



Engineering Standard

SAES-T-629

11 May 2009

Telecommunications Buried Cable and Wire

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Saudi Aramco DeskTop Standards

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1 Scope

This standard prescribes the design mandatory requirements governing the direct burial of telecommunications cable and wire.

2 Conflicts and Deviations

Any deviations, providing less than the mandatory requirements of this standard require written waiver approval as per Saudi Aramco Engineering Procedure [SAEP-302](#).

3 References

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

3.1 Saudi Aramco References

Saudi Aramco Engineering Procedure

[SAEP-302](#)

Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Procedure

Saudi Aramco Engineering Standards

[SAES-B-005](#)

Spacing and Diking for Atmospheric and Low-Pressure Tanks

[SAES-B-006](#)

Fireproofing in on-Shore Facilities

[SAES-B-008](#)

Restrictions to Use of Cellars, Pits, and Trenches

[SAES-B-064](#)

Onshore and Nearshore Pipeline Safety

[SAES-B-068](#)

Electrical Area Classifications

[SAES-O-112](#)

Communications

[SAES-O-119](#)

Work Permit Procedures

[SAES-O-126](#)

Blast Resistant Control Buildings

[SAES-T-018](#)

Telecommunications - Symbols, Abbreviations and Definitions

[SAES-T-603](#)

Telecommunications - Safeguards and Warning Devices

[SAES-T-624](#)

Telecommunications Outside Plant - Fiber Optics

[SAES-T-632](#)

Communications - Cable Splicing

| | |
|-----------------------------------|---|
| <u>SAES-T-634</u> | <i>Communications - Cable Testing & Identification</i> |
| <u>SAES-T-887</u> | <i>Telecommunications Electrical Coordination - Protection at Power Plants and Radio Stations</i> |
| <u>SAES-T-903</u> | <i>Telecommunications Outside Plant Electrical Protection and Grounding</i> |
| <u>SAES-T-911</u> | <i>Communication Conduit System Design</i> |
| <u>SAES-T-916</u> | <i>Telecommunications Building Cable Systems</i> |
| <u>SAES-T-920</u> | <i>Telecommunications - Cable Information</i> |
| <u>SAES-T-928</u> | <i>Telecommunications - OSP - Buried Plant</i> |

Saudi Aramco Standard Drawings

| | |
|----------------------------------|--|
| <u>AA-036748</u> | <i>Buried Telephone Cables/Distribution Wires - Installation Details</i> |
| <u>AB-036897</u> | <i>Buried/Underground Cable Route Marker Post And Signs</i> |

Saudi Aramco General Instructions

| | |
|--------------------|--|
| <i>GI-0002.100</i> | <i>Work Permits</i> |
| <i>GI-1021.000</i> | <i>Street and Road Closure: Excavations, Reinstatements and Traffic Controls</i> |

Safety Management System (SMS)

Operations Instruction Manual (Ch. 1.00 - 30.999)

Refinery Instructions Manual

3.2 Industry Codes and Standards

National Electrical Code (NEC)

National Electrical Safety Code (NESC)

4 Design

4.1 General Requirements

4.1.1 OSP Design Reference

The BICSI Outside Plant Design Reference Manual (current version) is hereby recognized as the referenced detailed design information. Design

drawings shall use conventional symbols as specified in [SAES-T-018](#) Telecommunications – Symbols, Abbreviations and Definitions.

4.1.2 OSP Designer Certification Requirements

All OSP telecommunications system designs by non-Aramco design offices (such as GES Contractor, LSTK, etc.) must be done under the design authority of a valid/current BICSI Registered Communications Distribution Design (BICSI RCDD and/or OSP Specialty) to ensure that a minimum level of competency has been provided in the telecommunications infrastructure and OSP cable system design. For external design contractors, the RCDD and/or OSP shall be a direct employee of that company. All related design drawings must be stamped by the RCDD and/or OSP specialist before the package can be Issued for Construction (IFC).

- 4.1.3 During construction, cables shall be protected from being driven over by highway traffic, construction equipment and other vehicles, and from any other activity that might damage the cable.

Direct buried telecommunication cables shall be placed at minimum depths in accordance with [SAES-T-928](#).

- 4.1.4 Buried cable crossings of streets, roads, and highways shall comply with [SAES-T-928](#).

- 4.1.5 Road and railroad crossings shall be constructed in accordance with [SAES-T-928](#), [SAES-T-911](#), and in accordance with any Government requirements when Government roads are involved.

- 4.1.6 Telecommunication cables which are placed in the vicinity of power facilities shall be installed in accordance with [SAES-T-928](#).

4.2 Joint Buried Cable - Installation

- 4.2.1 The "Random Separation" joint trench method shall not be used in Saudi Aramco for joint trench construction with power facilities. Joint buried construction with power facilities requires fixed separation as indicated above and in [SAES-T-928](#).

- 4.2.2 Joint pedestals for power and telecommunication cables shall not be used. Telecommunication terminal housings/pedestals located within 3 m (10') of power apparatus (transformer/pedestals etc.), or vertical pole grounds (MGN) shall have their grounding systems bonded together in accordance with [SAES-T-928](#).

- 4.2.3 All excavations and restorations shall be carried out in accordance with the Saudi Aramco "Safety Management System (SMS)".
- 4.2.4 Electrical station protection shall be installed in accordance with [SAES-T-887](#). Additional electrical protection requirements are given in [SAES-T-887](#) & [SAES-T-903](#).

4.3 Optimized Direct Buried Cable Delivery System

This section is intended, primarily, as a guide to be used when ordering or purchasing cable plowing equipment, however, the following are mandatory requirements when telecommunication cables are to be placed by the plowing-in method.

- 4.3.1 The diameter of the cable plow chute used shall provide a minimum clearance of 15% of the cable diameter on all sides of the cable being placed. See [SAES-T-624](#) when placing fiber optic cables.
 - 4.3.2 The minimum cable bending radius is ten times the cable diameter. A cable bending radius of less than ten times the cable diameter shall not be permitted in any part of the cable handling or placing operation. Therefore, the radius at the bottom of the cable plow chute shall be equal to or greater than ten times the cable diameter that is being placed. The arc of the radius of the cable chute used shall be extended so that the cable leaves the cable chute at a tangent to the arc.
 - 4.3.3 To ease the tension placed on the cable as it is pulled off the reel during installation, the cable reel carrier shall be equipped with cam roller type bearings on which the spindle bar will be mounted.
 - 4.3.4 When directed by Communications Engineering or by the Project Engineer, a cable shield fault alarm shall be used, during the plowing operation, to detect cable sheath damage. Use of a cable shield fault alarm should be considered when plowing cables in rough terrain (such as rocky areas) where there is concern of possible cable puncture or damage. All damaged cables shall be repaired or replaced.
 - 4.3.5 The cable shall be supported or guided from the cable reel to the cable plow chute. Vendor approved cable plowing mechanism/equipment/accessories shall be used. Refer to paragraph 4.5.2 above.
 - 4.3.6 The cable shall be positioned in such a way, during installation, that it will not come in close contact with extreme heat such as from a tractor's engine or exhaust pipe.
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4.4 Buried Cable Signs - Description and Installation

Saudi Aramco Drawing [AB-036897](#), "Buried/ Underground Cable Route Marker Post and Signs", provides typical installation information. Marker post/sign locations shall be shown on the construction drawings. Marker/Identification tape shall be placed in accordance with [SAES-T-928](#).

4.5 Joint Buried cable - Maintenance/Emergency Safety Precautions

4.5.1 Existing Communications facilities shall always be exposed by hand digging. Hand digging tools utilized shall have handles made of wood or other material having comparable insulating value. If power cables are to be exposed, PDD/Proponent should be on site prior to or during the excavation to advise as appropriate. Insulated rubber gloves, suitably certified, shall be worn while digging and while examining the markings and outside structure of the cables during the visual inspection of excavated cables.

4.5.1.1 After identifying the proper telephone cable and before breaking the cable metallic shield, a temporary bond shall be placed across the area to be opened to minimize difference in electrical potentials.

4.5.1.2 Telecommunications personnel shall not move or bend power cables at any time. As per Para. 4.2.3.1 above, the Power Distribution Department/Proponent must be requested to identify and reposition power cable as necessary.

4.5.2 In an event where a power cable and a telecommunication cable are damaged in the same excavation, the power cable should normally be repaired first. At any rate, repair of the telecommunications cable must not begin until both the supervisor and PDD/Proponent have determined that safe working conditions have been restored.

5 Installation

Buried telecommunication cables shall be installed in accordance with the requirements of this standard, [SAES-T-928](#) and other applicable codes and standards as referenced in paragraph 3 above. Construction in or near Hazardous or Classified areas shall comply with [SAES-B-008](#), [SAES-B-068](#), NESC, NEC and other applicable codes and standards. The Saudi Aramco "Construction Safety Manual", the SAES-B & O Series, [SAES-T-603](#) and, in general, all safety and security requirements shall be complied with. In addition, the installation of all cables shall comply with general requirements related to land use, clearances, road or pipeline crossings, etc.

6 Testing and Inspection

The testing and acceptance of buried telecommunication cables shall be done in accordance with [SAES-T-634](#), "Cable Testing and Identification". Quality assurance inspections shall be performed during all phases of construction by a Saudi Aramco Communications Inspector.

Revision Summary

11 May 2009

Revised the "Next Planned Update". Reaffirmed the contents of the document and reissued with minor changes.