

# Engineering Standard

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SAES-B-006

29 June, 2005

## Fireproofing for Plants

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## Saudi Aramco DeskTop Standards

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Previous Issue: 30 June, 2003    Next Planned Update: 1 July, 2010

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## 1 Scope

This Standard covers the minimum mandatory requirements for the design and installation of fireproofing to protect plant equipment and support structures from potential hydrocarbon fires.

### *Exceptions:*

*Where this Standard is in conflict with specialized requirements for offshore platforms (SAES-B-009) or for piers, wharves, and sea islands (SAES-B-060), those Standards shall govern. This Standard is not to be applied to other classes of property such as offices, warehouses, workshops, and community facilities.*

*Fireproofing is not required for offshore well platforms and unmanned tie-in platforms.*

## 2 Conflicts and Deviations

- 2.1 Any conflicts between this Standard and other applicable Saudi Aramco Engineering Standards (SAESs), Saudi Aramco Materials System Specifications (SAMSSs), Saudi Aramco Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Loss Prevention 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, Loss Prevention Department of Saudi Aramco, Dhahran.

## 3 References

All referenced Specifications, Standards, Codes, Forms, Drawings, and similar material shall be considered part of this Standard to the extent specified herein, and shall be of the latest issue (including all revisions, addenda and supplements) unless stated otherwise.

### 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 Engineering Standards

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<a href="#"><u>SAES-B-058</u></a>	<i>Emergency Isolation, Shutdown, and Depressuring</i>
<a href="#"><u>SAES-B-068</u></a>	<i>Electrical Area Classification</i>
<a href="#"><u>SAES-H-101</u></a>	<i>Approved Protective Coating Systems</i>
<a href="#"><u>SAES-J-601</u></a>	<i>Emergency Shutdown and Isolation Systems</i>
<a href="#"><u>SAES-L-108</u></a>	<i>Selection of Valves</i>
<a href="#"><u>SAES-N-001</u></a>	<i>Basic Criteria, Industrial Insulation</i>
<a href="#"><u>SAES-P-104</u></a>	<i>Wiring Methods and Materials</i>
<a href="#"><u>SAES-Q-001</u></a>	<i>Criteria for Design and Construction of Concrete Structures</i>

#### Saudi Aramco Materials System Specifications

<a href="#"><u>09-SAMSS-088</u></a>	<i>Aggregates for Concrete</i>
<a href="#"><u>09-SAMSS-097</u></a>	<i>Ready-mixed Portland Cement Concrete</i>
<a href="#"><u>21-SAMSS-010</u></a>	<i>Fireproofing for Valve Actuators -Box and Blanket System Enclosures</i>
<a href="#"><u>21-SAMSS-014</u></a>	<i>Intumescent Fireproofing for Valve Actuators</i>
<a href="#"><u>34-SAMSS-913</u></a>	<i>Instrumentation and Thermocouple Cable</i>

#### Saudi Aramco Standard Drawings

<a href="#"><u>AD-036711</u></a>	<i>Concrete Fireproofing for Structural Members</i>
<a href="#"><u>AC-036404</u></a>	<i>Flame Impingement Shield for Flangeless Valves</i>
<a href="#"><u>AC-036915</u></a>	<i>Details: Fireproofing Specifications for Column and Vessel Skirts</i>

#### Saudi Aramco Chemical Hazards Bulletins

### 3.2 Industry Codes and Standards

#### American Petroleum Institute

<a href="#"><u>API PUBL 2218</u></a>	<i>Fireproofing Practices in Petroleum and Petrochemical Processing Plants</i>
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#### American Society for Testing and Materials

<a href="#"><u>ASTM E119</u></a>	<i>Method of Fire Tests for Building Construction and Materials</i>
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#### British Standard

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*BS 6387*

*Performance Requirements for Cables Required to Maintain Circuit Integrity under Fire Conditions*

United Laboratories

*UL 1709*

*Rapid Rise Fire Test of Protection Material for Structural Steel*

*UL 2196*

*Tests for Fire Resistive Cables*

#### 4 Definitions and General Requirements

**Autoignition temperature:** The lowest temperature required to initiate self-sustained combustion in air without another source of ignition.

**Catch beam or pillar:** A support to keep suspended overhead piping from sagging during a fire. The catch beam or pillar is not in contact with the piping, but is just below it to "catch" the piping, thus reducing the chance of the piping and its flanges from breaking and feeding the fire.

**Combustible liquid:** A liquid that has a flash point greater than 54°C. For purposes of this Standard, the words "combustible liquid near or above its flash point" shall mean a combustible liquid which is at any temperature above or within 8°C of its flash point.

**Combustible gas:** A gas which can form an ignitable mixture with air.

**Dense Concrete:** Cement using gravel as an aggregate and having a weight of roughly 2200 to 2400 kg/m<sup>3</sup> (140 to 150 lbs/ft<sup>3</sup>). Refer to [SAES-Q-001](#) for specifications.

**Emergency Isolation Valve (EIV):** A valve that closes to stop a release in the event of a fire, rupture, or other emergency. An EIV can be either power-operated (air, hydraulic, or electrical actuation) or, under certain conditions, hand-operated. A "power-operated EIV" is commonly designated as a ZV in drawings and the two terms can be used interchangeable for the purposes of this Standard. ZVs can be actuated either by an automated ESD system or by an actuating button, depending on the design of the facility. Refer to [SAES-B-058](#) and [SAES-J-601](#) for more details.

**Fire-Hazardous Classification Drawings:** For every facility in which fire-hazardous zones occur, plan-view Fire-Hazardous Classification Drawings indicating the extent of these zones shall be provided as part of the Project Proposal, final design, and as-built documentation. The plan drawing shall be a scaled plot-plan-type drawing showing the relationship of fire-hazardous zones to major plant equipment and buildings. The fire-hazardous drawing shall also show an exclusion zone extending 7.5 m from the outer edge of the fire-hazardous zone. This will help in placement of safe-location EIV actuating buttons per [SAES-B-058](#).

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*Commentary Note:*

*Fire-hazardous drawings are not the same as Electrical Area Classification Drawings (See [SAES-B-068](#)). Fire-hazardous classification drawings are not required for offshore well platforms and unmanned tie-in platforms.*

**Flammable liquid:** One that has a flash point equal to or less than 54°C.

**Hold point:** A point in the installation procedure where the work is halted until quality assurance inspection is done and work is accepted before it is covered up. Hold points are normally required for items such as surface preparation or reinforcement. See 8.1.1 and 8.2.4.

**Intumescent mastic:** A paste-like material applied to equipment or supports. The intumescent property indicates that it swells and chars when exposed to a flame, thus forming a protective fireproof layer.

**Lightweight Concrete:** Cement using lightweight aggregate materials rather than gravel and having a weight of roughly 400 to 1300 kg/m<sup>3</sup> (25 to 80 lbs/ft<sup>3</sup>). See Section 7, API PUBL 2218, for more information.

**Potentially toxic material:** In the context of this Standard is a liquid, gas, or solid with a total concentration of 5% or greater of materials with a Health Category rating of " 3 " or greater per the Saudi Aramco Chemical Hazards Bulletins at any operating condition.

**Process heater:** For the purposes of this Standard, any type of direct or indirect fired process heater including furnaces, boilers, etc.

**Shall:** Indicates a mandatory requirement.

**ZV:** Power-operated EIV. Refer to [SAES-B-058](#) and [SAES-J-601](#) for more information. Also see definition for Emergency Isolation Valve (EIV).

**Fire-hazardous zone:** A three-dimensional space defined by any of the following:

- a) The space within 7.5 m horizontally of any fire-hazardous equipment specified in this Standard, and extending from grade to a height of 7.5 m.

For pumps and compressors, the horizontal distance shall be measured from the seals. For other fire-hazardous equipment, the horizontal distance shall be measured from the edge of the equipment.

A three-dimensional fire-hazardous zone created by fire-hazardous equipment located on a floor or platform elevated above grade is defined as the space within 7.5 m horizontally of the fire-hazardous equipment on the platform and extending from grade to a height of 7.5 m above the platform.

*Exception:*

*An elevated solid floor or platform that is designed to retain liquid spills, or designed to drain spills to a safe location, may be treated as a grade-level floor or platform for determining the extent of the fire-hazardous zone.*

*Commentary Note:*

*As an example, the fire-hazardous zone around a hypothetical point source at grade would be the space enclosed by a right cylinder 7.5 m high and a radius of 7.5 m, with the point source at the center of the bottom face of the cylinder.*

- b) The space within a dike around a tank(s) or vessel(s) containing flammable liquid, combustible liquid near or above its flash point, or liquefied combustible gas, and extending vertically from the grade of the diked area to a height of 7.5 m.
- c) The space within 3 m of the edge of surface drainage channels or diversion channels and extending vertically from grade to a height of 7.5 m, when the channels serve equipment, vessels, or tanks containing flammable liquid, combustible liquid near or above its flash point, or liquefied combustible gas.
- d) The space extending vertically from grade to a height of 7.5 m and within 3 m of the edge of an area catch basin serving (a) fire-hazardous equipment or (b) vessels with a gross volume of 2.5 m<sup>3</sup> (15 barrels) or greater that contain flammable liquid, combustible liquid near or above its flash point, or liquefied combustible gas.
- e) In the event that particular configurations of equipment present a conflict among a), b), c), and d), the most stringent requirements shall apply.

**Fire-Hazardous Equipment** is any of the following:

- A compressor handling combustible gas with a driver rated at more than 150 kW (200 HP).
  - Turbo-expanders handling combustible fluids.
  - A pump that is:
    - a) larger than 0.5 L/sec (10 gpm) in capacity, and
    - b) pumping a flammable liquid or a combustible liquid near or above its flash point, and
    - c) takes suction from a system (vessel and/or piping) with a liquid inventory in excess of 8 m<sup>3</sup> (50 barrels under normal conditions).
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- d) Regardless of capacity, any pump handling a flammable liquid having a true vapor pressure equal to or greater than an absolute pressure of 200 kPa (29 psia) at 54°C (130°F) and taking suction from a system with a liquid inventory in excess of 8 m<sup>3</sup> (50 barrels) shall be considered fire-hazardous.
- Any reactor, oxidizer, furnace, or process heater which has flammable liquid, combustible liquid, or combustible gas in the tubes.
- A vertically upfired furnace fired with liquid fuel.
- Heat exchangers, vessels, or other equipment (does not include piping components such as eductors and ejectors; does not include air-cooled heat exchangers) containing any of the following substances at autoignition temperature or above 315°C, whichever is lower:
  - a) flammable liquid
  - b) combustible liquid
  - c) combustible gas.
- Plate-type heat exchanger for flammable liquid, combustible liquid near or above its flash point, or combustible gas.
- Closure door of a scraper launcher or receiver in a pipeline carrying a flammable liquid or combustible gas.
- Any piece of equipment so designated by the Chief Fire Prevention Engineer.

## 5 Fireproofing Requirements for Vessel Supports, Equipment Supports and Piping Supports

- 5.1 Fireproofing is required for aboveground structures as described herein with the following general exceptions:

*General Exceptions:*

- a) *Fireproofing coating shall not be required for reinforced concrete structures having a minimum of 50 mm of dense concrete covering the reinforcing steel.*
  - b) *Fireproofing is not required for cross-bracing or other structural members whose main purpose is to resist horizontal wind, earthquake, or surge forces.*
  - c) *The top flat surface of a fireproofed horizontal pipe support shall not be fireproofed.*
  - d) *Fireproofing is not required on saddles or leg supports of a horizontal vessel if the distance between the lowest part of the vessel and grade or concrete foundation*
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*is less than 300 mm. For stacked vessels, fireproofing of the supports is not required if vessel-to-vessel distances are less than 300 mm.*

- e) *Anchor bolts for vessels, columns, or equipment (i.e., those bolts which are set in concrete and serve the purpose of anchoring vessels, columns, or equipment) and anchor bolt nuts shall not be fireproofed. Where fireproofing is required for piping supports, fireproofing of anchor bolts and nuts is permitted but not required.*
- f) *Fireproofing is not required for the supports of a scraper launcher/receiver barrel and other piping supports within the fire hazardous zone of a scraper launcher/receiver closure door.*

5.2 Refer to API PUBL 2218 for diagrams that help clarify how to fireproof piping and equipment supports.

### 5.3 Vessel Supports

5.3.1 Vessels and heat exchangers, including stacked ones with a gross volume of 2.5 m<sup>3</sup> (15 barrels) or greater and that contain flammable liquid, or combustible liquid near or above its flashpoint, combustible gas, or potentially toxic material, shall have their supports and anchor rings fireproofed from grade up to the level defined by 5.3.3.

*Commentary Note:*

*Note that this requirement for fireproofing of vessel skirts and supports applies regardless of whether the vessel or heat exchanger is in a fire-hazardous zone or not, as long as the vessel contains the mentioned hazardous substances.*

5.3.2 Fireproofing is required on the supports of all vessels or heat exchangers located in a fire-hazardous zone, regardless of size or content, where support failure could result in physical damage to other equipment, vessels, or tanks that contain and could release flammable, combustible, or toxic materials.

5.3.3 Fireproofing design and application shall conform to the following conditions:

- a) Materials and installation for fireproofing shall be in accordance with other sections of this Standard (see Sections 7 and 8).
- b) A clearance of 30 mm shall be maintained between the vessel surface and the fireproofing material on support legs, skirts, and saddles.



- c) A clearance of 30 mm shall be provided between a sliding surface and the fireproofing material on a sliding support.
- d) An internally insulated vessel operating at a fluid temperature above 260°C shall not have the top 300 mm of the skirt fireproofed.

*Commentary Note:*

*This will avoid cracking of the fireproofing due to expansion and contraction of the vessel.*

- e) Vessel support legs shall be fireproofed from grade up to a level 30 mm below the contact line/surface between the legs and vessel.
- f) The saddle supports for single horizontal vessels shall be fireproofed up to the vessel midpoint; i.e., up to the 3 o'clock and 9 o'clock positions. If the saddle supports do not extend to the vessel midpoint, fireproof the entire saddle support.
- g) The skirt supporting a tower or vertical vessel shall be fireproofed on the inside and outside surfaces. Refer to Standard Drawing [AC-036915](#).

*Exception to (g):*

*Fireproofing of the inside of a vessel skirt is not required if the vessel skirt is provided with only one access opening and no more than one pipe penetration. The access opening shall be no larger than 500 mm in diameter. The clearance between the edge of the penetration opening and the surface of the penetrating pipe shall not be larger than 13 mm.*

- 5.3.4 The bolts for the support of shell-and-tube heat exchangers, and the area within 30 mm of these bolts, shall not be fireproofed.

#### 5.4 Process Heater Supports

- 5.4.1 For process heaters (in any service) or steam generators that are wholly or partially located in a fire-hazardous zone, all load-bearing vertical supports shall be fireproofed from the foundation to the support point of the process heater or steam generator.
- 5.4.2 Horizontal beams in contact with the process heater floor or shell shall not be fireproofed. Any horizontal load-bearing beams below those in contact with the process heater floor or shell shall be fireproofed.

#### 5.5 Piping Supports

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Vertical columns acting as supports for piping containing flammable or combustible liquids, combustible gas, or potentially toxic material, shall be fireproofed per the general requirements of Standard Drawing [AD-036711](#) when located in fire-hazardous zones if the minimum vertical distance between the bottom of pipe and grade or concrete footing exceeds 300 mm.

- 5.5.1 Vertical columns supporting a single level of piping shall be fireproofed up to the point of support of the horizontal member, regardless of its height.

*Commentary Note:*

*It is incorrect to fireproof only the bottom 7.5 m of the column (the height of a fire-hazardous zone).*

- 5.5.2 Vertical columns supporting multiple levels of piping shall be fireproofed up to the point of support of the lowest horizontal load-bearing member located above the fire-hazardous zone, regardless of height.
- 5.5.3 Vertical columns which support both piping and air-cooled heat exchangers shall be fireproofed according to the requirements of this Standard for air-cooled heat exchangers.
- 5.5.4 Load-bearing horizontal cross members shall be fireproofed for their full length when one or more of the attached vertical columns are fireproofed up to or beyond the point of support of the horizontal member.
- 5.5.5 Load-bearing cantilevers, bracing, and dummy piping supports shall be fireproofed when attached to fireproofed vertical or horizontal members.
- 5.5.6 In fire-hazardous zones, a fireproofed catch beam or pillar shall be provided for hydrocarbon or toxic material piping which is suspended from rods or supported by a spring.

The catch beam or pillar shall be located as close as possible to the pipe without interfering with the designed movement of the pipe. Catch beam or pillar shall prevent the pipe from sagging more than 300 mm when a rod or spring fails.

*Exception:*

*No fireproofed catch beam or pillar is required if the purpose of the spring or rod is to accommodate dynamic loads; i.e., if removal of the spring or rod will not result in unacceptable static loads on piping or equipment flanges.*

5.5.7 Beam and column piping supports, other than the rod or spring type, suspended from fireproofed horizontal cross members shall be fireproofed.

#### 5.6 Air-Cooled Heat Exchanger Supports

For an air-cooled heat exchanger, the vertical supports located in a fire-hazardous zone shall be fireproofed from grade up to the support point of the heat exchanger. Load-bearing horizontal beams shall be fireproofed when one or more of the attached vertical columns are fireproofed up to or past the point of support of the horizontal member.

#### 5.7 Multilevel Equipment Structural Supports

Vertical and horizontal load-bearing members shall be fireproofed at all levels from grade up to the highest level at which any of the following are located:

- a) fire-hazardous equipment
- b) vessels with a minimum gross volume of 2.5 m<sup>3</sup> (15 barrels) that contain flammable liquid, combustible liquid near or above its flash point, combustible gas, or potentially toxic material.

## 6 Fireproofing Requirements for Vessels, Equipment and Instrumentation

### 6.1 Nonsteel Vessels and Piping

Fireproofing or shielding is required for a vessel, piping, or other equipment made from a material other than steel and that is located within a fire-hazardous zone which contains flammable or combustible liquid, combustible gas, or potentially toxic material. Installations shall be reviewed and approved by the Chief Fire Prevention Engineer or his representative on a case-by-case basis.

6.2 In cases involving high-pressure vessels containing large hydrocarbon inventories, emergency vapor depressuring is required to meet [SAES-B-058](#), Section 6.1. Fireproofing of process vessels may be used in place of a depressuring system where it is impractical to depressure the process vessels, such as surge bullets, fractionation columns and associated reflux drums, within 15 minutes to achieve depressuring to 50% of the vessel design pressure. The Chief Fire Prevention Engineer shall approve fireproofing in these special circumstances.

#### *Commentary Notes:*

- *Limiting heat input into process vessels during fire emergencies exterior to process vessels can be achieved by one of the following alternatives:*

- *Fireproofing of process vessel exterior with a proprietary fireproofing material.*
- *Application of insulation resistant to flame erosion and covered with stainless steel jacketing.*
- *Fireproofing by means of cold insulation covered with stainless steel jacketing.*
- *Optionally a water deluge system can be used in place of fireproofing. This option is considered at existing installations or when application of the fireproofing material is impractical for large equipment such as surge bullets.*

### 6.3 Instrumentation, Control, and Power

The following requirements shall apply to all components of those systems that are located in or above a fire-hazardous zone.

- 6.3.1 Valves used for EIVs that are associated with automated Emergency Shutdown Systems (see [SAES-B-058](#)) and that are located in or above fire-hazardous zones shall be certified fire-safe per [SAES-L-108](#). Therefore, EIV bodies need not be externally fireproofed.

Double-acting actuators and the power and signal systems to them shall be listed as fireproof or be provided with fireproofing when located in or above a fire-hazardous zone. Components that require fireproofing include items such as:

- Emergency isolation valve actuators
- Shutdown cabinets
- Air reservoirs
- Interconnecting piping and tubing, and
- Other components of hydraulic, electrical (See 6.3.2), or pneumatic power systems that affect the operation of emergency shutdown (ESD) systems, isolation systems, depressurization systems, or deluge or spray systems.

*Commentary Note:*

*Note that atmospheric storage tank nozzle valves inside of diked areas are not considered EIVs so their actuators do not require fireproofing.*

- 6.3.2 Where an EIV actuator is driven to the fail-safe position by a spring, use of fireproof EIV system components and fireproofing of the actuator are not required. A fusible plug or link shall be installed within 1 m of the actuator to allow the valve to fail safe if a fire involves the actuator.
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- 6.3.3 Power systems and instrument signal cables to non-spring return electrical power-operated EIVs that pass through fire-hazardous zones or that power and control EIVs in fire-hazardous zones shall meet the following:
- a) Power cables shall be inherently fireproof to meet UL 2196 fire test procedure for 20 minutes, BS 6387 (CW, SW, or ZW), or other criteria accepted by the Chief Fire Prevention Engineer. External fireproofing is not acceptable.
  - b) Instrument cables shall meet Group 6 fireproof cable criteria of [34-SAMSS-913](#) or other criteria accepted by the Chief Fire Prevention Engineer.
  - c) Fireproof cables are required when crossing any fire-hazardous zone, no matter what generates that fire-hazardous zone.
  - d) The cable trays or other supports for such cables in fire-hazardous zones shall be made of stainless steel (see [SAES-P-104](#)), but otherwise do not require fireproofing.
  - e) Power and instrument cables, junction boxes and other utilities shall be routed outside fire-hazardous zones as much as possible.
- 6.3.4 For new construction, EIV actuators that require fireproofing shall be delivered to the field with shop-applied intumescent fireproofing complying with [21-SAMSS-014](#). For repair or replacement of existing valve actuator fireproofing systems (boxes or blankets), [21-SAMSS-010](#) shall be met. All actuator fireproofing shall comply with its respective specifications for at least 20 minutes when subjected to a test furnace environment in accordance with UL 1709 or an equivalent fire test procedure as modified by [21-SAMSS-014](#) / [21-SAMSS-010](#) and accepted by the Chief Fire Prevention Engineer.
- 6.3.5 Pneumatic and hydraulic instrument lines which are stainless steel tubing (ASTM Types 304, 316, 321) do not require fireproofing.

#### 6.4 Long Bolts

Any piping components, valves, valve actuators, or other equipment located in a fire-hazardous zone and containing flammable or combustible liquids, combustible gas, or potentially toxic material, and having exposed bolts of 75 mm or greater length between flanges, shall be protected with flame impingement shields per Standard Drawing AC-036404.

## 7 Fireproofing Performance Criteria

- 7.1 Dense concrete meeting the material requirements of Section 8 and applied with a minimum thickness of 50 mm is accepted as complying with the performance requirements for fireproofing without further testing. Dense concrete is the preferred fireproofing for onshore facility structures and supports because of its proven economy, durability, and effectiveness in hydrocarbon fires.
- 7.2 The minimum thickness of fireproofing materials for structural members and vessel supports, other than qualifying dense concrete, shall be installed with a thickness 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. All materials and methods of fireproofing shall also be listed to meet the ASTM E119 Hose Test. The fireproofing manufacturer shall also demonstrate that there is no peel-back at the edges or terminations of the fireproofing in a fire situation for the intended application. Certified test reports shall be submitted to the Chief Fire Prevention Engineer for his approval. Refer to Appendix 1 for more information.

## 8 Materials and Installation

- 8.1 Dense Concrete
- 8.1.1 Dense concrete shall meet [SAES-Q-001](#) and [09-SAMSS-097](#). Hold points for inspection of items such as surface preparation or reinforcement shall be discussed with and agreed to by the Manager, Inspection Department, Dhahran, prior to concrete placement.
- 8.1.2 Minimum dense concrete cover of steel substrate or reinforcing shall be not less than 50 mm. See Saudi Aramco Standard Drawing [AD-036711](#).
- 8.1.3 Dense concrete aggregate shall comply with [09-SAMSS-088](#).
- 8.1.4 All openings between fireproofing and substrate shall be fully sealed.
- 8.1.4.1 Cap rings, top hats, or similar shields shall be used at all metal-to-concrete interfaces to prevent water intrusion. Where it is not mechanically possible to provide cap rings, metal-to-concrete interfaces shall be caulked with a butyl rubber, silicone, or acrylic caulking compound.
- 8.1.4.2 Bottom metal-to-concrete interfaces at support rings, etc., shall be provided with openings to permit drainage of any water that may accumulate beneath the fireproofing material.
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## 8.2 Proprietary Fireproofing (including intumescent epoxy mastics and lightweight concretes)

8.2.1 Proprietary fireproofing shall be approved by the Chief Fire Prevention Engineer. The material shall be applied in a manner approved by the fireproofing manufacturer and by the Manager, Inspection Department, Dhahran.

*Commentary Note:*

*Submit qualifying documentation to the Chief Fire Prevention Engineer for approval. Refer to Appendix 1 for a list of proprietary fireproofing materials that have been accepted for various applications and used in Saudi Aramco facilities.*

8.2.2 Application of intumescent mastics or other approved proprietary fireproofing shall be performed only by personnel trained and certified by the material manufacturer.

8.2.3 Application shall be made in strict accordance with the manufacturer's guidelines regarding ambient temperature, storage temperature, materials, proportioning, and mixing.

8.2.4 Quality control procedures and hold points for inspection of surface preparation and reinforcement shall be approved by the Manager, Inspection Department, Dhahran.

## 8.3 Process Insulation

Vessels, exchangers, and equipment externally insulated for process reasons shall be considered to be fireproofed if the process insulation per [SAES-N-001](#), as a composite system, satisfies the fireproofing performance standards given in Section 7.

## 8.4 Surface Preparation

Steel surfaces that are to be insulated per 8.3, fireproofed with cementitious materials or covered with intumescent or other proprietary fireproofing such as lightweight concrete, shall be coated in accordance with [SAES-H-101](#), APCS-1B.

The surface preparation and coating system specified shall be referenced on all applicable construction drawings.

## 8.5 Top-Coating of Cementitious Fireproofing

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- 8.5.1 All cementitious fireproofing (whether dense or lightweight concrete) shall be provided with a top coat under any of the following conditions:
- When top-coating is required by the manufacturer.
  - When fireproofing is installed within 3 m vertically from grade.
  - When fireproofing is installed on equipment that is protected by a fixed firewater spray or deluge system.
  - When fireproofing is installed below atmospheric drains or vents that are used during normal operations.

8.5.2 When cementitious fireproofing is to be provided with a top coat, the following shall apply:

- The surface shall be dry, and loose contaminants shall have been removed by brushing with a stiff bristle brush and vacuuming.
- Fireproofing must be fully cured in accordance with the manufacturer's technical requirements, prior to top-coat application.
- First top coat, Saudi Aramco Stock Number 1000194629 shall be thinned 10% to 15% and applied to a dry-film thickness of 50 to 90 micrometers.
- Second top coat, Saudi Aramco Stock Number 1000194797 shall be applied to dry-film thickness of 75 to 125 micrometers.

#### 8.6 Top-Coating of Intumescent Epoxy Mastic Proprietary Fireproofing

Intumescent epoxy mastic and other noncementitious proprietary fireproofing shall be top-coated when it is required by the fireproofing manufacturer.

8.6.1 Fireproofing must be clean, dry, and free of contaminants prior to top-coating.

8.6.2 Fireproofing must be cured in accordance with the manufacturer's recommendations prior to top-coating.

8.6.3 Top-coating of Saudi Aramco Stock Number 1000194797 or 1000194960 shall be applied to a dry-film thickness of 75 to 125 micrometers.

8.6.4 Top-coating for proprietary fireproofing other than an intumescent epoxy mastic shall be approved by the fireproofing manufacturer and the Chief



Fire Prevention Engineer. The coating shall be applied in a manner approved by the fireproofing manufacturer and by the Manger, Inspection Department, Dhahran.

**Revision Summary**

29 June, 2005

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

## Appendix 1

**Ordinary dense concrete is the preferred fireproofing of structures and supports because of its proven economy, durability, and effectiveness in hydrocarbon fires.**

*However, for some applications, alternative proprietary fireproofing materials may be justified. This listing is intended to provide useful information on the available proprietary fireproofing materials to requisition originators and others responsible for the development and evaluation of bids. This is not intended to list all acceptable materials, nor are requisition originators restricted to the products of manufacturers or vendors on this list. Fireproofing may be purchased from any qualified source that can comply with the mandatory requirements. Verification of compliance shall be the responsibility of the requisition originator, and approval shall be received from the Chief Fire Prevention Engineer for each product. See Section 8 for requirements.*

The proprietary fireproofing materials below have been found to be technically acceptable and have been used in Saudi Aramco facilities:

Material	Manufacturer	Local Material Supplier
CHARTEK 4, & 7 (Intumescent Epoxy Mastic)	International Coatings, Ltd.	Khalifa A. Al Gosaibi Group PO Box 222 Dammam 31411 Phone: (03) 847-4444 x 122 or x 114 Fax: (03) 847-1854 e-mail: kat@algosaibi.com.sa Website: www.chartek.com Licensed Installers are: 1) Faisal S. Al-Naimi, SA Contr. Code 1641 (see contact information below) 2) Global Suhaimi, SA Contr. Code 1093 Phone: (03) 857-1132 Fax: (03) 857-7246 3) Tasqeef, SA Contr. Code 7008 Phone: (03) 859-4649 Fax: (03) 859-1548
THERMO-LAG 440 (Intumescent Epoxy Mastic)	Thermal Science, Inc.	Yogesh Harnal PO Box 12852 Dubai, UAE Phone: 971 (09) 211-966 Fax: 971 (04) 238-600 Website: www.nu-chemusa.com
PITT-CHAR XP (Intumescent Epoxy Mastic)	PPG Industries, Inc.	Saud Khlawi PO Box 620657 Amman, Jordan Phone: 962 6 477-3746 Fax: 962 6 477-0497 email: ppgme@go.com.jo Website: www.ppg.com/ppgaf/pittchar
FENDOLITE MII (Lightweight Concrete)	Mandoval Coatings, Ltd.	Faisal S. Al-Naimi Est. PO Box 30019 Al-Khobar 31952 Phone: (03) 857-7054 / 858-1384 Fax: (03) 857-9337 [Installs Monokote PK-150, Chartek 4 & 7, Fendolite MII ] Website: www.faisalalnaimi.com
AVIKOTE AV 800 (Replaces MONOKOTE PK-150) (Lightweight Concrete)	WR Grace & Co.	Arabian Vermiculite Industries PO Box 7137 Dammam 31462 Phone: (03) 847-1450 Fax: (03) 857-1575 e-mail: husseinfawaz@avi.sa.com Websites: www.avi@aiv-sa.com Licensed Installer is: Faisal S. Al-Naimi, SA Contr. Code 1641 (see contact information above)

Proprietary fireproofing materials that have been found to be technically acceptance and used in Saudi Aramco facilities for protection of VALVE ACTUATORS (Section 6, SAES-B-006):

Material	Manufacturer	Local Material Supplier
K-MASS™ (Meets 6.3.4)	Thermal Designs, Inc.	Saudi Arabian Dev. Co. Ltd. PO Box 20598 Khobar 31952 Tel: (03) 887-0340/ 882-8390 Fax: (03) 882-6791 e-mail: mas@sadco.com website: www.sadco.com
FR Coating™ (Meets 6.3.4)	MOV Limited	MOV Limited #503, 812-1 Hyomoon Dong, Buk Gu, Ulsan City, Korea Tel: (82) 52-288-5052 Fax: (82) 52-288-5453 e-mail: mov@mov.co.kr website: www.mov.co.kr

Specify Only for Repair and Replacement of Existing Actuator Enclosures and Blankets and Fire Protection System for Existing Cables in Trays (NOT FOR NEW CONSTRUCTION):

Material	Manufacturer	Local Material Supplier
DARMATT & DARMATT J120	Abahsain Cope S & A Ltd.	Abahsain Cope S A Ltd. PO Box 38994 Dhahran-Doha 31942 Tel: (03) 859-5912 Mobile: (050) 993-0319 Fax: (03) 857-1570 Email: abclope@zajil.net Contact Person : Syed Asher Ali (Sales Engineer) <a href="http://www.darchem.co.uk/">http://www.darchem.co.uk/</a>
Actuator Enclosure (RIMAGUARD)	Riva & Mariani	A.A. Abu Bushait & Partners Co. PO Box 1670 Dammam Tel: 827-1432 / 826-4422 Fax: 826-2855 e-mail: bushait@sahara.com.sa
Actuator Enclosure (CERABOARD)	Thermal Ceramics	Binzagr Factory For Insulation PO Box 179 Rahima 31941 Tel: (03) 668-1113 Fax: (03) 667-2580
Firemaster Cable Tray System	Thermal Ceramics	Faisal S. Al-Naimi Est. PO Box 30019 Al-Khobar 31952 (see contact information above)