installed after the intrusion sensors at a typical maximum distance of 3 m behind the cameras in compliance with [SAES-O-204](#).

- 4.4.5 The lighting system is followed by the internal interface layer. This area includes an internal clear zone at least 5 m wide followed by a 4.6 m wide asphalted inner patrol road. A standard Type-III fence (Saudi Aramco Drawing [AB-036677-001](#)), as specified in [SAES-M-006](#), shall be installed in the clear zone. The distance of the fence from the lighting system is at the designer's discretion but it should be adequate to not intrude into the lighted area, obstruct any sensors and allow space for maintenance vehicles and activities on the lighting system.

- 4.5 Facilities with a security classification of Class 3 shall be protected with a Category 3 fencing system complying with the requirements stipulated in Section 4.5 of SEC-02, as applicable. This system shall consist of an outer clear zone, an anti-personnel fence and an inner clear zone as summarized below.

For exact design details refer to SEC-02.

- 4.5.1 The outer clear zone shall be at least 6 m wide.

- 4.5.2 The outer clear zone shall be followed by a 3 m high anti-personnel chain-link fence. Each alternate pole on the fence shall be reinforced with a brace pole on the inside to improve anti-vehicle characteristics. The fence shall have two rolls of concertina, one roll on the top and one roll on the top front.

- 4.5.3 Surveillance cameras shall be installed in a 7.5 m area on the inside of the anti-personnel fence. Cameras in this area shall be at a maximum distance of 7.5 m from the inside of the anti-personnel fence.
  - 4.5.4 An area lighting system shall be installed after the intrusion sensors at a typical maximum distance of 5 m behind the cameras in compliance with [SAES-O-204](#).
  - 4.5.5 The final element in the Category-3 fencing system is the internal clear zone at least 5 m wide.
  - 4.5.6 Bulk Plants with a classification of Class 3 shall have an outer patrol road for use by government security personnel. This road shall be located in the outer clear zone and shall be asphalted, 4.7 m wide.
- 4.6 Facilities with a security classification of Class 4 shall be protected with a Category 4 fencing system complying with the requirements stipulated in Section 4.6 of SEC-02, as applicable. This system shall consist of an outer clear zone, an anti-personnel fence and an inner clear zone as summarized below.

For exact design details refer to SEC-02.

- 4.6.1 The outer clear zone shall be at least 5 m wide.
  - 4.6.2 The outer clear zone shall be followed by a 3 m high anti-personnel chain-link fence. Fence bracing shall be at proponent discretion. The fence shall have one roll of concertina on the top of the fence.
  - 4.6.3 An area lighting system shall be installed, if requested by the proponent or Industrial Security Operations (ISO), after the anti-personnel fence.
  - 4.6.4 The final element in the Category-4 fencing system is the internal clear zone at least 5 m wide.
- 4.7 Shared Fence
- 4.7.1 Adjacent facilities present a special case for fencing. As a general rule, the first facility that is being constructed shall implement all fences, clearances and clear zones. Facilities built after the first facility is built shall implement a modified version of the requirements.
  - 4.7.2 Lighting shall comply with the requirements stated in [SAES-O-204](#) for Shared Fence Lighting. Camera and sensor locations for each category fence shall be modified, so that they minimize interaction between adjacent security systems.
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- 4.7.3 A clear zone of 5 m shall be established between the shared fence and the new facility. This clear zone shall house sensors as needed by the fence category. All remaining clearances for that particular fence category shall remain.
- 4.7.4 These requirements shall apply to facilities classified as Class 1, 2 or 3.
- 4.7.5 For exact design details refer to SEC-02.
- 4.8 Outer property fences located remotely from a Class 1, 2 or 3 facility present a special case for fencing. When a facility has an outer property fence that surrounds a Class 1, 2 or 3 facility or facilities, the outer property fence shall be a Category 4 fence with an asphalted, 4.7 m wide inner and outer patrol road.
- This fence shall be considered an administrative fence and it shall not impact the fencing systems used around the Class 1, 2 or 3 facilities located within the property fence which will continue to comply with all applicable standards.
- 4.9 Vital equipment is defined as “Any piece of equipment in or connected with an industrial facility whose destruction or damage would result in unacceptable interruption of the facility’s production or services”.
- Facility vital equipment near the perimeter fence shall be identified by the proponent. It shall be located at least 60 m from the nearest security fence.
- Non-vital equipment may be located closer to the fence as long as it does not intrude into any element of the fencing system and it complies with all applicable building codes and standards. HCIS has the right to declare specific components Vital.
- 4.10 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.
- For exact design details refer to SEC-02.
- 4.11 Emergency gates in the perimeter shall meet the requirements of ASTM F2656 for anti-vehicle barriers as specified in SEC-06, Section 4.3.3. This compliance may be accomplished by a combination of anti-personnel barriers and anti-vehicle barriers depending on the facility design.

Emergency gates shall have video surveillance that is monitored in the local Security Control Center (SCC). Active sensors shall be deployed at the gate opening to detect any intrusion attempt and annunciate an alarm at the Security control Center.

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Gate width shall be at least 5 m or greater if needed due to operational requirements.

For exact design details refer to SEC-02.

- 4.12 Fence penetration by pipelines shall be either under or over the fence and shall comply with the methods specified in Section 4.14 of SEC-02.

In no case shall pipelines exit or enter the ground closer than 18m from the anti-personnel fence. Where a Category 1 fencing system is used the clearance of 18 m shall apply to the outermost fence.

Over the fence pipelines shall have concertina wire wrapped around the pipe to deter climbing or scaling the pipe.

Video cameras shall be deployed at the fence crossing and shall be monitored at the security control center.

For exact design details refer to SEC-02.

- 4.13 Fence fabric shall be vinyl-coated chain link with galvanized steel poles. When required due to fence sensor performance or grounding considerations, galvanized steel fence fabric may be used. Grounding shall comply with [SAES-P-111](#).
- 4.14 Fence alignments shall be in straight lines as far as possible. The angle of any turns shall not be less than 90 degrees.
- 4.15 The fence shall be installed in accordance with ASTM F567 and the specific provisions in Section 4.13 of SEC-02. Section 5.0 of SEC-02 contains drawings of installation requirements.
- 4.16 Design requirements for fencing system components shall comply with the requirements of Section 4.12 of SEC-02.

#### Revision Summary

10 March 2012  
4 July 2013

New Saudi Aramco Engineering Standard.  
Editorial revision to add SAES-O-205 in the references.