

d) *System control requirements*

For machinery spaces, the system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be put automatically into action by a pressure drop in the system.

For vehicle spaces and ro-ro cargo spaces the pump or pumps are to be capable of being brought into operation by remote control from the same position at which the distribution valves are located.

**6.1.2 Equivalent water-mist fire-extinguishing systems**

Water-mist fire-extinguishing systems for machinery spaces and cargo pump rooms shall be approved by the Society.

**7 Automatic sprinkler, fire detection and fire alarm systems****7.1 Engineering specifications****7.1.1 General**a) *Type of sprinkler systems*

The automatic sprinkler systems shall be of the wet pipe type, but small exposed sections may be of the dry pipe type where, in the opinion of the Society, this is a necessary precaution.

b) *Automatic sprinkler systems equivalent to those specified in [7.1.2] to [7.1.4] shall be approved by the Society.***7.1.2 Sources of power supply**a) *Passenger ships*

There shall be not less than two sources of power supply for the sea water pump and automatic alarm and detection system. Where the sources of power for the pump are electrical, these shall be a main generator and an emergency source of power. One supply for the pump shall be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards, and shall be run to an automatic change-over switch situated near the sprinkler pump. This switch shall permit the supply of power from the main switchboard so long as a supply is available therefrom, and be so designed that upon failure of that supply it will automatically change over to the supply from the emergency switchboard. The switches on the main switchboard and the emergency switchboard shall be clearly labelled and normally kept closed. No other switch shall be permitted in the feeders concerned. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine it shall, in addition to complying with the provisions of item c) of [7.1.4], be so situated that a fire in any protected space will not affect the air supply to the machinery.

b) *Cargo ships*

There shall be not less than two sources of power supply for the sea water pump and automatic alarm and detection system. If the pump is electrically driven, it shall be connected to the main source of electrical power, which shall be capable of being supplied by at least two generators. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine, it shall, in addition to complying with the provisions of item c) of [7.1.4], be so situated that a fire in any protected space will not affect the air supply to the machinery.

**7.1.3 Component requirements**a) *Sprinklers*

- 1) The sprinklers shall be resistant to corrosion by the marine atmosphere. In accommodation and service spaces the sprinklers shall come into operation within the temperature range from 68°C to 79°C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30°C above the maximum deckhead temperature.

b) *Pressure tanks*

- 1) A pressure tank having a volume equal to at least twice that of the charge of water specified in this item shall be provided. The tank shall contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in one minute by the pump referred to in item c) 2) below, and the arrangements shall be provided for maintaining an air pressure in the tank such as to ensure that where the standing charge of fresh water in the tank has been used the pressure will be not less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank shall be provided. A glass gauge shall be provided to indicate the correct level of the water in the tank.

The tank is to be designed and built in compliance with the requirements for pressure vessels given in Ch 1, Sec 3.

- 2) Means shall be provided to prevent the passage of sea water into the tank.

c) *Sprinkler pumps*

- 1) An independent power pump shall be provided solely for the purpose of continuing automatically the discharge of water from the sprinklers. The pump shall be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.

- 2) The pump and the piping system shall be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 m<sup>2</sup> at the application rate specified in item b) 3) of [7.1.5]. The hydraulic capability of the system shall be confirmed by the review of hydraulic calculations, followed by a test of the system, if deemed necessary by the Society.
- 3) The pump shall have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and pipe shall be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in item b) 1) above.

#### 7.1.4 Installation requirements

##### a) General

Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing.

##### b) Piping arrangements

- 1) Sprinklers shall be grouped into separate sections, each of which shall contain not more than 200 sprinklers. In passenger ships, any section of sprinklers shall not serve more than two decks and shall not be situated in more than one main vertical zone. However, the Society may permit such a section of sprinklers to serve more than two decks or be situated in more than one main vertical zone, if it is satisfied that the protection of the ship against fire will not thereby be reduced.

Sprinkler heads installed to fulfil the provisions of Ch 4, Sec 5, [3.2.3] are not required to be solely dedicated to the windows and sidescuttles they are to protect, provided that the sprinkler heads protecting the room and having a spraying density of 5 l/(m<sup>2</sup> min) are arranged such that the window or sidescuttle is covered with the same spraying density and the relevant area is considered in the calculation as per [7.1.5].

- 2) Each section of sprinklers shall be capable of being isolated by one stop-valve only. The stop-valve in each section shall be readily accessible in a location outside of the associated section or in cabinets within stairway enclosures. The valve's location shall be clearly and permanently indicated. Means shall be provided to prevent the operation of the stop-valves by any unauthorized person.
- 3) A test valve shall be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section shall be situated near the stop-valve for that section.
- 4) The sprinkler system shall have a connection from the ship's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.

The automatic sprinkler fire detection and fire alarm system shall be an independent unit and therefore no other piping system shall be connected to it, except for the following:

- connections for feeding the system from shore-side sources, fitted with adjacent stop valves and non-return valves
- connection from the fire main as required above.

The valves on the shore filling connection and on the fire main connection shall be fitted with clear and permanent labels indicating their service. These valves shall be capable of being locked in the "closed" position.

- 5) A gauge indicating the pressure in the system shall be provided at each section stop-valve and at a central station.
- 6) The sea inlet to the pump shall, wherever possible, be in the space containing the pump and shall be so arranged that when the ship is afloat it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

##### c) Location of systems

The sprinkler pump and tank shall be situated in a position reasonably remote from any machinery space of category A and shall not be situated in any space required to be protected by the sprinkler system.

#### 7.1.5 System control requirements

##### a) Ready availability

- 1) Any required automatic sprinkler, fire detection and fire alarm system shall be capable of immediate operation at all times and no action by the crew shall be necessary to set it in operation.
- 2) The automatic sprinkler system shall be kept charged at the necessary pressure and shall have provision for a continuous supply of water as required in this Section.

##### b) Alarm and indication

- 1) Each section of sprinklers shall include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems shall be such as to indicate if any fault occurs in the system. Such units shall indicate in which section served by the system a fire has occurred and shall be centralized on the navigation bridge or in the continuously-manned central control station and, in addition, visible and audible alarms from the unit shall also be placed in a position other than on the aforementioned spaces to ensure that the indication of fire is immediately received by the crew.
- 2) Switches shall be provided at one of the indicating positions referred to in the previous item 1) which will enable the alarm and the indicators for each section of sprinklers to be tested.

3) Sprinklers shall be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 l/m<sup>2</sup>/minute over the nominal area covered by the sprinklers. However, the Society may permit the use of sprinklers providing such an alternative amount of water suitably distributed as has been shown, to the satisfaction of the Society, to be not less effective.

4) A list or plan shall be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance shall be available.

c) Testing

Means shall be provided for testing the automatic operation of the pump on reduction of pressure in the system.

## 8 Fixed fire detection and fire alarm systems

### 8.1 Engineering specifications

#### 8.1.1 General requirements

- a) Any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.
- b) The fixed fire detection and fire alarm system shall not be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.
- c) The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.
- d) Fixed fire detection and fire alarm systems with a zone address identification capability shall be so arranged that:
  - 1) means are provided to ensure that any fault (e.g. power break, short circuit, earth, etc.) occurring in the loop will not render the whole loop ineffective

Note 1: Loop means an electrical circuit linking detectors of various sections in a sequence and connected (input and output) to the indicating unit(s).

- 2) all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (e.g. electrical, electronic, informatics, etc.)
- 3) the first initiated fire alarm will not prevent any other detector from initiating further fire alarms, and
- 4) no loop will pass through a space twice. When this is not practical (e.g. for large public spaces), the part of the loop which by necessity passes through the space for a second time shall be installed at the maximum possible distance from the other parts of the loop.

#### 8.1.2 Sources of power supply

There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fixed fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in, or adjacent to, the control panel for the fire detection system.

The main (respective emergency) feeder shall run from the main (respective emergency) switchboard to the change-over switch without passing through any other distributing switchboard.

#### 8.1.3 Component requirements

##### a) Detectors

- 1) Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Society provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.
- 2) Smoke detectors required in stairways, corridors and escape routes within accommodation spaces shall be certified to operate before the smoke density exceeds 12,5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Society having regard to the avoidance of detector insensitivity or oversensitivity.
- 3) Heat detectors shall be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector shall operate within temperature limits to the satisfaction of the Society having regard to the avoidance of detector insensitivity or oversensitivity.
- 4) The operation temperature of heat detectors in drying rooms and similar spaces of a normal high ambient temperature may be up to 130°C, and up to 140°C in saunas.
- 5) All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

#### 8.1.4 Installation requirements

##### a) Sections

- 1) Detectors and manually operated call points shall be grouped into sections.

Note 1: Section means group of fire detectors and manually operated call points as shown in the indicating unit(s) required in item a) 3) of [8.1.5].

- 2) A section of fire detectors which covers a control station, a service space or an accommodation space shall not include a machinery space of category A. For fixed fire detection and fire alarm systems with remotely and individually identifiable fire detectors, a loop covering sections of fire detectors in accom-