



Engineering Standard

SAES-B-060

15 March 2006

Fire Protection for Piers, Wharves and Sea Islands

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Saudi Aramco DeskTop Standards

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1 Scope

This Standard defines the minimum mandatory safety requirements governing the design and installation of piers, wharves, and sea islands.

Exception:

Dry cargo, maintenance, and recreational piers are not included.

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, 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 of the Loss Prevention 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 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
Requirement*

Saudi Aramco Engineering Standards

<i>SAES-A-103</i>	<i>Discharges to the Marine Environment</i>
<i>SAES-B-005</i>	<i>Spacing and Diking for Atmospheric and Low-Pressure Tanks</i>
<i>SAES-B-006</i>	<i>Fireproofing in Onshore Facilities</i>
<i>SAES-B-009</i>	<i>Fire Protection and Safety Requirements for Offshore Production Facilities</i>
<i>SAES-B-014</i>	<i>Safety Requirements for Plant and Operations Support Buildings</i>
<i>SAES-B-017</i>	<i>Fire Water System Design</i>
<i>SAES-B-018</i>	<i>Air Foam Systems for Storage Tanks</i>
<i>SAES-B-019</i>	<i>Portable, Mobile, and Special Fixed Firefighting Equipment</i>
<i>SAES-B-054</i>	<i>Access, Egress, and Materials Handling for Plant Facilities</i>
<i>SAES-B-055</i>	<i>Plant Layout</i>
<i>SAES-B-058</i>	<i>Emergency Isolation, Shutdown, and Depressuring</i>
<i>SAES-B-063</i>	<i>Aviation Obstruction Marking and Lighting</i>
<i>SAES-B-067</i>	<i>Safety Identification and Color-Coding</i>
<i>SAES-B-068</i>	<i>Electrical Area Classification</i>
<i>SAES-J-505</i>	<i>Combustible Gas and Hydrogen Sulfide in Air Detection Systems</i>
<i>SAES-J-601</i>	<i>Emergency Shutdown and Isolation Systems</i>
<i>SAES-L-008</i>	<i>Selection of Valves</i>
<i>SAES-L-012</i>	<i>Design of Piping Systems Inside Plant Areas</i>
<i>SAES-L-015</i>	<i>Design of Piping on Offshore Structures</i>
<i>SAES-M-005</i>	<i>Design and Construction of Fixed Offshore Platforms</i>
<i>SAES-M-100</i>	<i>Aramco Building Code</i>
<i>SAES-P-114</i>	<i>Power System and Equipment Protection</i>
<i>SAES-P-116</i>	<i>Switchgear and Control Equipment</i>
<i>SAES-P-123</i>	<i>Lighting</i>

SAES-Q-001 *Criteria for Design and Construction of Concrete Structures*

SAES-S-020 *Industrial Drainage and Sewers*

Saudi Aramco Materials System Specifications

08-SAMSS-003 *Oil Suction and Discharge Hoses for Dock Tanker Loading*

21-SAMSS-010 *Fireproofing for Valve Actuator Systems*

3.2 Industry Codes and Standards

National Fire Protection Association (NFPA)

NFPA 11 *Low-Expansion Foam*

NFPA 15 *Fixed Water Spray Systems*

NFPA 16 *Installation of Deluge Foam-Water Sprinkler and Foam-Water Spray Systems*

NFPA 25 *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*

NFPA 72 *National Fire Alarm Code*

American Society for Testing and Materials (ASTM)

ASTM E84 *Surface Burning Characteristics of Building Materials*

American Petroleum Institute (API)

API RP 2003 *Protection Against Ignitions Arising Out of Static, Lightning and Stray Currents*

American National Standard Institute (ANSI) / National Electrical Manufacturers Association (NEMA)

ANSI / NEMA Z535.1 *Safety Color Code*

ANSI / NEMA Z535.2 *Environmental and Facility Safety Signs*

ANSI / NEMA Z535.3 *Criteria for Safety Symbols*

ANSI / NEMA Z535.4 *Product Safety Signs and Labels*

ANSI / NEMA Z535.5 *Accident Prevention Tags (for Temporary Hazards)*

Military Specification

MIL-W-25038

*General Specification for High Temp, Fire
Resistant, and Flight Critical Electrical Wire*

Oil Companies International Marine Forum (OCIMF)

Design and Construction Specification for Marine Loading Arms

International Safety Guide for Oil Tankers & Terminals

Commentary Note:

OCIMF references are available via:

*Oil Companies International Marine Forum (OCIMF)
27 Queen Anne's Gate, London, SW1H 9BU
Tel: 44 171 654-1200
Fax: 44 171 654-1205
e mail: ocimf@compuserve.com
website: <http://www.ocimf.com>*

Underwriters Laboratories, Inc. (UL)

UL 162

*Standard for Safety Foam Equipment and Liquid
Concentrates*

4 Definitions

AFFF: Aqueous Film-Forming Foam consisting of a fluorinated surfactant with a foam stabilizer and diluted with water to 3% solution. The solution is used to extinguish fires involving combustible and flammable liquids. AR-AFFF refers to alcohol-resistant AFFF foam that contains a gelling agent that helps to prolong its film-forming characteristics.

Approved: Meets United States Coast Guard Regulations and/or the International Convention for Safety of Life at Sea (SOLAS).

Berth: A space where a ship is tied when at a pier, wharf, or sea island.

Bollard: A post on a wharf or pier used to fasten mooring lines of ships.

Pier: A structure, usually of greater length than width, and projecting from the shore into a body of water.

Sea Island: A platform located some distance from shore in navigable waters and accessible for loading operations by large tankers.

Wharf: A structure having a platform built along and parallel to a body of water.

5 General

5.1 Lifesaving devices

- 5.1.1 Each berth shall be equipped with at least three approved ring life buoys, as specified by SAMS 21-590-200. One ring life buoy shall be installed at each set of mooring bits or bollards. One ring life buoy shall be installed at the gangway location.
- 5.1.2 Each ring life buoy shall be equipped with an approved automatic electric water light. The water light shall be attached to the ring buoy with a 1 to 2 m lanyard. The water light shall be mounted on a bracket adjacent to the ring life buoy such that when the ring life buoy is cast loose, the water light will pull free of the bracket.
- 5.1.3 Manned offshore sea islands shall be provided with approved life jackets, life rafts, and escape capsules that meet Section 4.19 of SAES-B-009.

5.2 Lighting

- 5.2.1 Normal and emergency task lighting shall be provided for hose, loading arm, and manifold areas, slops systems, fire pump and foam systems areas, and mooring bits or bollards to meet Section 4.2, SAES-B-009 and SAES-P-123.
- 5.2.2 Normal and emergency egress lighting shall be provided for the gangway area and escape routes to meet SAES-B-009 and SAES-P-123.
- 5.2.3 Electrical area classification shall meet SAES-B-068.

5.3 Signs

- 5.3.1 "No smoking/No Naked Light" signs shall be posted in Arabic and English in all areas handling hydrocarbons. Smoking shall be permitted only in designated locations. These areas shall be posted with signs indicating that smoking is permitted only in these areas.
- 5.3.2 Signs shall be posted showing emergency escape routes from all berth areas from which escape routes are not obvious.
- 5.3.3 All permanent and temporary safety signs and symbols shall meet ANSI/NEMA Z535.1 - Z535.5 and SAES-B-067.

5.4 Marine Aids to Navigation and Aviation Obstruction Marking

- 5.4.1 Marine navigation lights and horns shall be provided in accordance with
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the requirements of SAES-M-005.

- 5.4.2 Structures over 60 m in height shall be provided with aviation obstruction lighting in compliance with SAES-B-063.

6 Pier Construction

- 6.1 The transfer of hydrocarbons over a dock face using hoses shall be permitted in new or renovated facilities only where the facility handles vessels or barges under 5000 DWT. All new or renovated facilities handling vessels larger than 5000 DWT shall be designed using loading arms. Refer to Section 9 for other loading arm requirements.
- 6.2 Piers, wharves, sea islands, and other offshore loading facilities shall be of noncombustible or fire-resistive construction as defined by SAES-M-100.
- 6.3 Pier decks shall be reinforced concrete, or equivalent construction, to afford a 4-hr fire resistance rating per ASTM E84. Concrete piers shall meet SAES-Q-001.
- 6.4 Use of subway grating or similar open construction in decks shall be minimized, since, in major oil release and/or fire situations, such deck areas rapidly become untenable. Any subway grating used shall be steel. Solid steel decking protected by underside water sprays is required for escape routes (See 6.5).
- 6.5 Escape routes shall have solid steel decking at least 3 m wide and shall otherwise meet SAES-B-054. Secondary escape routes may be via an adjacent berth. Escape paths shall be clearly marked for easy identification in an emergency. Escape routes shall be provided with a weatherproof first aid cabinet.
- 6.6 When used on the underside of the pier deck, fenders, vapor barriers, moisture shields, coatings, or finishes shall conform to the definition of noncombustible or limited combustibles having a flame spread rating of less than 25 per ASTM E84.
- 6.7 Provision shall be made to limit the spread of spilled hydrocarbon under the waterfront facility and to facilitate its removal or treatment. This may consist of floating booms or bulkheads at water level depending upon the specific design of the facility, current and tidal effects, and relative cost and efficacy.
- 6.8 All buildings or rooms shall be of noncombustible construction and shall meet the requirements of SAES-B-014.
- 6.9 Where elevators are installed to access elevated loading observation areas, they shall be paired with a shielded staircase for emergency egress in the event structural damage prevents the use of the elevator.
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- 6.10 Where vessels are expected to come next to and be secured to the pier, a fendering system designed for this purpose shall be provided. These systems shall meet 6.6.

7 Drainage

- 7.1 Areas subject to hydrocarbon spills or drainage shall be drained via sealed catch basins per SAES-S-020. In facilities where onshore type designs are not practicable, an offshore design that meets SAES-B-009, Section 4.4 shall be used.
- 7.2 Areas around loading arms and manifolds shall be curbed and sloped a minimum of 1:65 (1.5%) to dedicated catch basins.
- 7.3 Collection sumps, if provided, shall have pressure/vacuum vents and automatic pump-out facilities, and shall be tightly covered. The vent shall discharge a minimum of 3 m above any platform or equipment within a horizontal distance of 15 m. The atmospheric end of the vent shall point upward and shall not be provided with gooseneck, raincap, T-section, or flame arrestor. The vent end shall be located on the periphery of facilities at a predominately downwind location. Prevailing wind direction shall be based on a wind rose diagram via the Chief Environmental Engineer, Environmental Engineering Division, Environmental Protection Department.
- 7.4 For crude oil and other flammable liquids, as defined by paragraph 4.0 of SAES-B-005, loading arms shall have a drain through valved connections to the sump.
- 7.5 LPG loading arms shall have a drain to a closed system that is either vented to a vapor recovery system or to a flare system.
- 7.6 All waste discharges shall comply with SAES-A-103.

8 Emergency Isolation

- 8.1 Emergency isolation valves shall be installed per SAES-B-058 and SAES-J-601.
- 8.2 An emergency isolation valve (EIV) is required for each loading/unloading hose and at the base of each riser for a loading arm at a berth.
- 8.3 An EIV is required on each hydrocarbon line at the shoreside entry to a pier, wharf, or at the entry point of an underwater pipeline feeding an offshore loading facility.
- 8.4 Quick-release valves and connections for loading arms/hoses and quick-release devices for hawsers shall be provided where specified and approved by the
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Proponent Operating Department.

- 8.5 An audible/visual alarm shall provide personnel in the control room, at the berth face, and on board the ship with notification that an ESD or emergency release has been initiated. The signal shall alert control room operators so that they can monitor and take appropriate action pertaining to disconnecting of loading arms and release of hawsers.
- 8.6 Push/pull buttons shall be located in the vicinity of the berth manifold, in a safe (local-remote) location (refer to SAES-B-058), and in the control room.
- 8.7 Each loading arm shall be designed such that the emergency release components remain connected to the ship's manifold. When an emergency release is activated, the action of the counterweights shall return the loading arm to the stored position whether full or empty.
- 8.8 A communication system shall be provided between the ship, loading operation points, and the onshore shipping pump control room to allow coordination of normal loading activities and emergency response.
- 8.9 All emergency isolation valves shall meet paragraph 7.5 of SAES-L-008.

9 Piping, Loading Arms, and Cargo Hose

- 9.1 Product piping shall meet the requirements of SAES-L-012 and SAES-L-015, as applicable.
- 9.2 Flexibility of piping shall be analyzed to ensure that motion of the pier or wharf structure resulting from wave action, currents, tides, or the mooring of vessels will not subject the piping to excessive strain.
- 9.3 Swivel joints shall be permitted to be used in piping to which hoses are connected and for loading arm transfer systems, provided that the design is such that the mechanical strength of the joint will not be impaired if the packing materials should fail due to exposure to fire.
- 9.4 Articulated swivel joint loading arms shall be constructed of steel pipe and shall be counterbalanced for the empty condition.

Exception:

Loading arms with emergency release shall meet 8.7.

- 9.5 Loading arms shall be capable of accommodating the combined effect of change of draft and change in tide on all vessels that the facility is designed to load.
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9.6 Loading arms shall be equipped with an overtravel alarm system capable of indicating when the acceptable envelope of range and drift conditions is being exceeded and shutting down the loading system per Design and Construction Specification for Marine Loading Arms (OCIMF).

9.7 Cargo Hoses

9.7.1 Cargo hoses shall meet the requirements of 08-SAMSS-003.

9.7.2 Hoses shall be supported to avoid kinking and damage from chafing.

10 Static Electricity and Stray Currents

10.1 Guidance in the prevention of ignition due to incendiary arcs caused by static electricity and stray currents is provided in API RP 2003 and in the International Safety Guide for Oil Tankers & Terminals (OCIMF).

10.2 All isolated sections of piping or other equipment shall be grounded. Product piping shall be connected to a ground run into the water and connected to a suitable grounding plate. Also refer to SAES-Q-001, 7.5.

10.3 Insulating flanges shall be provided at the shore end of the pier or wharf and at the loading arm or product hose.

11 Access for Operation, Maintenance, and Firefighting

11.1 Stairways and access platforms shall be provided to allow access to operating valves and instruments per SAES-B-054.

11.2 Where provided, roadways on piers and wharves shall be designed for one-way traffic. Suitable traffic controls shall be installed and passing lanes provided at suitable intervals to prevent the necessity of backing to resolve conflicts.

11.3 Transient trucks and automobiles shall be permitted to remain on piers and wharves only long enough to load and unload cargo. Parking areas shall be marked in such a way that vehicles can be promptly driven off the pier in the event of emergency. Minimum spacing shall meet SAES-B-055 to ensure access of firefighting equipment. A designated fire lane is required to be clearly marked.

Commentary Note:

The number of vehicles permitted upon the pier or wharf at any one time shall be limited to a number that enables free traffic flow. Parking of such vehicles shall not interfere with the access of emergency response equipment.

- 11.4 Each berth shall be served by a low-level platform suitable for boarding a pilot vessel or launch or retrieving a man overboard. Access to this platform shall be by stair.

12 Fireproofing

- 12.1 Fire-hazardous zone definition and the use of fireproofing shall be meet SAES-B-006. Protection via fixed water spray or fire water/foam monitors is preferred over fireproofing for piers, wharves, and sea islands; the extent of spray coverage vs. fireproofing shall be decided by consultation with the Chief Fire Prevention Engineer.

Commentary Note:

The layout and design of fireproofing or water sprays/monitors is critical for these facilities and specific to each situation. Design specifics shall be done in consultation with the Chief Fire Prevention Engineer and the Technical Advisor, Fire Protection Department or their representatives. See Section 13.

- 12.2 Actuators on EIVs in LNG/LPG service and located within 7.5 m of the dock face shall be fireproofed to meet 12-SAMSS-010.

Commentary Note:

This requirement is an additional precaution and does not imply the existence of a fire-hazardous zone, i. e., the loading arm/hose area of marine berths is not considered to be a fire hazardous zone. Fireproofing is not required for actuators of EIVs at marine berths except for those in LNG/LPG Service.

13 Fire Protection

- 13.1 The fire protection system design and equipment specifications shall meet SAES-B-017 and this Standard. Fire protection systems for facilities under the scope of this Standard shall be designed by qualified firms or individuals having expertise in fire protection systems. Drawings and calculations shall be submitted to the Chief Fire Prevention Engineer or his representative for review.

Commentary Note:

The number and type of fire protection devices required will vary with the size of the facility and the size and number of vessels using it. General guidance is given in Table 1 of this Standard and Table 1 of SAES-B-019. Design specifics shall be done in consultation with the Chief Fire Prevention Engineer or his representative.

- 13.2 All designs shall facilitate frequent inspection, testing, and maintenance of protection systems as described in NFPA 25. Commissioning and testing procedures shall be submitted to the Chief Fire Prevention Engineer or his
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representative prior to the time of the request to inspect for mechanical completion.

- 13.3 Piers, wharves, and sea islands shall meet process area requirements as defined in SAES-B-017. Dedicated fire water systems shall be provided; process and utility water shall not be provided through the fire water system.
 - 13.4 Where roadway access is provided, Type 509-K fire hydrants (Refer to SAES-B-017, Figure 1) shall be located on 45 m (150 ft) centers in the berth area. Hydrant spacing along approach trestles shall be on 90 m to 120 m (300 ft to 400 ft) centers. Type 509-G hydrants shall be used on the approach trestle.
 - 13.5 At least one Type 509-E hydrant (Refer to SAES-B-017, Figure 1) or other valved outlet acceptable to the Chief Fire Prevention Engineer or his representative shall be installed at each end of each berth for hydrotest water and fire water back-up.
 - 13.6 Deck protection for loading arm, manifold, and metering skid areas shall consist of either pre-aimed fixed foam monitors or foam/water spray heads. These shall be designed to provide a minimum discharge density of at least 0.10 L/m²s (0.15 gpm/ft²) sprayed upon the projected area.
 - 13.7 Underdeck protection shall be provided where there is the probability of a fire involving spilled hydrocarbons on the water surface. While such spills may be washed away by tidal currents at small facilities, at other facilities the presence of larger marine vessels will reduce the effectiveness of tidal washing. Protection may be in the form of fixed foam water spray systems or pre-aimed fire monitor nozzles connected to a foam proportioning system. These shall be designed to provide a minimum discharge density of at least 0.10 L/m²s (0.15 gpm/ft²) based upon the projected area. Actuation shall be by manually operated valves located in a protected or shielded area which will remain accessible in the event of a discharge and or ignition of flammable liquids on the sea surface.
 - 13.8 Protection of the ship's manifold area shall be provided by monitors at the berth face. Where, due to the size of vessels serviced, monitors must be elevated, monitors shall be remotely controlled. Either electric or hydraulically remote-controlled monitors are acceptable.
 - 13.8.1 The control station for remotely controlled monitors shall be located at least 45 m (150 ft) from the berth face at a point which provides a clear view of the berth and manifold areas.
 - 13.8.2 If hydraulic systems are used for remotely operated monitors, shielding from radiant heat or protection within a water spray envelope shall be provided.
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Commentary Note:

Flexible hoses are critical components of the system. Since hydraulic oil in these circuits is typically not circulating, the oil will quickly vaporize if exposed to high radiant heat loads or direct flame impingement and remote control of the monitor will be lost. For that reason, an electric system is preferred.

- 13.8.3 If electric systems are used for remotely operated monitors, mineral-insulated cable, MIL-W-25038, or other cable good for a two-hour hydrocarbon fire, as approved by the Chief Fire Prevention Engineer, shall be used. Factory-installed terminations for the cable ends shall be required.

Commentary:

Cable meeting the specifications above is very fireproof and durable if properly installed. The insulating material in many cables, especially MI cable, is hygroscopic, so unless the terminations are perfectly made, the cable will become useless because of moisture.

- 13.9 Oscillating monitors shall not be used.

- 13.10 Where more than one berth is installed, a central foam distribution system shall be incorporated (if foam is required). The foam supply shall be sufficient for 30 minutes to all users at the berth of the greatest demand.

Exception:

Foam systems are not required for all locations, i.e., LPG or LNG loading facilities do not require foam protection. Refer to SAES-B-017 and SAES-B-019, Table 1.

- 13.11 Foam systems shall be designed to utilize an AR-AFFF foam concentrate approved by the Manager, Fire Protection Department. Fixed foam/water spray systems shall be designed and installed per NFPA 16 and SAES-B-009, Section 4.10.
- a) Foam concentrates shall be UL 162 listed specifically for use with the foam concentrate proportioning equipment, the discharge devices, and other system components provided in the system and vice versa.
 - b) Type or brand of foam or components shall not be changed without approval from the Chief Fire Prevention Engineer and the Technical Advisor, Fire Protection Department, or their representatives.

Exception:

Where "listed" components are not manufactured, the components used shall be approved by the Chief Fire Prevention Engineer and the Technical Advisor, Fire Protection Department, or their representatives.

Commentary:

Metallurgy of foam concentrate tanks, concentrate piping, and nozzle configuration will be different depending on which type of foam concentrate is used. Refer to SAES-B-018, Section 8, for information on materials selection. Refer to NFPA 11 for general information on air-foams.

- 13.12 Exposure protection for loading arms, elevated pipe supports, and other structures shall consist of pre-aimed fire water monitors. A berth with up to 4 loading arms requires 2 monitors rated for 32 L/s (500 gpm) each. A berth with more than 4 loading arms requires 2 monitors rated for 63 L/s (1000 gpm) each.
- 13.13 Where slops tanks are located below the deck, they shall be protected by an automatically activated fixed water spray system covering the tank and any related pumps unless exempted in writing by the Chief Fire Prevention Engineer. Protection for pumps handling flammable liquids shall be at least 0.34 L/m²s (0.50 gpm/ft²) over an envelope extending 0.6 m (2 ft) from the periphery of the casing, seals and pump suction and discharge flanges.
- 13.14 Monitors shall be designed to operate at a nominal design nozzle gauge pressure of 690 kPa (100 psig).
- 13.15 Fixed water spray firefighting systems, when provided, shall be designed and installed per the requirements of NFPA 15.

14 Fire Water Pumps

- 14.1 Fire pumps and jockey pumps shall meet the process area requirements of SAES-B-017. The fire water system shall be supplied by pumps taking suction from the sea.

Exception:

Installations handling vessels less than 5000 DWT may use a shore-based fire water system as the primary supply, provided adequate flow and pressure are available to meet the berth demands. The requirements of SAES-B-017 regarding reliability must be met. This may require a looped supply main or the installation of an unspared diesel-driven pump on the marine facility.

- 14.2 Total installed fire water pumping capacity, not counting standby capacity, shall be no less than that required by the single greatest berth demand, including all fire protection system components protecting that berth, up to a maximum of 190 L/s (3000 gpm).
 - 14.3 Where a fire water system is provided from shore-based facilities, it may be used as an alternate means of providing pressurization of the marine facility fire water system. In such a case, the marine fire water system pumps shall be
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arranged to start immediately upon activation of any berth fixed fire protection system rather than waiting for a pressure drop to occur in the fire water system.

- 14.4 The fire water requirement for the marine facility shall be provided by two or more electric submersible or vertical pumps of equal size.
- 14.5 At least one-third of the electric-motor-driven capacity shall be supplied from a second bus capable of being tie-breaker-isolated from the normal electrical supply bus.
- 14.6 Diesel-driven standby fire pump capacity equal to at least the largest electrically driven fire pump is required and at least 50% of the total fire pumping capability (capacity plus standby) shall be diesel-engine-driven.
- 14.7 Diesel engines and diesel-driven pumps shall meet the requirements of SAES-B-017.
- 14.8 The fire water piping system shall meet the requirements of Section 4.8.6 of SAES-B-009.
- 14.9 Pump suction protection from marine growth shall meet SAES-B-017, 6.2.3.
- 14.10 The electrical supply for electrically-driven fire water and jockey pumps shall meet the requirements of SAES-B-017, SAES-P-114, and SAES-P-116.
- 14.11 For offshore platforms and piers exceeding 150 m (500 ft) in length, fire boat connections shall be provided to meet SAES-B-017, 12.12.

15 Portable Firefighting Equipment

- 15.1 Other firefighting equipment consisting of portable dry chemical extinguishers and wheeled dry chemical extinguishers shall be provided at each berth area. Refer to SAES-B-019 for general requirements.
- 15.2 Portable dry chemical extinguishers shall be spaced to limit running distance to not more than 15 m (50 ft).
- 15.3 Two nominal 150 lb wheeled dry chemical extinguishers shall be provided at each berth and shall be located such that there is one on each side of the berth.

16 Hose Reels

- 16.1 Live hose reels shall be provided at each berth and spaced such that together they cover all areas of the berth. Refer to SAES-B-017, Section 8.
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- 16.2 Hose reels at berths handling liquid hydrocarbons shall be equipped to deliver foam. Hose reels shall be capable of discharging either water or foam, with a push button mounted by each hose reel to start the foam concentrate pump.

Exception:

The hose reel foam-related functions and facilities shall not be provided for facilities that handle only LPG or LNG. Foam is not effective for LPG or LNG.

17 Fire and Gas Detection

- 17.1 Fire detection and Alarm systems, where provided, shall be designed and installed per the requirements of NFPA 72. The detectors shall:

- (a) Consist of listed cross-zoned UV/IR detectors.
- (b) Be arranged to scan the manifold area and loading arm areas.

Exception:

Manual deluge system activation with or without UV/IR detection may be provided in lieu of automatic activation, depending on size, complexity, congestion, products handled, manpower available, proximity to fire station, isolation capability, and concurrence by the Chief Fire Prevention Engineer.

- (c) Meet the requirements of SAES-B-014 for buildings and rooms.
- 17.2 Output shall be arranged to sound an alarm in the control room in the event of a single detection and to actuate the fire protection system in the event both zones are in alarm mode.
- 17.3 The need for a gas detection and alarm system and the exact location and number of gas detectors shall be determined by the designated representatives of the Operations Department; the General Supervisor, Process Instrumentation Division, P&CSD; and the Chief Fire Prevention Engineer.
- 17.4 Gas detection systems, where provided, shall meet the requirements of SAES-J-505.

Revision Summary

15 March 2006

Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with no other changes.

Table 1 – Fixed Fire Protection Guidelines for Hydrocarbon Loading Facilities

	Under 5000 DWT crude or liquid hydrocarbons	Over 5000 but Under 70,000 DWT crude or liquid hydrocarbons	Over 70,000 DWT crude or liquid hydrocarbons	Liquefied Natural /Petroleum Gas (LNG or LPG) only
Fixed foam monitors or foam-water spray systems	On each side of each berth to cover the dock-side manifold area, metering skid	On each side of each berth to cover the dock- side loading arm/ manifold area, metering skid	On each side of each berth to cover the dock-side loading arm/ manifold area, metering skid. On each side of each berth to cover the ship's manifold area (elevated with remote controls).	<i>Required for LNG/LPG loading areas only if bunkering is permitted at that berth. If bunkering is permitted, treat as hydrocarbon loading facility.</i>
Fixed water monitors or water spray systems	Slops tank and pump area	Pre-positioned for protection of structures on dock face. If access not possible, use water spray. Water spray for slops tank and pump	Pre-positioned for protection of structures on dock face. If access not possible, use water spray. Water spray for slops tank and pump.	On each side of each berth to cover the dock side manifold area, metering skid. On each side of each berth to cover the ship's manifold area (elevated with remote controls). Water spray for slops tank and pump.
International fire boat connections (Minimum) Number of connections and locations to be as required by the Chief Fire Prevention Engineer or his representative.	Two each at opposite ends of pier, wharf, or sea island.	Three each at opposite ends of pier, wharf, or sea island.	Four each at opposite ends of pier, wharf, or sea island.	Two each at opposite ends of pier, wharf, or sea island.
Underdeck foam protection	Single line of sidewall foam water sprinklers at berth face discharging toward vessel. Nozzles spaced at 3 m (10 ft) intervals	Manually-operated fixed foam/ water spray to cover the underdeck area beneath the manifold/loading arm area	Manually-operated fixed foam/water spray systems to cover the underdeck area beneath the entire berth area	Not required