

Engineering Standard

SAES-M-006

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Saudi Aramco Security and General Purpose Fencing

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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 Saudi Aramco Security and general purpose fencing, and shall be used to select the most appropriate type of Saudi Aramco fencing for protection of nonvital or nonsensitive facilities.
- 1.2 Fencing for vital or sensitive facilities, as defined in [SAES-O-100](#), General Requirements Safety and Security Standards, shall be in accordance with the Saudi Aramco Safety and Security Standards, SAES-O-Series.

2 Conflicts and Deviations

- 2.1 Any conflicts between this standard and other applicable Saudi Aramco Engineering Standards (SAESs), Materials System Specifications (SAMSSs), Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Consulting Services Department of Saudi Aramco, Dhahran.
- 2.2 Direct all requests to deviate from this standard in writing to the Company or Buyer Representative, who shall follow internal company procedure [SAEP-302](#) and forward such requests to the Manager, Consulting Services Department of Saudi Aramco, Dhahran.

3 References

The selection of material and equipment, and the design, construction, maintenance, and repair of equipment and facilities covered by this standard shall comply with the latest edition of the references listed below, unless otherwise noted.

Saudi Aramco Documents

Saudi Aramco Engineering Procedure

[SAEP-302](#)

*Instructions for Obtaining a Waiver of a
Mandatory Saudi Aramco Engineering
Requirement*

Saudi Aramco Engineering Standards

SAES-O-Series

Safety and Security Standards

[SAES-O-100](#)

General Requirements Safety and Security

[SAES-P-111](#)

Grounding

[SAES-Q-001](#)

*Criteria for Design and Construction of Concrete
Structures*

Saudi Aramco Materials System Specifications

<u>09-SAMSS-097</u>	<i>Ready-Mixed Portland Cement Concrete</i>
<u>12-SAMSS-021</u>	<i>Saudi Aramco Security and General Purpose Fencing (Galvanized)</i>
<u>12-SAMSS-022</u>	<i>Saudi Aramco Security and General Purpose Fencing (Vinyl-clad Galvanized)</i>

Saudi Aramco Standard Drawings

<u>AB-036677</u>	<i>Saudi Aramco Security and General Purpose Fencing - General</i>
<u>AA-036678</u>	<i>Saudi Aramco Security and General Purpose Fencing - Post and Fabric Details</i>
<u>AB-036679</u>	<i>Saudi Aramco Security and General Purpose Fencing - Gate Details</i>
<u>AC-036680</u>	<i>Saudi Aramco Security and General Purpose Fencing - Footings Details</i>
<i>AE-036881</i>	<i>L/M for Saudi Aramco Security Fencing Type I</i>
<i>AE-036882</i>	<i>L/M for Type II Fencing</i>
<i>AE-036883</i>	<i>L/M for Type III Fencing</i>
<i>AE-036884</i>	<i>L/M for Type IV Fencing</i>
<i>AE-036904</i>	<i>L/M for Type V Fencing</i>

4 Design

- 4.1 The type of fencing required is dependent upon operational, safety and security requirements and shall be determined by the Proponent Organization and in accordance with Standard Drawing [AB-036677](#).
 - 4.2 The use of reclaimed material is not permitted unless written approval is obtained from the Proponent Organization.
 - 4.3 Saudi Aramco Security Fencing Type I shall be used for all facilities where security is of concern.
 - 4.4 Saudi Aramco fencing shall be built according to the referenced Engineering Standards and Standards Drawings ([AB-036677](#), [AA-036678](#), [AB-036679](#), [AC-036680](#), *AE-036881*, *AE-036882*, *AE-036883*, *AE-036884*, and *AE-036904*.)
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- 4.5 Galvanized fabric and hardware shall be used for all inland locations. Vinyl-clad fabric, barbed wire, tension wire, tie wire, and gate infilling shall be substituted at locations within 1.5 km of the sea (refer to Saudi Aramco Materials System Specifications [12-SAMSS-021](#) and [12-SAMSS-022](#)). However, fencing that encloses or crosses over a ground grid and fencing passing under overhead powerlines of 230 kV and above shall utilize galvanized fabric and hardware regardless of location.
- 4.6 Saudi Aramco Security Fencing Type I shall have the bottom of the chain link fabric tied to a continuous concrete anchor constructed according to Standard Drawing [AC-036680](#).
- 4.7 All concrete for footings and grade beams shall have a minimum compressive strength of 27.6 MPa (4,000 psi) at 28 days and shall have type V sulphate resisting cement. Placement and curing shall comply with [SAES-Q-001](#), Criteria for Design and Construction of Concrete Structures.
- 4.8 The concrete material shall be in accordance with [09-SAMSS-097](#) "Ready-Mixed Portland Cement Concrete".
- 4.9 Table 1 - Types of Saudi Aramco Fencing lists the different types of Saudi Aramco fencing.
- 4.10 Table 2 - Applicable Gate Sizes lists the different sizes of gates applicable to each type of Saudi Aramco fencing. Width opening is measured from inside to inside of the gate posts. All gates are listed in the SAMS Catalog.
- 4.11 Total post length for all posts up to 102 mm O.D. shall be as specified in Table 3 - Post Lengths (± 12 mm). These lengths include 900 mm extension in the footing.

Table 1 – Types of Saudi Aramco Fencing

Fencing Type	Height of Fencing Fabric (mm)	Top Rail	Brace Posts for Each Line Post (1)	Barbed Wire Number of Supporting Arms	Number of Standards	Continuous Concrete Anchor
I	2400	Yes	Yes	2	6	Yes
II	2400	Yes	Yes	2	6	No
III	2400	No	No	2	6	No
IV	2400	No	No	1	3	No
V	2400	No	No	0	0	No

Note: (1) Refer to paragraph 4.4

Table 2 – Applicable Gate Sizes

Fence Type	Gate Type	Walk or Drive	Width Opening (mm)	Overall Height (mm)	Gate Frame Extensions	Gate Post Size O.D. (mm)
I, II, III, IV, V	A	Walk	1200	2450	No	73
	B	Drive	4000	2800	Yes	102
I, II, III, IV	C	Drive	7300	2800	Yes	102
V	D	Drive	4000	2450	No	102
	E	Drive	7300	2450	No	102

Table 3 – Post Lengths

Fence Type	Length of Posts (mm)				
	I	II	III	IV	V
Walk Gate	3400	3400	3400	3400	3400
Drive Gate	3900	3900	3900	3900	3400
Line	3400	3400	3400	3400	3400
Corner/End	3400	3400	3400	3400	3400
Brace	2900	2900	2900	2900	2900

5 Installation

5.1 Grounding

The fence shall be grounded in accordance with [SAES-P-111](#).

5.2 Posts

5.2.1 All posts shall extend 900 mm into concrete footings as measured from the ground surface. Where solid rock is encountered, posts shall extend 600 mm into concrete footings.

5.2.2 Footings for all posts shall extend 100 mm below the end of the post.

5.2.3 The post/foundation interface shall be treated as indicated on Standard Drawing [AC-036680](#), Footing Details.

5.2.4 If pre-cast fence post footings are used, backfill shall be compacted to meet or exceed the existing soil density.

5.2.5 All line posts shall be equally spaced at intervals of not more than 3 m.

- 5.2.6 All posts except brace posts shall be installed in a vertical position, plumb and in line.
- 5.2.7 Terminal posts (Corner, End, Gate or Tension) shall be installed at the beginning and end and at a maximum of 90 m intervals of fence fabric and at changes in vertical and horizontal alignments exceeding 22½° deflection angle.
- 5.2.8 All posts shall be equipped with moisture excluding top caps or extension arms.

5.3 Top Rail

The top rail (41 mm O.D. pipe) for Saudi Aramco Security Fencing Type I and Saudi Aramco Type II Fencing shall be continuous except over drive gates. One expansion coupling shall be used for every 30 m of rail.

5.4 Brace Posts

Brace posts shall be attached to all Saudi Aramco Security Fencing Type I and Saudi Aramco Type II line posts at a point 1500 mm above ground level and extend downward toward the inside of the fence at 45° in a vertical plane which is perpendicular to the plane of the fence. For Types III, IV, and V Fencing, brace posts shall be installed on line posts at 90 m centers of fencing runs.

5.5 Chain Link Fence

5.5.1 The fencing fabric for Saudi Aramco Security Fencing Type I and Saudi Aramco Type II Fencing shall be attached to top rails by means of tie wires spaced at intervals not exceeding 600 mm.

5.5.2 The fencing fabric shall be attached to the tension wire by means of tie wires spaced at intervals not exceeding 300 mm. The tension wire shall be attached to the line posts by tie wire wrapped around the post and secured to the tension wire by 3 complete turns on each side of the post.

The fencing fabric shall be attached to all line posts by means of tie wire spaced at intervals not exceeding 350 mm along each post.

5.6 Barbed Wire

Except on Type V Fencing, barbed wire shall be held in the extension arm slots by means of lock wire. Holding the barbed wire in the slots by means of the tension in the wire is not permitted. Barbed wire, where required, shall be extended over walk gates.

5.7 Tension Wire

Tension wire shall be secured to terminal posts by means of a winding bracket.

5.8 Bracing in Plane of Fence

5.8.1 Each brace assembly shall consist of one top and one intermediate compression member both of 41 mm O.D. pipe and one adjustable diagonal tension rod of at least 10 mm diameter. For Saudi Aramco Security Type I Fencing and Type II Fencing, the top rail is the top compression member. Pipe used for the compression members shall be of one piece without couplings in the bracing panel.

5.8.2 Gate and end posts shall be braced to the nearest line post with one complete brace assembly.

5.8.3 Corner and tension posts shall be braced to the two nearest line posts with one complete brace assembly to each line post.

5.9 General

When fully constructed the barbed wire, tension wire, fabric, and truss rods shall be taut.

Revision Summary

29 January, 2003	Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.
30 November, 2003	Editorial revision.