Engineering Standard

SAES-T-000 31 December, 2003
Telecommunications Standards
Introduction and Indices

Saudi Aramco DeskTop Standards

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1 Introduction

A. Purpose

The purpose of the Telecommunications Saudi Aramco Engineering Standards (SAESs) is to establish and publish the acceptable standards, specifications and design principles that are to be applied to every telecommunications system and service within Saudi Aramco Telecommunications. These are mandatory engineering requirements that shall be met, or an approved waiver shall be granted for each requested exception.

B. Administration Of Standards

The administration of these standards and specifications is the responsibility of the Communications Standards Committee Chairman (Information Technology Planning Division), Dhahran.

1) Applicability

These standards apply to facilities or locations requiring any of the communication services listed in General Instruction Manual (GI-1601 and GI-1603), and intended for use by Saudi Aramco. This manual shall be used by all personnel who are involved in designing, planning, constructing, modifying (rearrangement or removal), inspecting, operating, or maintaining any portion of the Saudi Aramco Telecommunications anywhere within Saudi Arabia.

Commentary Note:

These Standards do not necessarily apply to Saudi Aramco designed or built facilities that are located outside Saudi Aramco areas. These facilities (schools, clinics, mosques, etc) are subject to Saudi Government and/or Saudi Telephone Engineering requirements.

2) Compliance

Compliance with these mandatory Standards is essential and will ensure increased safety, service life, compatibility, performance, and cost effectiveness. The increasing telecommunication traffic (voice and non-voice) among widely separated Saudi Aramco locations, between Saudi Aramco and the Saudi network, and between Saudi Aramco and international locations is demanding stricter standards from user to user. The entire lengths of all paths (switched and non-switched) in this worldwide telecommunication network are extremely interdependent and subject to adverse influences such as noise, hum, echoes, intermodulation, signal interference, excessive voltages and currents,

distortion, abnormal attenuation, etc. Conscientious compliance with Saudi Aramco standards and specifications eliminate or reduce the effects of these adverse influences. Thereby, the network usefulness to all users is maintained and life cycle cost effectiveness is extended to the full service life.

3) Availability

All Telecommunication Standards are available through the Saudi Aramco Standards-On-Line (SOL) system. Copies of the GTE practices are located in the Technical Information Center. Additional copies are located in the Consulting Services Department, Communication Engineering and Services Department and in the Community and Infrastructure Projects Department.

C. Waivers

Within Saudi Aramco the approved standards and specifications, or approved referenced documentation, shall meet the needs of the majority of Communication Engineering situations. When the occasional unusual need arrives the responsible engineer shall use his ability and initiative to recognize the need for a waiver to meet the exception. The review and approval of waiver requests shall be as per Saudi Aramco Engineering Procedure SAEP-302.

In addition, as new products appear on the market and new techniques are proposed for their application Saudi Aramco shall rely on the skill and experience of its engineering personnel to recognize the need for either a waiver or a revision.

The instructions for obtaining a waiver of a Saudi Aramco Engineering Requirement are found in Saudi Aramco Engineering Procedure, SAEP-302.

D. Organization Of The Telecommunication Standards

The Telecommunications Standards are organized into three parts: Saudi Aramco Engineering Standards (SAESs), Saudi Aramco Materials System Specifications (SAMSSs), and Saudi Aramco Standard Drawings (SAMDs).

Each part has generalized subsections which provide subject matter guidelines for quickly locating applicable standards or specifications. However, there are no special sections or subsections for optical fibers, cables, connectors or associated items because they are receiving the same general classifications that copper conductors, cables, and accessories have traditionally received. (e.g., - Practices for the placement of optical fiber cables in outside plant shall be located in the 600 series).

1) Saudi Aramco Engineering Standards (SAES)

The numbering system is similar to the GTE Corporation Practices. It is very similar to the former Bell System Practices (BSP) and to the RUS Telecommunication Engineering and Construction Manual. Non-GTE practices have been assigned appropriate titles and numbers.

2) Saudi Aramco Materials System Specifications (SAMSS)

The numbering system for these specifications utilizes two digits followed by the four letters, "SAMSS", followed by a maximum of three digits. The first two digits are the same for all tele-communications related materials, "18". The final three digits are not issued in numerical sequence.

3) Saudi Aramco Standard Drawings

This section of the manual contains the standard drawings that are either mandatory or typical installation drawings, according to designation. Saudi Aramco mandatory drawings shall have "Mandatory Drawing" entered above the title block in 6.4 mm letters. All typical installation drawings shall have "Typical Installation Drawing" entered above the title block in 6.4 mm letters.

E. Sources Of Standards

The main sources of standards for telecommunications in Saudi Aramco are:

- GTE Corporation (USA)
- Rural Utilities Services (RUS) of the U.S. Department of Agriculture
- National Fire Protection Association

  NFPA 70 *National Electrical Code (NEC)*
- American National Standards Institute

  ANSI C2 *National Electrical Safety Code*
- International Telecommunications Union Telecommunications Sector (ITU-T)
- International Telecommunications Union Radiocommunications Sector (ITU-R)
- Electronic Industries Association (EIA of USA)

1) For use within its communication network and facilities Saudi Aramco has formally adopted all applicable GTE Corporation (formerly General

Telephone and Electronics) Practices as utilized in the General Telephone Operating Companies. In 1979, GTE Corporation gave written permission for Saudi Aramco to use and reproduce these GTE Practices in unlimited quantities for internal Company use only. The GTE Practices with exceptions, additions and deletions etc., as listed in the SAES-T-Series, have been approved as mandatory.

2) The Telecommunications Engineering and Standards Division, RUS, U.S. Department of Agriculture, issues a wide variety of standards and specifications for independent telephone companies. These documents are produced by the federal government and are in the public domain as uncopyrighted material. Therefore, any of the documents may be reproduced in any quantity for use by anyone. The Materials Specifications by RUS are particularly useful to Saudi Aramco because many manufacturers of telecommunication materials and supplies already produce these items according to RUS specifications. The materials specifications (18-SAMSS-XXX) listed in this standard are mandatory.

3) The NFPA 70, National Electrical Code (NEC), has been approved for use throughout Saudi Aramco. All telecommunication designs, installations, and operations shall comply with that code.

4) International Recommendations - In general, the ITU-T issues the recommendations for telecommunications, the ITU-R issues recommendations for radio telecommunications and the ISO issues recommendations for data telecommunications. Certain of these international recommendations are applicable and have been approved for use by Saudi Aramco. This is particularly true for traffic between Saudi Aramco users and the Saudi Telecommunication network. As one example, the ITU-T inter- national transmission plan specifies the allowable range of attenuation losses for each segment of the overall connections. This includes losses for end user cable pair loops, local switching center, interoffice trunks, gateway to the toll network, and international circuits. Therefore, the local subscriber service on cable pairs shall continue to be designed for resistance limits as in the past. But the local service shall also be designed for attenuation limits.

5) The ITU-T and ITU-R recommendations are coordinated with the International Standards Organization (ISO) recommendations for data telecommunication using the Open System Interconnection (OSI) with its several levels. The first level involves the physical connection which includes the local loop to the user.

6) The EIA issues recommendations for standards in telecommunications. For example, Saudi Aramco utilizes EIA documentation for communication towers, electronic cabinets, equipment racks, interfaces for data circuits (EIA-232), optical fiber cable, and connector tests. Others are added as required.

7) If Saudi Aramco Telecommunications has confirmed a need for standards or specifications in areas not covered by the above mentioned organizations, or has unique conditions in the kingdom, then original standards have been approved for issuance.

F. Applicable Editions

All references to specifications, standards, Codes, etc. shall be interpreted as applying to the latest edition as of the date of design or major alteration to project in question.

G. Request For Comments

The development of standards, specifications, standard drawings, and practices for a subject as complex and varied as telecommunications is a time-consuming process. A continuous effort is required in order to provide complete and up to date Design and Engineering Standards adapted to conditions in Saudi Arabia. Therefore, Consulting Services Department invites comments or requests for revisions or updates from all organizations. Please submit your comments or requests to the Manager, Consulting Services Department, for his review and presentation to the Vice President, Engineering Services.

2 Index for Saudi Aramco Engineering Standards (SAES-T Series)

This section contains an index of mandatory engineering standards that are applicable to telecommunication engineering in Saudi Aramco. The standards are grouped and listed under generalized subsection headings. In areas where no SAES has been issued the GTE practices, are the accepted standards. Telecommunications SAES's have been or are currently being issued as listed below.

General Information (000-019)

SAES-T-000	*Telecommunications Index*
SAES-T-018	*Telecommunications Symbols, Abbreviations and Definition*

Power And Grounding (150-199)

SAES-T-151	*D.C. Power Systems*

Switching Systems (200-259)

SAES-T-243	*Protection Equipment in Communications Buildings*

Transmission Systems (300-399)

SAES-T-348	*Multiplex Systems (Frequency Division)*
SAES-T-360	*Synchronous Digital Hierarchy Transmission Systems*

User Premise Equipment (400-491)

SAES-T-435	*User Station Protection*
SAES-T-481	*Powered In-Plant Communications*

Radio Frequency User Equipment (492-499)

SAES-T-492	*VHF/UHF Land-Mobile and Fixed Radio Communications*

Private Branch Exchanges (500-519)

SAES-T-500	*Central Office CO) Digital Telephone Switching Systems*

Measurement Systems (520-549)

SAES-T-521	*Circuit Measuring Techniques*

Data Communications (550-599)

SAES-T-556	*Circuit Quality and Performance*

Plant Construction (600-699)

SAES-T-600	*Communications Drop and Block wiring*
SAES-T-601	*Communications Line Wire Facilities*
SAES-T-603	*Communications Safeguard and Warning Devices*
SAES-T-604	*Communications Plant Clearances and Separations - Aerial*
SAES-T-621	*Communications Pole Lines*
SAES-T-624	*Outside Plant, Fiber Optics*
SAES-T-625	*Inter and Intra Building Fiber Optic Communications Cables*
SAES-T-628	*Telecommunications Buried Cables and Wires*

SAES-T-629	*Buried Cable and Wire*
SAES-T-631	*Communication Cable Terminals*
SAES-T-632	*Communication Cable Splicing*
SAES-T-633	*Communication Splice Closures*
SAES-T-634	*Communication Cable Testing and Identification*
SAES-T-637	*Communications Cable Pressure Testing*

Physical Facilities (740-759) (land, buildings, structures, shelters, towers, etc.)

SAES-K-003	*Environmental Considerations in Communication Offices and Shelters (Formerly SAES-T-743)*
SAES-T-744	*Design Criteria and Installation of Communication Towers*

Equipment Engineering (780-829)

SAES-T-795	*Communications Facility Grounding Systems*
SAES-T-820	*Narrow-Band Video Conferencing Systems*

Protection And Transmission Engineering (830-899)

SAES-T-830	*Voice Frequency Loop Transmission Objectives*
SAES-T-883	*Telecommunications Inductive Coordination*
SAES-T-887	*Telecommunications Electrical Coordination Protection and Grounding*

Plant Engineering (Inside And Outside, 900-949)

SAES-T-903	*Communications Outside Plant Electrical Protection and Grounding*
SAES-T-906	*Telecommunications Structural Coordination*
SAES-T-909	*Communications Pole Lines*
SAES-T-911	*Communications Conduit and Manholes*
SAES-T-912	*Communications Feeder Cable*
SAES-T-914	*Communications Distribution Cable*
SAES-T-916	*Communications Building Cable*
SAES-T-920	*Cable Information*
SAES-T-928	*Outside Plant Direct Burial*
SAES-T-938	*Outside Plant Systems Design*

3 Index for Saudi Aramco Materials System Specifications (18-SAMSS Series)

This section contains an index of all mandatory materials systems specifications that are applicable to the procurement of telecommunication materials or equipment for Saudi Aramco. The specifications are grouped and listed in generalized subsections. In general telecommunication materials and equipment are Class 18, but there may be occasional exceptions.

Low Frequency Wires and Cables (001-099)

Includes associated connectors, closures, splice cases, cable racks, terminals, blocks, etc. The final digits used in the identification numbers (18-SAMSS-XXX) in this subsection are generally taken from the specifications issued by the Rural Utilities Services (U.S.D.A.). These documents are uncopyrighted and provide technical specifications for many telecommunication materials and equipment requirements. One exception is 18-SAMSS-080 for premise wiring, which is published by the Insulated Cable Engineers Association. However, this particular specification is used and recommended by the RUS because it has not published its own premise wiring standard.

18-SAMSS-007 *Parallel Conductor Drop Wire, RUS-PE-07.*

Higher Frequency Systems and Components (400-499)

Radio (VF, VHF, UHF and microwave), CATV, CCTV and optical frequencies for telecommunications:

18-SAMSS-493 *Two-Part Polyurethane Duct Sealant*

Telecommunication Test Equipment (600-699)

Central office, transmission, user equipment, station equipment, electrical and specialized.

18-SAMSS-625 *Outside Plant – Fiber Optic Cable Specifications (Single Mode and Multiple Mode)*

4 Index for Saudi Aramco Standard Drawings

This section contains an index of Saudi Aramco Standard Drawings arranged according to titles that contain key subject words. An identifying number is assigned to each drawing by the SAO Drafting Services in accordance with approved procedures. As a result the telecommunications drawings are not numbered sequentially. The originator of each drawing shall classify that drawing either as a Saudi Aramco Mandatory Drawing (SAMD) or as a Saudi Aramco Typical Installation Drawing (SATID). Every mandatory drawing shall have "Mandatory Drawing" entered above the title block in 6.4

mm letters. Every typical installation drawing shall "Typical Installation Drawing" entered above the title block in 6.4 mm letters.

Index of Saudi Aramco Standard Drawings
Description Sequence

Description	Drawing	Ind
Concrete Buried/Underground Cable Route Marker	AA-036659	A
Antenna Installation On Self Supporting Tower, VHF/UHF	AA-036361	T
Antenna Installation On Wood Pole, VHF/UHF	AA-036362	T
Jackfield Arrangements For 46A And 36A Multiplex Applications	AA-036371	T
Direct Buried/Encased PVC Conduit in Concrete (Sheets 1 & 2)	AA-036373	T
Communication Special Manholes Details, (Sheets 1 to 4)	AA-036374	T
Handhole Communication Non-Traffic Areas	AA-036377	T
Equipment Grounding System, Telecommunications Facilities	AA-036391	T
Cable Exposed Building Entrance	AE-036421	T
Cable Exposed Building Entrance (Metric)	AE-036422	T
Cable Exposed Building Entrance	AE-036434	T
Cable Exposed Building Entrance (Metric)	AE-036436	T
Cable Exposed Building Entrance (Sheets 1 & 2)	AE-036448	T
Overhead Telephone Drop Wire	AB-036747	T
Buried Telephone Cable Distribution Wire Installation Details (Sheets 1 to 3)	AA-036748	T
Standard Installation Telephone Pole Lines	AA-036749	T
Grounding For Remote Communication Sites	AA-036765	T
Communication Manholes Service Type, Plan & Section (Sheet 1)	AA-036794	T
Communication Manholes Type I and V (Sheets 2 & 3)	AA-036794	T
Communication Manholes Bar Bending Schedule (Sheet 4)	AA-036794	T
Post and Sign	AB-036897	T

Revision Summary

31 December, 2003 Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes.