Engineering Standard

SAES-N-004 30 April, 2003

Design and Installation
of Building Thermal Insulation

Saudi Aramco DeskTop Standards

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1 Scope

1.1 This Saudi Aramco Engineering Standard covers the mandatory requirements for thermal insulation of air-conditioned and mechanically ventilated buildings.

1.2 For buildings where the temperature is maintained below 15°C (59°F) (cold storage) refer to the manufacturer's requirements.

1.3 For thermal insulation requirements of pre-engineered metal buildings refer to 12-SAMSS-014.

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 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 Requirement*

Saudi Aramco Materials System Specification

12-SAMSS-014	*Pre-Engineered Metal Buildings*

Saudi Aramco Engineering Standard

SAES-B-014	*Safety Requirements for Plant and Operations Support Buildings*

3.2 Industry Codes and Standards

American Society for Testing and Materials

ASTM C755 *Selection of Vapor Barriers for Thermal Insulation*

International Conference of Building Officials

Uniform Building Code, 1997 Edition

Underwriters Laboratories, Inc.

UL 1709 *Safety Rapid Rise Fire Tests of Protection Materials for Structural Steel*

4 General Requirements

4.1 Roofs and walls of all air conditioned or mechanically-ventilated buildings shall be insulated.

4.2 Floors shall be thermally insulated when the air-conditioned space is above a non-conditioned space or ambient air (as in a building elevated above grade).

4.3 Partitions shall be thermally insulated if the air-conditioned space is adjacent to a non-conditioned space or to an area of high heat output.

4.4 The overall heat transmission coefficient (U-factor) of insulated roofs, walls, partitions or floors shall not exceed 0.568 W/(m² °K) or (0.10 btu/h ft² °F).

5 Design

5.1 The design of insulated roofs and walls shall meet the criteria of ASTM C755 for the control of water vapor flow and for the selection of vapor barriers. Vapor barriers shall be designed to be installed on the warmside (outside) of the stud or joist. Water vapor permeance of vapor barriers shall not exceed one perm. A perm equals 1 g/(24 hr m² mm Hg) or (grain/h ft² in Hg).

5.2 For high humidity rooms (kitchens and showers, etc.) vapor barriers shall be installed on both inside and outside of the stud or joist.

6 Materials

6.1 The insulation material shall not increase the overall fire hazard classification of the assembly being insulated.

6.2 The insulation material shall be rot and rodent resistant and must not be affected by temperatures of 65°C (150°F) or by short period exposure to direct sunlight, causing thermal decomposition not related to combustion.

6.3 Insulation materials, including insulating cement and insulation covering, shall not contain asbestos fibers.

6.4 The material must be easily handled without deteriorating and without harmful effects to personnel handling it.

6.5 Where insulation is provided in a "sandwich" panel construction, thermal short-circuits (metal-to-metal contacts) shall be minimized to retain an effective insulator.

6.6 All insulation materials other than foam plastic shall have a flame-spread rating not to exceed 25 and a smoke density not to exceed 450 in accordance with the Uniform Building Code, Section 707.

Exception:

All insulation materials for use in substations, communications buildings, centralized computer facilities, and other buildings under the scope of SAES-B-014 shall either be noncombustible or shall be covered on exposed surfaces with fireproofing sufficient to provide a minimum fire-resistance rating of two (2) hours when subjected to a test furnace environment in accordance with UL 1709 or an equivalent fire exposure test procedure accted by the Chief Fire Prevention Engineer.

6.7 Foam plastic insulation shall conform to requirements stated in the Uniform Building Code, Section 2602.3.

Exception:

Exposed surfaces of foam plastic insulation for use in substations, communications buildings, centralized computer facilities, and other buildings under the scope of SAES-B-014 shall be covered with fireproofing sufficient to provide a minimum fire-resistance rating of two (2) hours when subjected to a test furnace environment in accordance with UL 1709 or an equivalent fire exposure test procedure accepted by the Chief Fire Prevention Engineer.

7 Delivery, Handling and Storage

Insulation materials shall be handled and stored as recommended by the Manufacturer.

8 Installation

When materials of a specific manufacturer are specified, installation shall be in strict accordance with that manufacturer's requirements and specifications.

Revision Summary

30 April, 2003	Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes to paragraphs 6.6 and 6.7.