

Engineering Standard

SAES-T-912

12 October 2005

Communications Feeder Cable

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Saudi Aramco DeskTop Standards

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I Scope

This Standard prescribes mandatory requirements governing the design, extension and placement of outside plant FEEDER CABLE for buried and underground applications.

II 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](#).

III References

All referenced specifications, standards, codes, forms, drawings, and similar materials shall be of the latest issue (including all revisions, addenda and supplements) unless stated otherwise.

A. Saudi Aramco References

Saudi Aramco Engineering Procedures

[SAEP-110](#)

Saudi Aramco Standards Drawings

[SAEP-302](#)

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

Saudi Aramco Engineering Standards

SAES-B Series

Fire and Safety

SAES-B Series

Safety in Design

[SAES-B-068](#)

Electrical Area Classifications

SAES-B Series

Environmental Health

SAES-O Series

Safety and Security Design

SAES-T-011

Symbols-Communications

[SAES-T-631](#)

Cable Terminals

[SAES-T-632](#)

Cable Splicing

[SAES-T-633](#)

Splice Closures

[SAES-T-634](#)

Cable Testing and Identification

[SAES-T-887](#)

*Telecommunications Electrical Coordination -
Protection at Power Plants and Radio Stations*

[SAES-T-903](#)

*Telecommunications Outside Plant Electrical
Protection and Grounding*

[SAES-T-920](#)

Cable Information

[SAES-T-938](#)

Outside Plant Systems Design

General Instructions

GI-0002.100

Work Permits

Construction Safety Manual

Saudi Aramco Drafting Manual

B. Industry Codes and Standards

General Telephone and Electronics

National Electrical Code (NEC)

National Electrical Safety Code (NESC)

National Fire Code (NFC)

Institute of Electrical and Electronics Engineers

IEEE STD 634

*Standard Cable Penetration Fire Stop
Qualification Test*

Rural Electric Administration

REA-PE-39

*Multi-Pair, Plastic Insulated, Filled,
Telecommunications Cable*

Underwriters Laboratories, Inc.

UL 910

*Standard for Test Method for Fire and Smoke
Characteristics of Electrical and Optical-Fiber
Cables used in Air-Handling Spaces*

UL 1479

Fire Tests of Through-Penetration Firestops

IV Important Design Requirements

- A. All feeder cable(s) shall be designed such that multiplying of cable complements shall not occur.
 - B. All feeder cable shall be of the filled core type. The filling compound shall be in accordance with requirements as prescribed in [SAES-T-920](#) and REA-PE-39.
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The outer sheath, conductor insulation material and metallic shield(s), including armor if required, shall also be in accordance with these referenced standards.

- C. The following points are to be observed when making, additional central office cable terminations and extensions to feeder cable:
- a) Feeder Cables originating at the Central Office (CO) shall contain the number of pairs, in the correct gauge, that can be economically justified for the planned feeder area to be served by each cable.
 - b) New terminations shall be planned when the route under study reaches a fill of 75% at the CO.
 - c) Extension of Feeder Cables, other than from the CO, shall be sized to meet initial and forecasted growth requirements. Extension of these cables shall be planned when cable-fill reaches 80%.
- D. Cable gauge shall be specified to meet the requirements of user loops, and limiting factors such as the resistance, capacitance and attenuation design parameters. Refer to the GTE 832 series, "Exchange Area Transmission" for additional design parameters.
- E. Feeder cable placement shall conform to established "Fundamental Feed Routes." "Feed Route Boundaries" shall not be violated by the placement of additional feeder cable in such a manner that cable complements will ultimately be distributed in an area served by another established route.
- F. Aerial feeder cable, except for service of a temporary nature, shall not be proposed as it is not within the long term objectives of Saudi Aramco Communications.
- G. Route layout sheets (GTE 912-100-073) shall accompany each proponent specification submittal to justify additional feeder cable placement. This will ensure adequate size, correct gauging and extension of cable to point where relief is justified. Refer to GTE 912-100-071, for additional design objectives.
- H. Cable stubs shall be placed at locations (manholes) where it is anticipated that branch splices will be required to service an area in accordance with the established Outside Plant Plan.

Sizing of stubs shall be as follows:

- a) The size of a stub shall be such as to make it reasonably certain that no change will be required either in its size or pair count during the life of the main cable. One of the following arrangements shall be utilized:
 - i) Stubs may be omitted on main cables of 400 pairs or smaller unless it
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- is anticipated the main splice will be opened a number of times. If placed, stubs shall be the same size as the main cable.
- ii) For main cables over 400 pairs, stubs shall be at least about 1/3 the size of the main cable or three times the size of the ultimate branch pairs to be spliced to it, whichever is larger.
 - iii) One stub in 5 shall be 1200 pairs, or the same size as the main cable, whichever is smaller. It shall be located in a manhole where there will be several small branches totaling about 200 pairs.
- b) For 26, 24 and 22 gauge main cables, stubs shall be 24 gauge. For 19 gauge main cable, stubs shall be 22 gauge. Stubs the same size as the main cable shall be of the same gauge. The splicing of 26 gauge pairs to 19 gauge pairs is difficult and shall be avoided.
 - c) The pair count of stubs shall be in hundred pair groups and such counts shall be in continuity such as 1-300, 601-1200, 401-800, etc.
- I. The size of feeder cables terminated (on the raw-ended harness) in the Facility Area Connector (FAC) shall be equal to the size of the "In Count" termination field. For example, an 1800 pair connector has a 600 pair "In Count" termination field. Therefore, a 600 pair cable shall be initially terminated. This will eliminate the reentering of the splicing section of this connector and thus reduce troubles caused by workman activity.
- J. Ducts in conduit systems shall be selected (assigned) for placement of feeder cable such that:
- a) i) Other vacant ducts and racking positions shall not be blocked.
 - ii) Cross over of cables or abrupt changes in level shall not occur.
 - b) Ducts shall always be selected (assigned) from the lowest appropriate ducts.
- K. Wall to wall and center to center measurements shall be required on all construction drawings. This will ensure that cable waste is kept to an absolute minimum and that sufficient cable is allowed for splicing, stubbing (bridging) and racking.

V Modifications to GTE 912 Series

5 DESIGN

The following paragraph numbers refer to GTE 912 series on "Feeder Cable", which is part of this standard. The text in each paragraph below is an addition, exception, modification, or deletion to GTE 912 as noted.

Paragraph numbers not appearing in GTE 912 are new paragraphs to be inserted in numerical order.

GTE Section 912-000-070: Feeder Cable - Development of Central Plans;
Issue 2/May, 1974

5.1.1 This section was cancelled by GTE in its entirety in February, 1985.

5.2 GTE 912-100-071: Multiple Plant Design - Feeder Cable Relief;
Issue 3/November, 1985

5.2.1 Multipling of cable complements in separate cable sheaths shall not be allowed, except in manhole cable stubs.

5.2.2 Much of the data in this section pertaining to "Cost Analysis," and "Economy of Deferring Major Relief" will not apply in Saudi Aramco.

5.3 GTE Section 912-100-072: Cable Layout Sheet - Description;
Issue 1/March, 1976

This section is retained for guidance purposes only as Saudi Aramco has not obtained the form referenced in this practice.

Local generated forms may be used for this purpose to provide the required tracking of major feeder cable fills.

5.4 GTE Section 912-100-073: Feeder Cable - Route Layout Sheet;
Issue 1/March 1976

This section is retained for tracking purposes. However, the form referenced in this section is not available in Saudi Aramco.

A local form may be generated and the information in this section shall be considered applicable to Saudi Aramco's requirements.

5.5 GTE Section 912-105-072: Feeder Cable Size; Issue 2/May, 1974

This section was cancelled by GTE in February, 1985.

5.6 GTE Section 912-110-070: Multipling and Stubbing;
Issue 1/November, 1961

This section was cancelled by GTE in February, 1985.

5.7 GTE Section 912-200-070: Cross-Connection Multiple Plant Design-
Engineering Application; Issue 2/September, 1974

(Deletion) Delete this section in its entirety as any relevant design criteria in this section is included in [SAES-T-938](#).

5.8 GTE Section 912-300-085: Selection of Ducts and Measuring for Cable;
Issue 3/November, 1975

No exceptions to this section.

VI Installation

Direct buried and underground cables shall be placed in such a manner to avoid damaging the outer sheath, shield and/or the conductors contained within the sheath. Additional considerations may be found in applicable paragraphs of GTE 920-000-070, "Cable Damage Considerations," GTE 928 series covering buried cable, and GTE 622 and GTE 911 series covering underground conduit.

VII Testing and Inspection

After installation, all cables shall be tested in accordance with [SAES-T-634](#) using approved testing apparatus. Results shall be in accordance with applicable sections in [SAES-T-634](#) and GTE 920-200-100, Paragraph 3.08 and Table 7. Cables exceeding the listed number of "non-conforming" pairs shall only be accepted by written approval from an authorized representative of Communications Operations.

Inspection during all stages of construction shall be carried out by a qualified Communications Inspector.

Revision Summary

12 October 2005

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