Polski Rejestr Statków

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GUIDELINES FOR PERIODIC INSPECTIONS OF FIRE-EXTINGUISHING SYSTEMS AND APPLIANCES USED ON SHIPS

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GDAŃSK

Publication No. 29/I – Guidelines for Periodic Inspections of Fire-Extinguishing Systems and Appliances Used on Ships – October 2017 specifies the general principles, scope of work, test specifications, additional information – to be applied during periodical inspections of fire-extinguishing systems and appliances as well as the equipment posing fire hazard as required in *Part V – Fire Protection* of the *Rules for the Classification and Construction of Sea-going Ships*. This *Publication* is intended for PRS' Surveyors, as well as technical personnel of approved service suppliers providing services on ships classed with PRS.

This *Publication* takes into account IMO documents (IMO Assembly/MSC Committee resolutions and circulars), available on their website: www.imo.org.

The *Publication* was approved by the Ship Division Director on 1 October 2017.

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1 GENERAL

1.1 Application

1.1.1 This *Publication* is applicable to sea-going ships.

1.1.2 The present *Publication* specifies the guidelines for inspections of: fire divisions, escape routes, fire-extinguishing systems and appliances used in fire protection, as well as devices and equipment which constitute additional fire hazard, carried out during assignment, confirmation and renewal of the ship's class.

1.1.3 Intervals between periodical inspections and the scope of the inspections should be in accordance with the requirements specified in *Part I – Classification Regulations* of the *Rules for the Classification and Construction of Sea-going Ships.*

1.2 Definitions

For the purpose of the present *Publication*, the following definitions have been adopted:

Inspection – a set of activities relating to fire-extinguishing systems/appliances/ ship equipment, realized through checking technical documentation and carrying out appropriate examination, measurements and tests.

Close-up examination – a thorough visual examination of fire-extinguishing system, machinery or appliance usually being within Surveyor's reach.

Internal examination – a visual examination of machinery or appliance in dismantled condition, aimed at the assessment of their technical condition.

External examination – a visual inspection of machinery or appliance, without dismantling, for evidence of corrosion, wear, damage, to provide a general assessment of their technical condition, as well as to check the provision of access to enable their maintenance and proper operation, e.g. checking that extinguishing medium discharge nozzles are not obstructed.

Operation test – close-up examination of machinery or appliance under working conditions, combined with the measurements of essential operation parameters.

Hydraulic test – a pressure of the liquid medium is applied to the tested pressure vessel, cylinder, a component of the system, machinery or appliance.

Tightness test – a pressure of the liquid or gas medium is applied to the tested pressure vessel, cylinder, a component of the system, machinery or appliance.

Checking – examination in order to ascertain whether the basic parameters/information comply with the Rules requirements.

Approved service station – a service station approved by PRS in accordance with the requirements of *Publication No. 51/P – Procedural Requirements for Service Suppliers*.

2 ANNUAL INSPECTION

2.1 General

The following should be conducted:

.1 prior to inspection, the Surveyor should be informed by the ship Owner/master on any changes/alterations/modifications made to construction/fire-extinguishing systems/equipment/ appliances which are essential for ship fire safety since the latest inspection and on the event of fire that required the use of fire-extinguishing systems/portable fire-extinguishing equipment. If so, the Surveyor will perform acceptance/operation tests of such constructions/fire-extinguishing systems/equipment/appliances for compliance with the approved documentation;

.2 checking the operational readiness and maintenance of fixed fire-extinguishing systems, fire alarm systems and fire protection appliances. The Surveyor will check the records in ship documents relating to the required periodic inspections and maintenance of fire-extinguishing systems/appliances performed by the crew, performed in accordance with MSC.1/Circ.1432, as amended by MSC.1/Circ.1516;

.3 checking, if the required reports on periodic inspections/operation tests of fire-extinguishing systems and appliances performed by approved service stations are stored on the ship; for ships equipped with automatic sprinkler (water mist) systems, it should be checked that records on water quality testing*, performed in accordance with system manufacturer's guidelines, are maintained onboard, as specified in MSC.1/Circ.1516;

.4 checking that all valves/controls/other elements of fire-extinguishing system activation and elements essential for the systems operation, such as: stopping ventilation fans, closing the openings leading to spaces protected by gas fire-extinguishing system, closing the valves on engine/oil-fired boilers fuel supply pipes, stopping fuel/oil transport pumps, control of fire dampers in ventilation ducts, etc. are clearly marked by appropriate signs/ plates for identification and are indicated by plates with the symbol used on the *Fire Control Plan*;

.5 checking that fire-extinguishing systems control positions are provided with operating manuals;

.6 verification that signs/ plates for essential appliances/controls, system operating manuals and warning signs are made in the working language of the ship;

.7 checking the required spare parts for fire-extinguishing systems/appliances for their compliance with the manufacturer's recommendations;

.8 checking that combustible waste materials/garbage are not accumulated within accommodation area and that baskets/receptacles intended for combustible waste/garbage are made of non-combustible materials, have no openings and are capable of being tightly closed;

.9 verification that ship fire-fighting equipment, subject to replacement, such as: fire-extinguishers, fire hoses, fire-fighter's outfit, emergency escape breathing apparatus, etc. has appropriate approval certificate (MED Certificate – on ships subject to *SOLAS Convention* and flying the EU Member State flag, or Type Approval Certificate or other required certificate – on other ships);

.10 checking that the ship's worn-out and renewed furnishings, such as floor covering, draperies, curtains and other suspended textile materials, bedding components, etc. are provided with appropriate approval certificates;

.11 checking the calibration validity of such control and measuring instruments as pressure gauges, pressure control devices, weights, etc.;

.12 checking that NO SMOKING signs are provided on board the ship and that smoking areas have been designated as well as properly protected and marked;

.13 checking that the replaced fire-fighting personal protection means such as fire blankets, clothing, gloves, etc, are provided with asbestos-free declarations;

.14 checking that the materials and insulated construction components used during the recent alteration/modification such as ceiling panels, floor panels, wall lining panels, fore doors etc. are provided with asbestos-free declarations.

2.2 Technical Documentation of Fire Protection

The following should be conducted:

.1 verification that *Fire Control Plan* is: up-to-date, approved by Flag State Administration, exhibited in the ship and stored in a container at entrances outside the deckhouse;

.2 checking maintenance and safety operation documentation: *Fire Protection Systems and Appliances Maintenance Plan*, *Fire Training Manual*, *Fire Safety Operational Booklet*. Checking that the *Fire Protection Systems and Appliances Maintenance Plan* complies with the guidelines contained in MSC.1/Circ.1432, MSC.1/Circ.1516 and MSC.1/Circ.1318.

2.3 Fire Divisions and Fire Protection Constructions

* the water quality control system should cover assessment, once a quarter, of water quality in a header tank and in pump unit, according to manufacturer's guidelines, as stated in MSC.1/Circ.1432 amended by MSC.1/Circ.1516.

The following should be conducted:

.1 external examination of A and B Class fire divisions – checking the condition of insulation, the tightness of piping, ventilation ducts and cables penetrations, the tightness of closures of openings in the divisions fitted in:
- accommodation spaces, service spaces and control stations,
- machinery spaces and cargo pump-rooms,
- cargo spaces;

.2 external examination of fire protection constructions to verify that no alterations have been made to the enclosures of stairways and lifts, cabin balconies, ventilation systems, windows and sidescuttles and no combustible materials have been used;

.3 external examination of draught stops[1)];

.4 on passenger ships – external examination of main fire divisions to check the condition of insulation, divisions integrity, the tightness of closures of openings in the divisions;

.5 on passenger ships[2)] of a length 120m and above or having three or more main vertical zones – checking that safe areas have been designated;

.6 on passenger ships[3)] – checking the arrangement of onboard safety centre and the associated ventilation systems

.7 on gas tankers – external examination of wheelhouse doors and windows, external examination of windows and sidescuttles in superstructure and superstructure after bulkhead in cargo area as well as external examination of cargo handling control stations.

2.4 Fire Doors

The following should be conducted:

.1 external examination and operation test of closure of all doors in A and B fire class divisions;

.2 operation test of all self-closing fire doors (hinged and sliding doors);

.3 operation test of remote release of all fire doors designed to be permanently kept open, from control station and their closing from a position at both sides of the door;

.4 operation test of closure indication of all doors at the fire door indicator panel in control station;

.5 operation test of release mechanism allowing to automatically close the door in the event of disruption of the control system or central power supply;

.6 operation test of remote-released sliding door and checking the alarm signal;

.7 operation test of re-opening the remote-released sliding door designed to re-open upon contacting an object in its path;

.8 operation test of closing the fire doors fitted with hose ports[4)] after unreeling the fire hose (for passenger ships).

2.5 Means of Escape

The following should be conducted:

.1 examination of internal and external means of escape leading to liferaft and life boat embarkation stations – verification that ladders/steps/handrails/floor plates on escape routes are made of steel and they are properly secured, and that escape routes are not impeded by furniture, cleaning gear and other obstacles:
- in accommodation spaces, service spaces and control stations;
- in machinery spaces and cargo pump-rooms (where the crew are normally employed);
- in ro-ro cargo spaces/special category spaces;
- on open decks;

.2 examination of marking and lighting (supplied from the emergency source of power) of escape routes, emergency exits and assembly stations;

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1) Draught stops are tight barriers aimed at preventing the spread of smoke and fire, as well as preventing a draught of air containing oxygen from sustaining a fire in areas behind ceilings, panels or linings where this cannot readily be seen.

2) Applies to ships constructed on or after 1 July 2010.

3) Applies to ships constructed on or after 1 July 2010

4) Hose ports in fire doors should be fitted on ships constructed on or after 1 July, 2002.

.3 checking that no doors which require key to unlock them when moving in the direction of escape are along any designated escape routes;

.4 examination of overhead hatches which form escape routes from spaces to check whether the hatch can be opened from both sides;

.5 examination of lift trunks and lift cars to check the possibility of evacuation when the lift stops between exit levels in the event of power failure. Checking whether the lift car is fitted with an escape hatch and the lift trunk is provided with an emergency escape ladder;

.6 operation test of remote opening of any power operated watertight/fire doors fitted along escape route, as well as opening such doors manually in the event of power failure;

.7 verification that there are no dead-end corridors[5)] having a length of more than 7 m on the ship.

2.6 Fire Protection of Machinery Spaces

The following should be conducted:

.1 examination of machinery spaces – checking if the spaces are clean and properly maintained (no evidence of contamination, leakages, etc. by flammable products which may be a cause of fire);

.2 the operation test of: remote means of control provided for the opening and closing of the sky-lights and ventilation dampers in machinery casing, the release of smoke from the machinery space, the closure of the funnel and ventilation openings;

.3 operation test of the means of control for closing all openings leading to machinery spaces, such as: doors, manholes, ventilation heads and louvres;

.4 operation test of remote stopping inlet and exhaust ventilation fans;

.5 operation test of remote closing of: boiler supply fans, fuel transport pumps, lubricating oil and thermal oil circulating pumps as well as oil separators;

.6 operation test of remote closing of quick closing valves on oil fuel pipes of storage tanks, settling and daily service tanks, located in the machinery space above the double bottom;

.7 inspection of the fixed fire detection and fire alarm system;

.8 inspection of the fixed total flooding fire-extinguishing system;

.9 inspection of a fixed local fire-extinguishing system;

.10 checking the arrangement of the required fire-fighting equipment (portable and mobile fire-extinguishers, portable foam applicator units, emergency escape breathing devices, fog applicators[6)])

.11 checking that insulating materials (of ship sides, divisions, ceilings, casings, ventilation ducts, piping, etc.) in machinery spaces are provided with a suitable coating to protect such materials against the penetration of oil vapours.

2.7 Fire protection of galley spaces and pantries

The following should be conducted:

.1 internal examination of under ceiling space in galleys (through inspection dampers) – checking if they are free of grease and contamination;

.2 operation test of stopping mechanical ventilation provided in a galley space;

.3 checking that in pantries classified as accommodation spaces (not provided with cooking appliances) electrical cooking appliances (toasters, microwave ovens, induction heaters, etc.) with a power of more than 5 kW or electrically heated cooking plates and hot plates for keeping food warm of more than 2 kW and heating surface temperature above 150 °C have not been temporarily/permanently installed. Such pantries may be provided with coffee machines, dish washers heaters and water heaters with no uncovered hot surfaces, regardless of power;

.4 checking that in pantries classified as service spaces (provided with cooking appliances) electrically heated cooking plates and hot plates for keeping food warm of more than 5 kW have not been temporarily/permanently installed. Such pantries may be provided with coffee machines, dish washers and water heaters, regardless of power;

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5) In justified cases, dead-end corridors are permitted in spaces located above the lowest deck, provided that escape route from the dead-end corridor is a steel ladder leading to a deck above from which evacuation is possible

6) On passenger ships carrying more than 36 passengers, each machinery space of category A should be provided with at least 2 fog applicators

.5 checking that a galley space is provided with at least 1 Class B portable fire-extinguisher;
.6 checking that a galley fitted with deep-fat cooking equipment is provided with at least 1 Class F or K portable fire-extinguisher.

2.8 Fire Protection of Store-rooms for Paints and Flammable Liquids

The following should be conducted:
.1 examination of the store-room-checking that the room is clean and properly maintained;
.2 operation test of means of closing all openings;
.3 operation test of the room ventilation;
.4 operation test of fire-extinguishing system control;
.5 checking if a required portable fire-extinguisher is provided in the store-room/at the entrance to the store-room.

2.9 Fire Protection of Ro-Ro Spaces, Vehicle Spaces and Special Category Spaces (additional mark: RO-RO SHIP, RO-RO/ PASSENGER SHIP)

The following should be conducted:
.1 space examination – checking the marking of communication routes of at least 600 mm in width designated between the secured vehicles and escape routes;
.2 operation test of the means of closure of all openings leading to a space (stern and side shell doors, hatches, ventilation heads and louvres);
.3 operation test of the space ventilation. Checking the operation of alarm on the bridge indicating loss of the required ventilating capacity;
.4 operation test of remote operation of inlet air and exhaust ventilation fans;
.5 checking that electrical equipment, cables and electrical appliances do not pose sparking-related fire risk;
.6 checking that drain openings are fitted with grating to prevent debris from blocking the drain and plates prohibiting the drain openings from being covered or obstructed during loading the vehicles;
.7 operation test of gravity water discharge overboard from the space by flushing the space floor with fire hoses;
.8 operation test of remote operation of scuppers' discharge valves;
.9 checking that notice plates stating that scuppers discharge valves should be kept open, while the ship is at sea, are provided next to the valves remote operation;
.10 operation test of the space bilge system;
.11 inspection of the fixed fire detection and fire alarm system;
.12 inspection of a fixed fire-extinguishing system;
.13 checking that the ship is provided with a portable combustible gas detecting instrument;
.14 checking the arrangement of the required fire-fighting equipment (portable fire-extinguishers, portable foam applicator units, fog applicators).

2.10 Fire protection of cargo pump-room/cargo compressor rooms on tankers and gas tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, PRODUCT CARRIER B, CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:
.1 external examination of cargo pump-room/cargo compressor room/air locks – checking the tidiness and proper maintenance;
.2 external examination and operations test of closing all openings leading to the cargo pump-room/ cargo compressor room (doors, hatches, ventilation heads and louvres);
.3 external examination and operation test of the main external inlet and outlet openings of ventilations systems and operation test of remote shutting down of the inlet and exhaust ventilation fans;
.4 inspection of a fixed fire-extinguishing system;
.5 inspection of temperature monitoring system for pumps driven by shaft penetrating the pump-room bulkhead (cargo pumps, slop tank pumps, ballast pumps and tank cleaning pumps) – external examination of the system components, such as: control panel indicating that the setting point

is reached, temperature sensing devices, etc. and operation test of alarm signal by activation of one of the temperature sensing devices when the setting point is reached;

.6 checking the interlock between the cargo pump-room lighting and ventilation;

.7 inspection of the system for continuous monitoring of the concentration of hydrocarbon gases;

.8 operation test of bilge high-level monitoring devices/alarms;

.9 checking that the cargo pump-room/cargo compressor room is provided with at least 2 portable fire-extinguishers.

2.11 Water fire main systems

The following should be conducted:

.1 external examination of fire pumps, isolating valves, pipes which are likely to be damaged, fire hydrants, fire hose nozzles, fire hoses, fire hydrant boxes, fire hose reels, international shore connections, etc.;

.2 operation test of all fire pumps – checking the water flow and pressure, checking if each fire pump, including the emergency fire pump, can operate separately so that two fire jets at the required pressure can be supplied from different fire hydrants in any part of the ship;

.3 operation test of the emergency fire pump – checking the pump priming arrangement (for the pump situated above the summer load waterline), checking the water flow and pressure, checking the pump diesel engine drive (ventilation, fuel system, engine cooling system, exhaust gas discharge), checking the starting of the engine in its cooled condition;

.4 checking that there is adequate fuel supply in the diesel driven emergency pump fuel tank;

.5 operation test of the emergency fire pump water supplying capability through the water fire main pipes after closing the valves isolating the pipes in the machinery space;

.6 checking the marking and easy access to valves isolating pipes in the machinery space;

.7 checking the relief valve settings on all fire pumps;

.8 checking that all filters used in the system are free from debris and contamination;

.9 operation test of all shut-off/isolating valves of the fire-extinguishing system and all fire hydrants;

.10 checking that all fire hoses provided in the ship spaces are permanently connected to fire hydrants (on ships carrying more than 36 passengers);

.11 operation test of remote starting of one of the fire pumps from the navigation bridge (on ships assigned additional mark **AUT** and on passenger ships of less than 1000 gross tonnage);

.12 operation test of automatic operation of fire pump after opening a fire hydrant and on drop of pressure in the system (for permanently pressurized systems, on passenger ships of 1000 gross tonnage and above);

.13 operation test of pressure tank – checking water and compressed air replenishing (for permanently pressurized systems);

.14 checking the water pressure[7)] at the hydraulically most unfavourably situated fire hydrants during the operation of the required fire pumps and water supply by 2 nozzles;

.15 operation test of draining/anti-freezing systems for pipes subjected to freezing;

.16 operation test of fire hose nozzles and fire hoses – at least 20% of the total number of the nozzles and fire hoses provided on board should be subjected to the test. Checking that the nozzle sizes and types are correct;

.17 tightness test of selected fire hoses – at least 20% of the total number of fire hoses provided on board, at maximum pressure of the system, should be so selected to the test that all the hoses be tested within 5 years. The numbers of tested hoses should be entered in the *Fire Protection Systems and Appliances Maintenance Plan*. The test should be performed by an approved service supplier and the test report should include test pressure and hose serial numbers. The tightness test may be performed by ship's crew and witnessed by PRS Surveyor. During the test, the hose should be connected to a hydrant and, after the hose has been filled, subjected to the maximum working pressure in the fire mains for at least 1 minute. The test result should be considered positive if no sign of hose leakage has been found.

[7)] On ships constructed on or after 1 July 2002, the required pressure should be min 0.25 MPa – for cargo ships ≥ 500 but < 6000 gross tonnage and 0.27 MPa – for cargo ships ≥ 6000 gross tonnage and min 0.3 MPa – for passenger ships < 4000 gross tonnage and 0.4 MPa – for passenger ships ≥ 4000 gross tonnage. For existing ships, subject to *SOLAS Convention*, constructed before 1 July 2002, the values of pressures should be in accordance with the applicable requirements specified in *SOLAS Convention.*

Hoses which failed the test should be replaced by new ones or repaired by tape-binding to be performed by an approved service supplier;

.18 checking that the couplings of repaired fire hoses were properly bound[8)].

.19 checking that the required number of spare fire hoses with nozzles are available on board the ship (at least 1 item).

2.12 Automatic Sprinkler Systems on Passenger Ships (additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP)

The following should be conducted:

.1 external examination of the system components, such as: sea water pump, pressure tank, section valves, piping, etc., as well as external examination of randomly selected sprinklers. During the sprinklers examination, heat sensing element should be checked for liquid loss in the glass ampoule;

.2 external examination and check whether possible alterations of the arrangement of piping, ventilations ducts, etc. obstructed the sprinklers or impeded their correct operation;

.3 external examination of all sprinklers in such spaces as saunas, spas, galley spaces, etc., where they are exposed to aggressive atmosphere, as well as in such spaces as luggage handling rooms, gyms, play rooms, etc. where sprinklers are likely to be damaged mechanically, so that all sprinklers are inspected within one year. Sprinklers with obvious external damage, including paint, should be replaced and not included in the number of sprinklers tested in subparagraph .17, as given in MSC.1/Circ.1516;

.4 operation test of sea water pump – checking flow and pressure (the flow of water through delivery pipe on the discharge side);

.5 checking the settings of sea water pump relief valve and the pressure vessel safety valve;

.6 checking all the pressure vessels in the system for hydraulic test validity;

.7 checking that all filters used in the system are free of debris and contamination;

.8 operation test of all shut-off valves and section valves in the system;

.9 testing the automatic operation of sea water pump on pressure reduction in the system to the setting value;

.10 operation test of pressure tank – checking the replenishing of fresh water and compressed air supply in the pressure tank, checking the alarms warning of the drop below the minimum values in water level and pressure in the tank;

.11 operation test of visual and audible alarm signals (on control panel located on the bridge or in control station) on opening the test cock of each section valve of the system;

.12 testing the system cross-connection to water fire main system;

.13 operation test of anti-freezing systems for pipes subjected to freezing;

.14 operation test of automatic water supply to dry-type pipes upon activation of fire detector;

.15 operation test of the system power supply from the emergency source of electric power and testing the automatic switch-over;

.16 operation test of sprinklers/water mist nozzles, carrying out basic tests/extended tests of sprinklers/water mist nozzles, in accordance with block diagram Part 1 and Part 2 (see Annex to MSC.1/Circ.1516).

.17 during basic testing, and extended testing when applicable, of automatic sprinklers/water mist nozzles as outlined in subparagraph .16, water quality testing should be conducted in each corresponding piping section.

[8)] In accordance with the Order of the Minister of Home Affairs and Administration of 20 June 2007, the Law Gazette No. 143, item 1003, Chapter 3.1, fire hose and coupling attachment should be effected by binding the fire hose ends with two sections of wire, each section consisting of at least 3 coils. The binding of each end of the fire hose should be made using one piece of wire, winding the successive wire sections, at constant tension, in the direction of the coupling crown. The wire coils should adhere to each other. After the last wire section has been wound, the binding should be protected against getting loose. During binding, the covering of the coupling connecting sleeve and fire hose ends with adhesive or tucking the fire hoses in or turning them inside out, is not permitted. Other means of the coupling attachment to the fire hose may be permitted, provided they will be equivalent in terms of strength, durability and safety to wire binding. Fire hose binding, other means of the coupling attachment to the fire hose may only be made by an approved service supplier.

Note – should a tested sprinkler fail, assessing the corresponding water quality at that time would assist in determining the cause of failure.

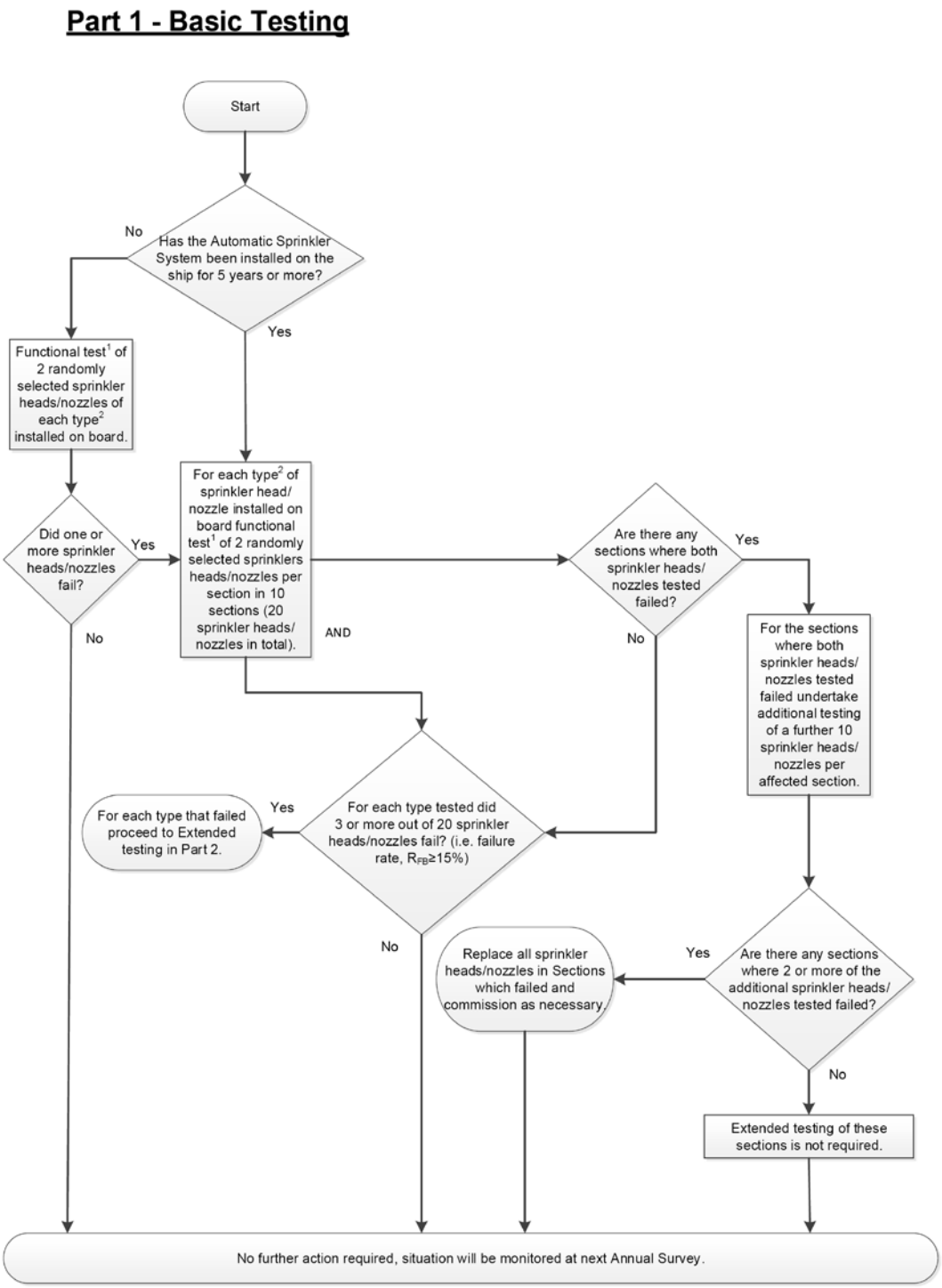
.18 operation test of all functions (alarms and self-check) of the system control panel;

.19 checking that a diagram or plan of the sprinkler system arrangement on board the ship is placed at each control panel;

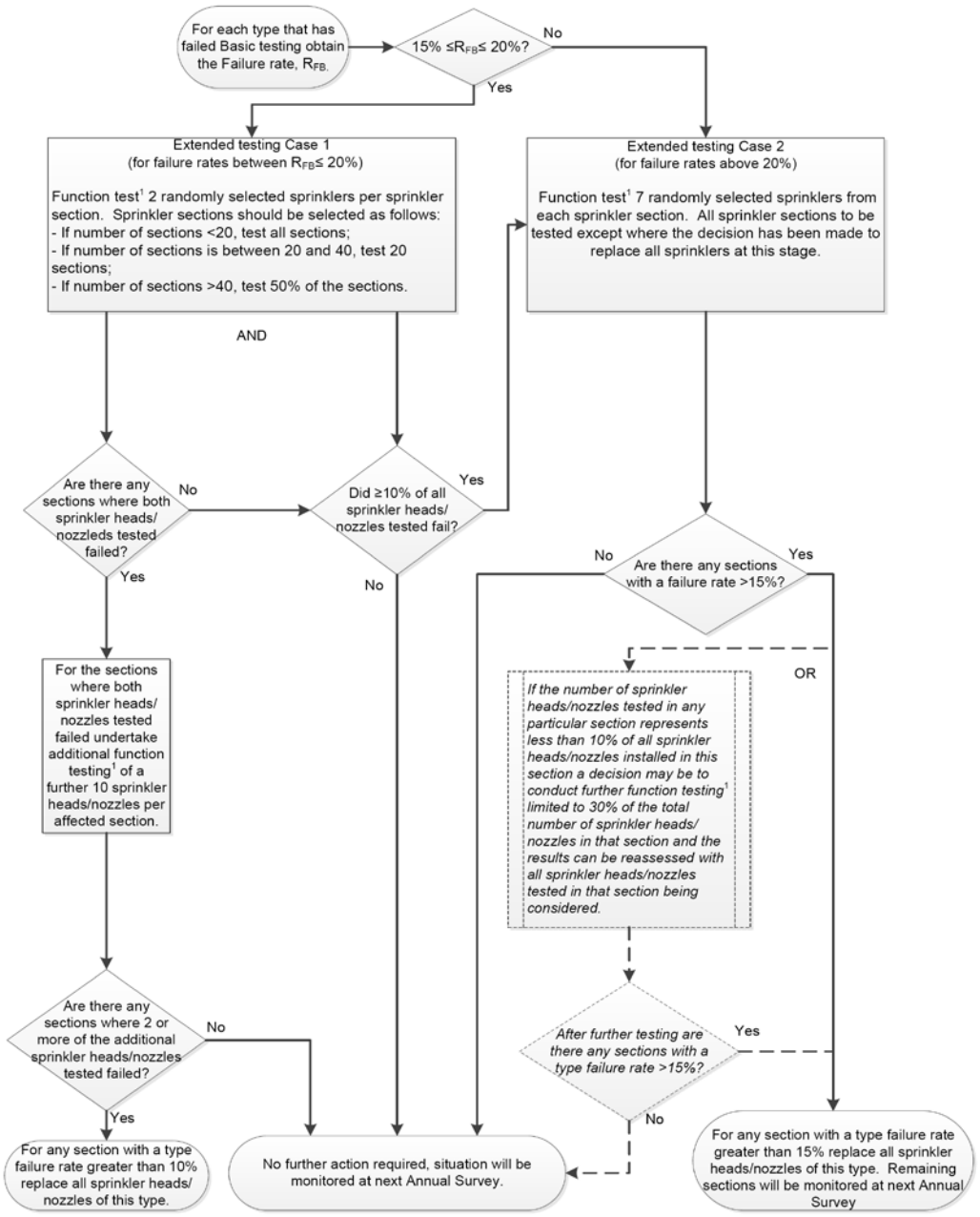
.20 checking that all control/section valves are in the correct position after the inspection is complete;

.21 checking that the required number of spare sprinklers (at least 6 pieces for each section) is provided on board.

Block diagram



Part 2 - Extended testing



Explanatory notes to the flow charts, Part I and Part II

1 – functional test – a test that demonstrates the operation and flow of water from sprinkler/ nozzle.

2 – type – each different manufacturer model of sprinkler~~/~~nozzle.

3 – static/standby pressure – the constant pressure maintained in the system at all times prior to activation.

4 – all testing should be carried out at static/standby pressure.

5 – failure rate (R_{FB}) – the number of sprinklers /nozzles to fail testing divided by test sample size multiplied by 100.

2.13 Equivalent High-pressure Sprinkler Systems (Water Mist)

In addition to the activities specified in 2.12, the following should be conducted:

.1 operation test of all pump units (main and emergency) – checking water flow and pressure;
.2 operation test of automatic start of the emergency pump unit after isolating the main pump unit;
.3 operation test of sea water supply filtering arrangement/system;
.4 checking the hydraulic test validity for all cylinders and pressure vessels in the system;
.5 checking the certificate[9] of water quality laboratory test after the last filling the system with water (the content of chlorides, solid particles, other debris, which may cause the discharge nozzles clogging) for compliance with the system manufacturer's requirements/reservations specified on the system approval certificate;
.6 checking the test validity of foam concentrate or a softening additive used to enhance the system fire-extinguishing effectiveness, where applicable.

Note: Inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

2.14 Water-spraying Fire-Extinguishing Systems for Protection of Ro-ro Spaces, Special Category Spaces and Vehicle Spaces on Ro-ro Ships and for Protection of Cargo Area and Superstructure Walls on Gas Tankers (additional mark: RO-RO SHIP, RO-RO/ PASSENGER SHIP, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 external examination of such system components as: the supply water pump, valves, piping, discharge nozzles, etc.;
.2 operation test of the supply water pump – checking the water flow and pressure;
.3 checking the supply water pump relief valve setting;
.4 operation test of remote starting of water supply pump;
.5 checking that the filters used in the system are free of debris and contamination;
.6 operation test of all shut-off valves and section valves;
.7 testing the system cross-connection to the water main system;
.8 operation test of anti-freezing systems for pipes subjected to freezing;
.9 operation test (sea water supply) of one pipe section. During the test, the flow rate (at least 5 *l/min/m*^{2} of floor area – for special category spaces of a height exceeding 2.5 *m* and at least 3.5 *l/min/m*^{2} of floor area – for spaces of a height not exceeding 2.5 *m*)[10] and coverage of the whole deck/platform/cargo area/superstructure walls with water should be checked. The section subjected to be tested should be so selected that all pipe sections be tested within 5 years. The recently tested section number should be entered in the *Fire Protection Systems and Appliances Maintenance Plan*;
.10 checking the efficiency of draining the supplied water overboard, checking scuppers protection against clogging (in ro-ro spaces/ special category spaces);
.11 checking that all the system means of control are clearly marked;
.12 flushing the piping with fresh water after the water supply test is complete;
.13 blowing through, with compressed air or nitrogen, all the piping (for dry-type systems) and discharge nozzles.

2.15 Equivalent High-pressure Water-based Fire-extinguishing Systems for Ro-Ro Spaces and Special Category Spaces

In addition to the activities specified in 2.14, the following should be done:

.1 operation test of all pump units (main and emergency) – checking the water flow and pressure;
.2 operation test of the system water supply filtering arrangement/system;
.3 checking the hydraulic test date of all cylinders and pressure vessels in the system;

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[9] The test may be performed only by a recognized laboratory.

[10] On ships constructed on or after 1 July 2014, the water flow rate should be in accordance with that specified in MSC.1/Circ.1430.

.4 operation test of anti-freezing systems for pipes subjected to freezing;
.5 operation test of automatic operation of the pump units on pressure drop in the system to the setting value (for automatic sprinkler system with wet-type piping – type A);
.6 operation test of automatic start of emergency pump units after disconnection of the main pump unit;
.7 operation test of pressure tank, operation test of alarms warning of the drop of water level and pressure in the tank below the minimum values (for automatic sprinkler system with wet-type piping – type A);
.8 operation test of visual and audible alarms [on control panel(s)] with open test cock on each section valve of the system (for automatic sprinkler system with wet-type piping – type A);
.9 testing the automatic opening of water supply pipe valve upon activation of fire detection system (for automatically operated water-spraying system – type B);
.10 testing the automatic opening of water supply pipe valve upon activation of automatic sprinkler (for water-spraying system with dry-type piping – type D);
.11 testing the automatic opening of water supply pipe valve upon activation of additional fire detection system (for the system fitted with additional fire detection – type D);
.12 blowing through, with compressed air or nitrogen, all water supply pipes (for dry-type piping system). This may require the removal of nozzles, if applicable;
.13 operation test of all functions of the system control panel (alarm and self-check systems);
.14 checking the validity of the certificate[11)] of water quality laboratory test after the latest filling the system with water – for system with wet-type piping;
.15 checking the validity of foam concentrate or a softening additive used to enhance the system fire-extinguishing effectiveness, where applicable.

Note: Inspection of the system may be carried out only by an approved service station or a firm duly authorized by the system manufacturer.

2.16 Water-spraying Systems for Protection of Machinery Spaces and Cargo Pump-rooms

The following should be conducted:

.1 external examination of such components of the system as: the supply water pumps, valves, piping, nozzles, etc.;
.2 operation test of the main and emergency supply water pump – checking the water flow and pressure;
.3 checking the supply water pump relief valve setting;
.4 checking whether all filters used in the system are free of debris and contamination;
.5 operation test of all shut-off valves;
.6 operation test of draining/anti-freezing systems for pipes subjected to freezing;
.7 testing the system cross-connection to the water fire main system;
.8 operation test of supplying the system from the emergency power source and testing the emergency power supply switchover;
.9 operation test of visual and audible alarms upon activation of each section of the system;
.10 operation test of sea water supply by a piping section. During the test, the flow rate (at least 5 $l/min/m^2$ of floor area) and coverage of the whole deck/platform with water should be checked. The section should be so selected to the test that all the sections be tested within 5 years. The recently tested section number should be entered in the *Fire Protection Systems and Appliances Maintenance Plan*. During the test, appliances likely to be damaged during water spraying should be properly protected;
.11 operation test of all the system control panel functions (alarm and self-check system);
.12 checking that all the system means of control are clearly marked;
.13 blowing through, with compressed air or nitrogen, all water supply pipes (for a system with dry-type piping) and nozzles;
.14 checking that all control/section valves are in the correct position after the inspection is complete.

11) The test may be performed only by a recognized laboratory

2.17 Equivalent High-pressure Water-spraying Systems for Protection of Machinery Spaces and Cargo Pump-rooms

In addition to the activities specified in 2.16, the following should be done:

.1 operation test of all pump units (main and emergency) – checking the water flow and pressure;
.2 operation test of the system water supply filtering arrangement/system;
.3 checking the hydraulic test validity for all cylinders and pressure vessels;
.4 testing the automatic operation of the main pump unit;
.5 testing the automatic operation of emergency pump unit after disconnection of the main pump unit;
.6 operation test of pressure tank, operation test of alarms warning of the low water level and pressure drop in the tank/cylinders below the minimum values;
.7 testing the automatic opening of water supply pipe valve upon activation of fire detection system (for water-spraying system with wet-type piping);
.8 testing the automatic opening of water supply pipe valve upon activation of discharge nozzle (for water-spraying system with dry-type piping);
.9 testing the automatic opening of water supply pipe valve upon activation of additional fire detection system (for system fitted with additional fire detection);
.10 blowing through, with compressed air or nitrogen, all water supply pipes (for system with dry-type piping) and nozzles. This may require the removal of nozzles, if applicable;
.11 checking the validity of the certificate of water quality laboratory test after the latest filling the system with water – for system with wet-type piping;
.12 checking the test validity of foam concentrate or a softening additive used to enhance the system fire-extinguishing effectiveness, where applicable.

Note: Inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

2.18 Fixed Local Water-based[12)] Fire-extinguishing Systems for Machinery Spaces of Category A

The following should be conducted:

.1 external examination of such system components as the water supply pumps, valves, piping, nozzles, etc.;
.2 operation test of fresh water storage tank filling;
.3 operation test of water supply pump – checking the water flow, with the maximum capacity for the largest section at the required pressure, through a test valve installed on the pump discharge;
.4 checking that all filters used in the system are free from debris and contamination;
.5 operation test of sea water supply filtering arrangement/system (for high-pressure systems);
.6 operation test of sea water supply filtering arrangement/system (for high-pressure system);
.7 checking the water supply pump relief valve setting;
.8 checking the hydraulic test validity of all cylinders and pressure vessels;
.9 operation test of drainage/anti-freezing systems for pipes subjected to freezing;
.10 operation test of low water level alarm in the fresh water tank which supplies the system;
.11 operation test of all isolating/section valves;
.12 operation test of the activating each system section using the control panel/manually operated call points;
.13 operation test of supplying the system from the emergency power source and testing the automatic switchover of emergency power supply;
.14 operation test of visual and audible alarms upon activation of each system section in the protected space, ECR and in control station;

[12)] The system should be provided on ships assigned additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP, affixed to the symbol of class, of 500 gross tonnage and upwards, as well as on cargo ships assigned additional mark: GENERAL CARGO SHIP of 2000 gross tonnage and upwards subject to *SOLAS Convention* constructed on or after 1 July 2002. Such system should also be provided on all passenger ships assigned additional mark: PASSENGER SHIP, RO-RO/PASSENGER SHIP of 2000 gross tonnage and upwards, constructed before 1 July 2002.

.15 operation test of water supply in a piping section – (for water-spraying system with dry-type piping). During the test the flow rate (as specified in the *Certificate of approval*) and protected space floor area coverage should be checked. The section should be so selected to the test that all the sections be tested within 5 years. The recently tested section number should be entered in the *Fire Protection Systems and Appliances Maintenance Plan*. During the test, appliances likely to be damaged during water spraying should be properly protected;

.16 blowing through, with compressed air or nitrogen, the pipes and nozzles of each section of the system (for system with dry-type piping);

.17 operation test of the automatic activation of each system section by simulating fire detectors' activation (for systems used in unattended machinery spaces);

.18 checking all the functions of control panel (alarm and self-check system);

.19 checking that all controls of the system are clearly marked;

.20 checking the certificate of water quality laboratory test after the last filling the system with water (for high-pressure system with wet-type piping);

.21 checking the validity of test of foam concentrate or a softening additive used to enhance the system fire-extinguishing capability, where applicable.

.22 checking if after inspection the system is placed in automatic mode whenever the protected machinery space is unattended.

2.19 Fixed Local Water-spraying Fire-Extinguishing Systems and Water Screen Systems

The following should be conducted:

.1 external examination of such system components as valves, piping, discharge nozzles, etc.;

.2 operation test of all shut-off valves;

.3 operation test (water supply) of a piping section;

.4 operation test of draining/anti-freezing systems for pipes subjected to freezing;

.5 checking that all the system means of control are clearly marked;

.6 blowing through, with compressed air or nitrogen, the system piping and nozzles.

2.19-1 Fixed Water-spraying Fire-Extinguishing Systems for Cabin Balconies on Passenger Ships (additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP)

In addition to the activities specified in 2.19, the following should be done:

.1 operation test of all pump units (main and emergency) – checking the water flow, with the maximum capacity for the largest section at the required pressure;

.2 operation test of visual and audible alarms, upon activation of each section of the system, in the continuously manned central control station or onboard safety centre;

.3 operation test of water supply in a piping section – (for water-spraying system with dry-type piping). During the test the flow rate (as specified in the *Certificate of approval*) and protected space floor area coverage should be checked. The section should be so selected to the test that all the sections be tested within 5 years. The recently tested section number should be entered in the *Fire Protection Systems and Appliances Maintenance Plan*. During the test, appliances likely to be damaged during water spraying should be properly protected.

2.20 Fixed High-expansion Foam Fire-extinguishing Systems

The following should be conducted:

.1 external examination of such system components as foam concentrate storage tanks, foam generators, water supply pump and foam concentrate pumps, foam proportioners, valves, piping, ducts supplying air into foam generators, ducts supplying high-expansion foam, dampers, etc.;

.2 operation test of water supply pumps and foam concentrate pumps – checking the flow and pressure. Operation test of foam concentrate pump may be performed with the use of water, if there are problems to circulate the foam concentrate back to the tank. Checking the operation of the diesel-powered pump drive (operation of: ventilation, fuel system, engine cooling system, exhaust gases discharge), checking the engine starting in its cooled condition, checking the required fuel supply for the engine;

.3 checking the relief valve settings on all pumps;

.4 checking that all filters used in the system are free from debris and contamination;
.5 operation test of the system cross-connections to other sources of water supply;
.6 operation test of all shut-off valves and isolating dampers of the system;
.7 operation test of foam generators space fans (without generating foam);
.8 blowing through, with compressed air or nitrogen, all pipes supplying foam concentrate to foam proportioners, as well as the piping conveying foam solution to foam generators, including discharge outlets; checking the nozzles are not clogged;
.9 operation test of air dampers/closures of openings allowing air outlet from the upper part of the protected space;
.10 operation test of ventilation in foam generators' spaces;
.11 checking the required quantity of foam concentrate. The foam concentrate quantity should not be less than that specified in the approved documentation;
.12 checking the validity of foam concentrate periodic laboratory test[13)] in accordance with MSC/Circ.670. The first test should be performed within 3 years from the foam concentrate delivery to the ship and the subsequent ones – every year;
.13 operation test of supplying the system from the emergency power source and operation test of the emergency power supply switchover (for the systems intended to protect the machinery spaces and cargo pump-rooms);
.14 operation test of visual and audible alarms in the protected spaces;
.15 checking that all controls of the system are clearly marked;
.16 checking that all shut-off/control valves and dampers are in the correct position after the inspection is complete;
.17 verivication the operation manual, checking if it contains the following information:

- before the system is activated, it should be proved that the local water- spraying fire-extinguishing system is closed. Using foam fire-extinguishing system and local water- spraying fire-extinguishing system simultaneously is not permitted due to lower effectiveness of extinguishing foam;
- after the system is activated, air dampers/closures of openings in the upper part of the protected space should remain open to allow air outlet from the space. After the space is filled with foam, dumpers/openings should be closed.

2.21 Fixed Low-expansion Foam Fire-extinguishing Systems

The following should be conducted:

.1 external examination of such system components as foam concentrate storage tanks, water supply pump and foam concentrate pumps, foam proportioners, valves, piping, discharge nozzles, etc.;
.2 operation test of water supply pumps and foam concentrate pumps – checking the flow and pressure. Operation test of foam concentrate pump may be performed with the use of water, if there are problems to circulate the foam concentrate back to the tank;
.3 checking the settings of relief valves of all the pumps;
.4 checking that all filters used in the system are free from debris and contamination;
.5 operation test of the system cross-connection to other sources of water supply;
.6 operation test of all shut-off valves in the system;
.7 blowing through, with compressed air or nitrogen, all pipes supplying foam concentrate to foam proportioners;
.8 checking the required quantity of foam concentrate. The foam concentrate quantity should not be less than that specified in the approved documentation;
.9 checking the validity of periodic laboratory test[14)] of foam concentrate, in accordance with MSC.1/Circ.1312. The first test should be performed within 3 years from the foam concentrate supply to the ship and the subsequent ones – every year;
.10 checking that all controls of the system are clearly marked;

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13) The test may be performed only by an approved service station or a recognized laboratory. The test scope covers checking of such foam concentrate parameters as sedimentation, pH value, expansion ratio, condensation time and unit mass.

14) The test may be performed only by an approved service supplier or a recognized laboratory. The test scope covers checking of such foam concentrate parameters as sedimentation, pH value, expansion ratio, condensation time and unit mass.

.11 checking that all shut-off/control valves are in the correct position after the inspection is complete.

2.22 Fixed Deck Foam Fire-extinguishing Systems on Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, PRODUCT CARRIER B, CHEMICAL TANKER)

The following should be conducted:

.1 external examination of such system components as foam concentrate storage tanks, foam monitors, foam applicators, water supply pump, foam pump and foam proportioner, valves, piping, discharge nozzles, etc.;

.2 operation test of water supply pumps and foam concentrate pumps – checking the flow and pressure;

.3 operation test of the foam system (with the use of water) for the foam and water fire main systems supplied from the common line – checking that operation of the deck foam system at its required output will permit the simultaneous use of the minimum required jets of water at the required pressure from the fire main;

.4 checking the settings of relief valves on all pumps;

.5 checking that all filters used in the system are free from debris and contamination;

.6 operation test of all shut-off valves in the system;

.7 operation test of drainage/anti-freezing systems for pipes subjected to freezing;

.8 operation test of all water-and-foam monitors with the use of water – checking manual/remote control of monitors (testing the horizontal and vertical rotation/movement of monitor discharge nozzle at maximum discharge angles); checking the water throw range;

.9 operation test of foam applicators with fire hoses using water – at least 20% of the total number of foam applicators and fire hoses provided on board should be tested;

.10 tightness test of all foam applicators' fire hoses – at the maximum pressure in the system;

.11 checking the required quantity of foam concentrate. The quantity of foam concentrate should not be less than that specified in the approved documentation;

.12 checking the validity of periodic laboratory test[15)] of foam concentrate in accordance with MSC.1/Circ. 1312 – for low-expansion foam or with MSC.1/Circ.798 – for medium-expansion foam. The first periodic test should be performed within 3 years after the foam concentrate delivery to the ship and the subsequent ones – every year;

.13 additionally for chemical carriers, checking the validity of protein-based alcohol-resistant foam concentrate[16)] test, where applicable.

2.23 High-pressure Carbon Dioxide (CO_2) Fire-extinguishing Systems

The following should be conducted:

.1 external examination of CO_2 fire-extinguishing station – checking the station lock, space thermal insulation, ventilation openings/operation of mechanical ventilation, thermometer, means for weighing carbon-dioxide cylinder, the system operating manual, information plates on valves, etc.;

.2 external examination of such system components as CO_2 cylinders, securing thereof, flexible hoses, control cabinets, main shut-off valves/distribution valves, piping, discharge nozzles, etc. Cylinders with the signs of leakage, indents, bulging or corrosion should be replaced or subjected to hydraulic test;

.3 checking that all flexible hoses are in proper condition and screw connections are properly tightened;

.4 checking the connections of all pilot release piping and tubing for tightness;

.5 checking the proper setting and vent of safety valves on manifold/piping segments;

.6 checking the validity of hydraulic test of all pressure cylinders in the system;

.7 blowing through all piping and nozzles supplying CO_2 to each protected space after connecting compressed air or nitrogen to manifold stub pipe. The passage of each CO_2 discharge nozzle in

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15) The test may be performed only by an approved service station or a recognized laboratory. The test scope covers checking of such foam concentrate parameters as sedimentation, pH value, expansion ratio, condensation time and unit mass.

16) Such foam concentrate is required to demonstrate manufacturing consistency through a small-scale test in accordance with standards: ISO 7203-3, Annex C, PN-EN 1568-4, Annex I or other national standards and the concentrate should be tested, with acetone, for stability. The tests should be performed annually.

the protected space should be verified by putting a plastic bag over a nozzle outlet and checking if the bag has become inflated or otherwise checking the gas discharge;

.8 operation test of fire-extinguishing station mechanical ventilation and the operation test of station lighting supplied from the main and emergency sources of power;

.9 measurement of the quantity of CO_2 in all CO_2 storage cylinders and all pilot cylinders (the cylinder should be weighed or the liquid level should be measured). The content of CO_2 should not be less than 90% of the nominal quantity. Cylinders containing less than 90% of the nominal quantity should be refilled to the required level. The check should be performed every year – for passenger ships and every two years – for other ships (cargo ships, tugs, supply vessels, etc.). The total quantity of CO_2 should be sufficient for the protection of the largest protected space;

.10 checking that CO_2 fire-extinguishing system for the protection of machinery spaces and cargo pump-rooms is fitted with two separate controls[17)], No.1 – for opening the valve (main/distribution) of pipe supplying gas to the protected space, No. 2 – to discharge gas from CO_2 storage cylinder. It should also be checked that the two controls are located in a release cabinet clearly identified for the particular protected space;

.11 operation test of all remote CO_2 release cabinets. The test should cover the operation of the two separate controls, as well as the positive means provided so that the controls can be operated in the correct sequence[18)]. During the test, automatic activation of pre-discharge alarm and stopping the ventilation in the protected spaces should be checked;

.12 operation test of servo-mechanisms for remote release of cylinder rows by means of actuating rods (after disconnecting the rods);

.13 checking that all release cabinets are provided with identification plates and operating manuals;

.14 operation test of all the functions of system control panel;

.15 operation test of the main valve/all valves supplying CO_2 to the protected spaces;

.16 checking the emergency operation of the system from CO_2 fire-extinguishing station for the possibility of manual opening of each cylinder and each distribution valve, as well as the possibility of automatic activation of pre-discharge alarm and stopping the ventilation in the protected spaces);

.17 operation test of visual and audible warning alarms in all protected spaces, where the crew is normally employed. The alarm should be audible throughout the space at the maximum noise level and should also be distinct from other audible alarms;

.18 operation test of the warning system supply from the emergency source of electric power and the operation test of emergency power supply switchover or supply from accumulator batteries;

.19 operation test of sample extraction smoke detection system in cargo rooms connected to pipes discharging CO_2 to the protected spaces;

.20 operation test of closing appliances of all openings in the protected spaces (entrance doors and hatches, ventilation heads and louvres);

.21 external examination to verify the tightness of all bulkheads/decks forming boundaries of all protected spaces (in way of penetrations by pipes, cables, ventilation ducts penetrations) and checking that no modifications have been made to the bulkheads/decks that have created uncloseable openings which would render the system ineffective;

.22 checking that all entrance doors/hatches to the protected spaces are provided with warning signs;

.23 after the inspection is complete – checking that all isolating valves/control valves and adjustable flanges are in the correct position and that all CO_2 cylinders and pilot cylinders are properly connected to the piping. Checking that each remote control pilot line pipe is capable of opening such numbers of cylinders as is required for the protection of the given space. Checking that each pilot line is capable of opening an appropriate distribution valve.

Note: For the safety of persons who may be present in the protected spaces during the tests, provision should be made for blanking off the manifold with the connected CO_2 cylinders by means of adjustable flange (if fitted) or isolating the manifold from pipes supplying CO_2 to those spaces.

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17) On ships constructed before 1 July 2002, the two separate controls should be provided by the first dry-docking survey to be performed after 1 January 2010, not later however than 1 January 2013.

18) The positive means of closure should be provided on ships constructed on or after 1 January 2010

2.24 Low-pressure Carbon Dioxide Fire-extinguishing Systems

In addition to the activities specified in 2.23, the following should be done:

.1 external examination of such system components as CO_2 cylinder (the examination should cover the surface condition under insulation in places exposed to corrosion like pipes and cylinder connections for fittings), securing thereof, refrigerating units (main and emergency units consisting of compressor, condenser and evaporator), CO_2 cylinder filling pipes, etc.;

.2 both safety valves on the CO_2 cylinder (the valve setting should not be lower than 1.1 p_{rob}) and of the safety valves on manifold/piping segments and the manifold/pipe segments;

.3 checking the hydraulic test date of CO_2 cylinder;

.4 measurement of CO_2 quantity in the cylinder. The quantity of CO_2 in the cylinder should be sufficient for the protection of the largest protected space. The loss of CO_2 in the cylinder should not exceed 5% of the required quantity. The measurement is required every year – for passenger ships and every two years – for other ships (cargo ships, tugs, supply ships, etc.);

.5 operation test of pressure alarm and liquid CO_2 level indicator;

.6 operation test of visual and audible alarms warning of cylinder high pressure (not exceeding the safety valve setting) and low pressure alarm (not lower than 1.8 MPa);

.7 operation test of visual and audible alarms warning of refrigerating unit failure;

.8 operation test of visual and audible alarms warning of the minimum CO_2 level in the cylinder;

.9 operation test of automatic/manual means of control of the required quantity of CO_2 discharge to the protected spaces (e.g. automatic timer, liquid level indicator, etc.);

.10 operation test of the supply from the emergency source of electric power to the alarm warning system and CO_2 cylinder cooling system and the emergency power supply switchover operation test;

.11 operation test of two CO_2 refrigerating (main and stand-by) units, as well as of all the functions of cooling system automatic control and alarms, including automatic actuation of stand-by refrigerating unit;

.12 operation test of both (main and stand-by) cooling water circulating pumps of refrigerating unit;

.13 operation test of all the functions of CO_2 cylinder cooling system control panel;

.14 checking that all control/distribution valves and CO_2 cylinder cooling system valves are in the correct position after the inspection is complete.

2.25 Local Carbon-dioxide (CO_2) Fire-extinguishing Systems

The following should be conducted:

.1 external examination of such system components as cylinders, flexible hoses, isolating/ distribution valves, piping, discharge nozzles, etc.;

.2 checking the hydraulic test validity of all CO_2 cylinders;

.3 blowing through, with compressed air or nitrogen, all CO_2 discharge pipes and discharge nozzles;

.4 measurement of CO_2 quantity in the cylinders;

.5 operation test of all isolating valves on pipes supplying CO_2 to the protected areas;

.6 operation test of the closing appliances of all openings in the protected areas;

.7 external examination to verify the tightness of the protected areas;

.8 checking the identification plates of shut-off valves.

2.26 Equivalent Gas Fire-extinguishing Systems for Protection of Machinery Spaces and Cargo Pump-rooms (using extinguishing media, such as: halons, other halogen derivatives of hydrocarbons – halon substitutes and inert gases)

The following should be conducted:

.1 external examination of fire-extinguishing stations containing cylinders: the lock, thermal insulation of the space, ventilation openings, system operating manuals, information plates on valves, etc.;

.2 external examination of such system components as extinguishing medium cylinders, securing thereof, flexible hoses, control cabinets, shut-off valves, piping, discharge nozzles, etc.;

.3 checking the proper setting and vents of the manifold safety valves and cylinder relief valves;

.4 checking the tightness of joints on all remote control pilot lines;

.5 checking that all flexible hoses are in proper condition and that the screw connections are properly tightened;

.6 checking the hydraulic test validity of all pressure vessels of the system;

.7 blowing through, with compressed air or nitrogen, of all discharge pipes and nozzles – to be performed every 2 years;

.8 for liquid gas systems (halogen derivatives of hydrocarbons) – measurement of extinguishing agent[19] the quantity and pressure in all cylinders. The loss of extinguishing agent in each cylinder should not exceed 5% of the required quantity, whereas the pressure drop should not exceed 10% of the required value at the specified temperature. The check should be performed every year;

.9 for not liquefied inert gas systems – pressure measurement in all cylinders. The pressure drop should not exceed 5% of the required value at the specified temperature. The check should be performed every year. If the check is performed with pressure gauge/pressure measuring device installed on the cylinder, the pressure gauge or pressure measuring device should have been calibrated;

.10 operation test of all remote control pneumatic release cabinets of the system – checking the controls, as well as the automatic activation of pre-discharge alarm and stopping the ventilation in the protected spaces;

.11 operation test of all functions of the system electric control panel – checking activation of extinguishing medium cylinders' electromagnetic valves, checking alarm and self-check systems, cylinder low pressure alarm, control circuit gap alarm;

.12 checking identification plates and operating manuals on all control cabinets/panels;

.13 checking the integrity of the double release lines inside the protected space;

.14 operation test of all shut-off valves on pipes supplying extinguishing agent to the protected spaces;

.15 operation test of visual and audible alarms in all protected spaces, where the crew is normally employed. The sound signal should be audible throughout the space at the maximum noise level;

.16 operation test of visual and audible alarms, on the navigation bridge and in the protected space, indicating the pressure drop in extinguishing agent containers (for containers located in the protected spaces);

.17 operation test of the alarms and the system remote control from the emergency source of power and testing the emergency power supply switchover;

.18 operation test of all means of closure of the openings in the protected spaces (entrance doors/ hatches, ventilation heads and louvres);

.19 operation test of vent hole flaps in the protected spaces (for inert gas systems);

.20 external examination to verify the tightness of all bulkheads/decks forming boundaries of all protected spaces (in way of penetrations by pipes, cables, ventilation ducts penetrations) and checking that no modifications have been made to the bulkheads/decks that have created uncloseable openings that would render the system ineffective;

.21 checking that all entrance doors/hatches to the protected spaces are provided with warning signs;

.22 after the inspection is complete – checking that all control/distribution valves are in the correct position.

Note: The inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

2.27 Aerosol Fire-extinguishing Systems for Machinery Spaces

The following should be conducted:

.1 external examination of such system components as aerosol generators/canisters, securing thereof, control cabinets, piping, discharge nozzles, etc.;

.2 checking the proper setting and vents of relief valves on dispersed aerosol canisters;

.3 checking the hydraulic test validity of all pressure canisters containing dispersed aerosol;

[19] The check may be performed by liquid level indicator or by weighing the cylinder.

.4 checking the pressure in all dispersed aerosol canisters;
.5 blowing through, with compressed air or nitrogen, all pipes distributing dispersed aerosol and discharge nozzles – to be performed every 2 years;
.6 operation test of all remote control cabinets/panels. The test should include checking the operation of pneumatic/electric actuators and all self-check and alarm functions for electric circuits. During the test, automatic activation of alarms and ventilation shut-down in the protected spaces should also be checked;
.7 checking that all release cabinets are provided with identification plates and operating manuals;
.8 operation test of all functions of the system's main control panel (alarm and self-check system, control circuits interruption signal);
.9 operation test of all shut-off valves on pipes supplying the extinguishing agent to the protected spaces;
.10 operation test of visual and audible alarms in all protected spaces where the crew is normally employed. The sound signal should be audible throughout the space at the maximum noise level;
.11 checking that pyrotechnic generators replacement time limit, specified by the manufacturer, has not expired;
.12 operation test of pneumatic and electric actuators releasing the extinguishing agent, if practicable;
.13 operation test of visual and audible alarm, on the navigation bridge and in protected space, of pressure drop in all dispersed aerosol containers;
.14 operation test of the alarms and the system remote control from the emergency source of power and testing the emergency power supply switchover;
.15 operation test of the means of closure of openings in the protected spaces (entrance doors and hatches, ventilation heads and louvres);
.16 external examination to verify the tightness of all bulkheads/decks forming the boundaries of all protected spaces (pipes, cables, ventilation ducts penetrations) and checking that no modifications have been made to the bulkheads/decks that have created uncloseable openings that would render the system ineffective;
.17 checking warning sign plates on all entrance doors/hatches to the protected spaces.

Note: The inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

2.28 Powder Fire-extinguishing Systems on Chemical Carriers and Gas Tankers (additional mark: CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 external examination of such system components as powder containers, gas (powder carrier) pressure vessels, securing thereof, powder monitors, valves, control panels, pipes, fire hose nozzles with hoses;
.2 checking the proper setting of safety valves on powder containers/gas (powder carrier) pressure vessels;
.3 checking the hydraulic test validity for all powder containers, gas (powder carrier) pressure vessels and starting cylinders for remote activation;
.4 checking the quantity of powder in the container and the quantity of gas in pressure vessels (including remote control stations) – to be performed every two years;
.5 checking the validity of laboratory test[20)] of the powder for lumping and moisture content – to be performed every two years;
.6 blowing through, with dry nitrogen, all pipes supplying powder – to be performed every two years;
.7 operation test of local and remote control of the system and operation test of section valves – to be performed every two years;
.8 test of mixing the powder in a container using dry nitrogen, in accordance with the manufacturer's instructions;

[20)] The test may be performed only by the dry powder manufacturer or a recognized laboratory.

.9 hydraulic test of pressure vessels, safety valves, flexible hoses at working pressure – to be performed every two years;
.10 operation test of all remote control panels of the system;
.11 operation test of all powder monitors – checking manual/remote control of each monitor (testing the horizontal and vertical rotation/movement of monitor discharge nozzle at maximum discharge angles);
.12 additional tests – in accordance with the manufacturer's recommendations.

2.29 Fire-extinguishing Systems for Deep-fat Cooking Equipment[21)]

The following should be conducted:
.1 external examination of such system components as fire-extinguishing medium container, flexible hoses, control valves, thermostats, pipes, discharge nozzles, etc.;
.2 operation test of the system automatic or manual control and examining the system in accordance with the manufacturer's instructions;
.3 operation test of automatic shut-down of electric power supply on fire-extinguishing system activation;
.4 operation test of alarms on fire-extinguishing system activation;
.5 checking the validity of laboratory test of foam concentrate/softening additive to enhance the system fire-extinguishing effectiveness, where applicable;
.6 additional tests – in accordance with the system manufacturer's recommendations.

2.30 Galley Exhaust Ducts

The following should be conducted:
.1 external examination of such system components as fire-extinguishing medium container, flexible hoses, control valves, fire dampers, pipes, discharge nozzles, etc.;
.2 internal examination of grease trap and exhaust ventilation duct (through inspection hatches) – checking that the ducts walls are free of grease build-up;
.3 operation test of manual control of fire dampers in the lower and upper parts of duct[22)];
.4 operation test of fire-extinguishing system control.

2.31 Inert Gas Systems on Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:
.1 external examination of such system components as inert gas generators, together with fuel supply arrangements, blowers, scrubbers, water seal, flue gas isolating valves, non-return valves, gas regulating valves, isolating valves, pipes supplying inert gas, arrangements enabling the inert gas main to be connected to an external source of inert gas, indicating and recording devices, etc.;
.2 operation test of both inert gas blowers;
.3 operation test of scrubber;
.4 operation test of scrubber compartment ventilation;
.5 operation test of both water pumps supplying the water seal;
.6 operation test of the water seal for automatic filling and draining;
.7 operation test of anti-freezing systems of water seals subjected to freezing;
.8 operation test of all remote or automatic flue gas isolating valves fitted in the inert gas supply mains;
.9 operation test of the interlocking feature of soot blowers;
.10 operation test of isolating valves on each branch pipe supplying gas to all cargo tanks and double hull spaces;
.11 operation test of inert gas regulating valve;

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21) The system should be installed on ships constructed on or after 1 July 2002, as well as for cooking equipment fitted on existing ships on or after 1 July 2002.

22) Fire damper in the upper part of the exhaust duct should be fitted on all passenger ships carrying more than 36 passengers. Additionally, the fire damper should be fitted on cargo ships and on passenger ships carrying not more than 36 passengers constructed on or after 1 July 2010 who are subject to *SOLAS* requirements.

.12 operation test of the automatic shutdown of inert gas blowers and gas regulating valve on the following predetermined limits being reached: low water pressure or low flow rate to the flue gas scrubber, high water level in the flue gas scrubber and high gas temperature;

.13 operation test of automatic closing of gas regulating valve after alarm on the failure of the inert gas blowers;

.14 operation test of automatic shut down of cargo pumps, closing inert gas supply shut-off valve and activation of alarms after the oxygen content of inert gas has exceeded 8% by volume;

.15 operation of the instruments continuously indicating the temperature and pressure of the inert gas on the discharge of gas blowers;

.16 operation test of the instruments continuously indicating and permanently recording such inert gas parameters in the inert gas supply main as the pressure and the oxygen content in the inert gas;

.17 operation test of audible and visual alarms indicating: low water pressure or low flow rate to the flue gas scrubber, high water level in the flue gas scrubber, high gas temperature, failure of the inert gas blowers, oxygen content in excess of 8% by volume, failure of the power supply to the automatic control system for the gas regulating valve and to the indicating and recording devices, low water level in the water seal, gas pressure on the inert gas supply main lower than 1 kPa and high gas pressure;

.18 operation test of oil fired inert gas generator;

.19 operation test of both fuel oil pumps fitted to the inert gas generator;

.20 operation test of automatic shut-off of the oil fuel supply to inert gas generators on reaching the predetermined limits of low water pressure or low rate of water flow to the cooling and scrubbing arrangement (the scrubber) and on high gas temperature;

.21 operation test of automatic shut-off of gas regulating valve in the event of failure of power supply to the oil fired inert gas generator;

.22 operation test of the inert gas generator audible and visual alarms indicating: insufficient fuel oil supply, failure of the power supply to the inert gas generator or failure of the power supply to the automatic control system for the generator;

.23 operation test of nitrogen (as an inert gas) gas generator;

.24 operation test of both air compressors of nitrogen gas generator;

.25 operation test of mechanical extraction ventilation system in nitrogen gas generator compartment;

.26 operation test of automatic operation of nitrogen gas generator venting valve and of the system alarm;

.27 operation test of instruments continuously indicating the temperature and pressure of air on the compressor discharge and the air inlet to the nitrogen generator;

.28 operation test of instruments continuously indicating and recording the oxygen content on the nitrogen outlet from the generator;

.29 operation test of inert gas generator audible and visual alarms indicating: low air pressure on the compressor discharge, high air temperature on the compressor discharge, high condensate level at automatic drain of water separator, failure of electrical heater, oxygen content in excess of 5% by volume and failure of the power supply to the instruments;

.30 operation test of automatic shut-down of the system after alarm conditions specified above have been reached.

2.32 Fixed Fire Detection and Alarm Systems

The following should be conducted:

.1 external examination of such system components as control panel, indicating units, manually operated call points, etc. as well as randomly selected fire detectors;

.2 external examination of all fire detectors in spaces where the detectors are exposed to aggressive atmosphere, such as saunas, spas, galley areas, etc., as well as in spaces where the detectors are likely to be damaged mechanically, such as: luggage handling spaces, gyms, play rooms;

.3 operation test of fire detection and fire alarm system:
- in accommodation spaces and service spaces[23)];

[23)] The system is required on cargo ships assigned additional mark GENERAL CARGO SHIP, constructed on or after 1 July 1986.

– in machinery spaces[24];
– in enclosed spaces containing garbage incinerator[25]
– in cargo spaces[26],
– on cabin balconies (for passenger ships);

on the basis of tests of randomly selected fire detectors with the use of „testers", i.e. devices producing hot air, smoke or dispersed particles, or creating other phenomena simulating a fire to which fire detectors respond – checking the reception of input signal from a fire detector and operation of fire alarm on control panel;

.4 for fire detection and alarm system in machinery spaces – operation test of alarm in the engineers' spaces if the alarm signal on navigation bridge has not been acknowledged within 2 min.;

.5 operation test of fire detection system used to automatically release local fire-extinguishing system, testing automatic operation of fire-extinguishing system after fire detection simulation;

.6 operation test of selected manually operated call points;

.7 operation test of visual and audible fire detection alarm signal at the control panel and operation test of all functions of the control panel (normal operation, alarm, alarm acknowledgement, alarm of fault and loudspeaker turning down);

.8 for the fixed fire detection and alarm system capable of section identification – operation test of identifying each section;

.9 for the fixed fire detection system with individually identifiable fire detectors/manually operated call points[27]– operation test of identifying the particular detector/manually operated call point;

.10 for systems capable of disconnecting particular spaces, e.g. ro-ro spaces during loading and unloading – operation test of automatic restoring the system to normal surveillance after a predetermined time that is appropriate for the operations in question;

.11 operation test of all indicating units and checking the automatic switchover, within 2 min of alarm from indicating units to general emergency alarm system;

.12 operation test of local audible alarm signal in overnight cabins[28] fitted with fire detectors (on passenger ships);

.13 operation test of the system power supply from the emergency source of power and testing emergency power supply switchover;

.14 operation test of output signals to other fire safety systems, such as: fire alarm, fan stops, closing fire doors, smoke extraction systems, etc.;

.15 checking the required number of spare fire detectors (at least 5% for each type of detectors), as recommended by the system manufacturer.

2.33 Fixed Sample Extraction Smoke Detection Systems

The following should be conducted:

.1 external examination of such system components as control panel, indicating units, isolating valves, pipes, smoke accumulators, etc.;

.2 operation test of the system in cargo spaces by smoke simulation using smoke generating machine. An alarm should be received at the control panel within 180 *s* for vehicle decks and within 300 *s* – for container and general cargo holds, after smoke has been introduced at the most remote smoke accumulator;

.3 checking the systems' automatic control of sequential scanning on each sampling pipe (the intervals between the two subsequent scans should not exceed 120 *s*);

.4 operation test of all the functions of control panel (visual and audible alarms, power supply loss and failure self-monitoring system);

.5 operation test of indicating units;

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[24] The system is required on ships assigned an additional mark AUT.

[25] The system is required on ships constructed on and after 1 July 2012.

[26] On cargo ships assigned the mark GENERAL CARGO SHIP, fire detection and fire alarm system is required only when dangerous goods are carried.

[27] Remote identification is required on passenger ships constructed on or after 1 July 2010.

[28] The system is required on passenger ships constructed on or after 1 July 2010.

.6 operation test of the system power supply from the emergency source of power and testing emergency power supply switchover;
.7 operation test of isolating valve/ three-way valve on each sampling pipe;
.8 blowing through, with compressed air or nitrogen, all smoke accumulators and sampling pipes.

2.34 Fixed Hydrocarbon Gas Detection System in Tanker Hull Spaces[29], Systems of Continuous Monitoring Hydrocarbon Gases/Flammable Gases Concentration in Cargo Pump-rooms on Tankers and Gas Detection System on Gas Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:
.1 external examination of such system components as gas analysis unit, isolating valves, pipings, gas sampling points, etc.;
.2 calibration of the detector should be performed with a zero calibration gas and a span calibration, according to manufacturer's procedure;
.3 checking the automatic control of sequential operation of continuous gas monitoring and analysis from each gas sampling line, at intervals not exceeding 30 min or as specified by the manufacturer;
.4 operation test of sound and visual alarms and all the functions of gas analysis unit, including errors signalization;
.5 testing the automatic shutdown of the system when gas concentration inside the cabinet containing gas detecting equipment exceeds 30% of the lower flammability level;
.6 operation test of shut-off valves on each gas sampling line;
.7 checking the airflow rate;
.8 blowing through, with compressed air or nitrogen, all gas sampling lines, if required by the Manufacturer operation manual.

2.35 Low-location Lighting Systems of Escape Routes on Passenger Ships (additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP)

The following should be conducted:
.1 external examination of photoluminescent strip indicators and marking on all escape routes leading to assembly stations to verify their condition;
.2 external examination and checking the condition of all evacuation guidance systems arranged in accordance with MSC/Circ.1167 and used as an alternative to low-location lighting systems;
.3 operation test of low-location lighting supplied by electrical power – checking each section of the lighting;
.4 checking the validity of low-location lighting system luminance/ checking the audible alarm for the alternative evacuation guidance systems arranged in accordance with MSC/Circ.1167 – to be performed every five years.

2.36 Ventilation Systems – Fire Dampers

The following should be conducted:
.1 external examination and operation test of the means of closure of air intake and exhaust openings of all ventilation systems;
.2 operation test of the remote stopping of fans in ventilation systems;
.3 external examination of all accessible fire dampers in ventilation ducts;
.4 operation test of the remote means of closure of all fire dampers in ventilation ducts (from both sides of the main fire division – applies to passenger ships);
.5 operation test of all ventilation controls interconnected with fire-protection systems;
.6 checking that fire dampers provided on board are indicated with plates made from photoluminescent material and marked with the symbol used on the *Fire Control Plan*.

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[29] Hydrocarbon gas detection system should be installed on tankers assigned an additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A of 20 000 deadweight and above, constructed on or after 1 January 2012.

2.37 Fire-fighter's Outfit, Breathing Apparatus and Emergency Escape Breathing Devices (EEBDs)

The following should be conducted:

.1 checking the number and disposition of the required sets of fire-fighter's outfit and emergency escape breathing devices for compliance with the approved *Fire Control Plan*;

.2 checking the validity date of hydraulic test of all air cylinders of breathing apparatus, emergency escape breathing devices and other air recharging cylinders;

.3 checking the validity of breathing apparatus inspection – to be performed every year – by an approved service supplier, in accordance with manufacturer's instructions. During the inspection, the quantity of air in the air cylinders should be checked. In the case of air loss/pressure drop, the cylinders should be refilled. Inspection of emergency breathing escape devices may be performed at different intervals, as recommended by the manufacturer;

.4 checking the validity of air quality[30)] test for air cylinders or air exchange – to be performed every two years;

.5 operation test of compressed air cylinders' charging system (including the compressor) in respect of air cleanliness. The air quality test[30)] may be performed only by a service supplier approved in accordance with standard ISO/IEC 17025:2005 or EN 12021 or other equivalent national standard;

.6 checking that full face pieces of breathing apparatus and air regulating valves are in good working condition;

.7 checking that fire-fighter's outfit, i.e. protective clothing, fire fighter's gloves and boots, fire-fighter's helmets and belts, electric safety lamps, as well as breathing apparatus and emergency escape breathing devices are complete, are in good working condition and that all air cylinders, including the spare charges of each required breathing apparatus are properly charged;

.8 checking that fire-fighter's outfit/emergency escape breathing devices/ additional protective clothing/additional breathing apparatus located on board are indicated with plates, made from photoluminescent material and marked with the symbol used in the *Fire Control Plan*;

.9 checking the number of spare charges for breathing apparatus (200% of spare charges for each breathing apparatus is required) unless the ship is provided with the means/compressors for recharging air cylinders;

.10 checking the number of spare charges for breathing apparatus for fire drills required on SOLAS vessels not fitted with a compressor to charge compressed air cylinders[*];

.11 checking that for each pair of breathing apparatus, one fog applicator kept in the vicinity of these apparatus is provided (applies to on passenger ships carrying more than 36 passengers). Checking that fog applicators located on board are indicated by plates with the symbol used on the *Fire Control Plan*.

2.38 Portable and Mobile Fire-extinguishers

The following should be conducted:

.1 checking the number and disposition of the required fire-extinguishers provided on board for compliance with the approved *Fire Control Plan*;

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30) The air should fulfil at least the following requirements in respect of cleanliness:
- contamination content should be as little as practicable;
- mineral oil content should not be perceptible by smell; the perception threshold value corresponds to about 0.3 mg/m^3;
- humidity content in the airs for the compressed air cylinder apparatus should not exceed 30 mg/m^3 for 30.0 MPa cylinders or 50 mg/m^3 – for 20.0 MPa cylinders.

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- contamination content should be as little as practicable;
- mineral oil content should not be perceptible by smell; the perception threshold value corresponds to about 0.3 mg/m^3;
- humidity content in the airs for the compressed air cylinder apparatus should not exceed 30 mg/m^3 for 30.0 MPa cylinders or 50 mg/m^3 – for 20.0 MPa cylinders.

[*] 1 set of spare cylinders for each mandatory breathing apparatus is required, unless additional spare cylinders are required by the shipboard safety management system (SMS); additional spare cylinders for fire drills for breathing apparatus required during the carriage of dangerous goods are not required, as specified in the *SOLAS Convention*, Regulation II-2/19, as well as those required by the IMSBC Code, the IBC Code or the IGC Code.

.2 checking the securing of all (located onboard and spare) fire-extinguishers to bulkheads/decks;

.3 checking the validity of all (located onboard and spare) fire-extinguishers inspection, to be performed every year (one month window before and after the due date is allowed) by an approved service supplier, performed in accordance with the guidelines specified in Res. A.951(23) and the manufacturer's recommendations (inspection confirming label). During the inspection, the quantity of extinguishing medium in fire-extinguishers and powder carrier cartridges should be checked; in the case of extinguishing agent loss of more than 10%, it should be replenished;

.4 checking the condition of several randomly selected fire-extinguishers;

.5 for mobile fire-extinguishers – external examination of each extinguisher components, checking the hydraulic test validity of each pressure vessel of fire-extinguisher; additionally for dry powder fire-extinguishers – turning the extinguisher upside-down to verify that the powder has not lumped;

.6 checking that fire-extinguishers located on board are indicated by plates made from photoluminescent material and marked with the symbol used in the *Fire Control Plan* (or properly lighted with electrical installation supplied from an emergency source of power);

.7 checking that the ship is provided with the required numbers of charges/spare extinguishers as follows: 100% – for the first 10 extinguishers and 50% of the required total number of portable extinguishers – for each type of the remaining extinguishers (on ships who are subject to *SOLAS*).

2.39 Portable Foam Applicators

The following should be conducted:

.1 checking the validity of foam concentrate laboratory test[31)] in accordance with the recommendations specified in MSC.1/Circ.1312. The first test should be performed 3 years after filling the tank with foam concentrate, with the next tests performed annually, unless 20 *l* foam concentrate tank is factory sealed and longer validity period is specified by the manufacturer[32)];

.2 checking the validity of each foam applicator unit inspection by an approved service supplier and checking the setting of foam proportioning in each foam applicator;

.3 checking that portable foam applicators located on board are indicated by plates made from photoluminescent material, marked with the symbol used in the *Fire Control Plan*.

2.40 Portable Instruments[33)] for Measuring Concentration of Flammable Vapours and Concentration of Oxygen on Tankers and Gas Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 external examination of the instruments;

.2 checking the validity of the instruments' calibration;

.3 checking that the required supply of spare parts is available on board;

.4 checking the possibility of measuring, from the open deck through a closeable opening in the tank, the concentration of flammable gases in each cargo tank;

.5 checking the instruments' capability of measuring, with fixed air sampling pipes connected, flammable vapour concentrations in double hull and double bottom spaces.

2.41 Welding Gases (oxygen or acetylene) Installations

The following should be conducted:

.1 external examination of compartments for the storage of gas cylinders – checking the compartment locking arrangements, the condition of insulation, ventilation openings, safety manual and warning signs;

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31) The test may be performed only by an approved service station or a recognized laboratory.

32) The factory sealed foam concentrate contained may be approved for use without periodical laboratory test for up to 10 years

33) Each tanker should be provided with at least 2 portable instruments for measuring concentration of flammable vapours and at least 2 instruments for measuring oxygen concentration, together with spare parts set for each instrument and calibration set.

.2 external examination of such installation components as cylinders, pressure reducing valves, flexible hoses, shut-off valves, pipes, etc.;
.3 checking the hydraulic test validity for all oxygen and acetylene cylinders;
.4 checking the proper setting of manifold safety valve;
.5 checking that the oxygen and acetylene intake filter is clean/filter exchange;
.6 pressure test, with nitrogen compressed to a pressure of at least 1.25 p_{rob}, of the oxygen and acetylene pipes running through other spaces;
.7 blowing through, with compressed nitrogen, the oxygen and acetylene pipes;
.8 operation test of shut-off valves on the oxygen and acetylene pipes;
.9 visual examination of welding shop – checking the compartment locking arrangements, checking the bulkheads/fire divisions separating the shop from the engine room and other spaces (for the absence of openings), checking safety manual;
.10 operation test of welding shop ventilation.

2.42 Gas Fuel Systems for Domestic Purposes

The following should be conducted:
.1 external examination of such system components as gas receptacles, reducing valves, flexible hoses, shut-off valves, piping, gas-fired appliances, components of ventilation system and combustion gas extraction arrangements;
.2 checking the hydraulic test validity of all gas receptacles – to be performed every five years;
.3 pressure test of all distributing pipes to a pressure of at least 1.25 p_{rob};
.4 operation test of closing valves;
.5 operation test of gas-consuming appliances, checking flame failure device;
.6 operation test of spaces containing gas-consuming appliances.

2.43 Medical Oxygen Cylinders

The following should be conducted:
.1 external examination of the cylinders, reducing valves, flexible hoses, cut-off valves;
.2 checking the hydraulic test validity of all oxygen cylinders – to be performed every 5 years.
.3 checking the validity date of cylinders' oxygen replacement, required every 3 years, or at other intervals if the cylinders' supplier specifies other validity date,

2.44 Fire-extinguishing Systems and Equipment on Fire-fighting Ships (additional mark: FIRE FIGHTING SHIP ...)

A. Water and Foam Monitor Systems (for protection of external objects)

The following should be conducted:
.1 external examination of such system components as foam concentrate storage tanks, foam monitors, water and foam concentrate pumps, foam proportioners, valves, piping, etc.;
.2 operation test of water and foam concentrate pumps – checking the flow and pressure;
.3 operation test of sea valves' control;
.4 operation test of purging sea chests;
.5 operation test of the piping system arrangements to avoid overheating of the pumps at low delivery application rate;
.6 checking the proper settings of relief valves on all pumps;
.7 checking that all filters used in the system are clean;
.8 operation test of all shut-off valves in the system;
.9 operation test of drainage/anti-freezing systems for pipes subjected to freezing;
.10 operation test, with the use of water, of all water/foam monitors – checking manual/remote control of the monitors, checking the water throw range;
.11 checking the required quantity of foam concentrate. The quantity of foam concentrate should not be less than that specified in the approved documentation;

.12 checking the validity of foam concentrate periodic laboratory test[34] in accordance with MSC.1/Circ.1312 – for low-expansion foam or in accordance with MSC.1/Circ.798 – for medium-expansion foam. The first test should be performed within 3 years from the foam concentrate delivery to the ship and the subsequent ones – every year.

B. Water Screen Systems

The following should be conducted:

.1 external examination of such system components as valves, piping, discharge nozzles, etc.;
.2 operation test of water supply pump – checking the water flow and pressure;
.3 checking the pump relief valve setting;
.4 checking that all filters used in the system are clean;
.5 operation test of all section/shut-off valves;
.6 operation test of each section of the system – checking uniform coverage of all protected areas with water;
.7 operation test of drainage/anti-freezing systems for pipes subjected to freezing.

C. Fire Hose Stations (for protection of external objects)

The following should be conducted:

.1 external examination of manifold, fire hydrants, fire hoses and nozzles;
.2 operation test of all fire hydrants for connecting fire hoses;
.3 tightness test of all fire hoses for the protection of external objects – at the maximum pressure of water supply;
.4 operation test of fire hose nozzles with fire hoses – the test should be conducted for at least 20% of the total number of nozzles and fire hoses, after their connection to fire hose station, intended for the protection of external objects.

D. Fire-fighter's Outfit

The following should be conducted:

.1 visual examination of the fire-fighter outfits' locker – checking ventilation and heating;
.2 checking that the required number of fire-fighter's outfits is available on board;
.3 checking the hydraulic test validity for all air cylinders of breathing apparatus;
.4 checking the validity of breathing apparatus inspection to be performed every year by an approved service supplier;
.5 operation test of air compressor for recharging the air cylinders;
.6 checking the condition of breathing apparatus full face masks and air valves;
.7 checking that fire-fighter outfits are complete and in good working condition and that all air cylinders, including the spare ones, of each required breathing apparatus are properly charged.

E. Portable High-expansion Foam Generators

The following should be conducted:

.1 external examination of the generators;
.2 checking the validity of foam concentrate periodical laboratory test[35] in accordance with MSC.1/Circ.1312 – as for low-expansion foam. The first test should be performed within 3 years from the foam concentrate supply to the ship and the subsequent ones – every year.
.3 operation test of the generators – checking the operation of the fan, without foam generation.

F. Ship Lighting for Fire-fighting and Rescue Operations at Night

The following should be conducted:

.1 external examination of searchlights;
.2 operation test of searchlights – checking the capability of horizontal and vertical range of coverage and testing an object illumination at night.

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[34] The test may be performed only by an approved service supplier or a recognized laboratory
[35] The test may be performed only by an approved service supplier or a recognized laboratory.

2.45 Helicopter Facilities

A. Helideck Construction

The following should be conducted:

.1 visual examination of helideck construction – checking the condition of A-60 Class divisions' insulation, checking escape routes;

.2 operation test of deck drainage facilities – checking the water drainage after flowing water over the helideck.

B. Water Fire Main System

The following should be conducted:

.1 external examination of such system components as fire hydrants, pipes, fire hoses, nozzles, etc.;

.2 testing the supply of two fire jets to each part of the helideck.

C. Foam Fire-extinguishing System

The following should be conducted:

.1 external examination of such system components as foam monitors, foam proportioners, foam nozzles with reeled hose, foam concentrate storage tanks and shut-off valves;

.2 operation test of foam monitors with the use of water – checking manual/remote control of the monitors, checking the water throw range;

.3 operation test of all shut-off valves in the system;

.4 operation test of foam nozzles with hoses;

.5 operation test of hose reel;

.6 checking the required quantity of foam concentrate. The quantity of foam concentrate should not be less than that specified in the approved documentation;

.7 checking the validity of foam concentrate periodic laboratory test, in accordance with MSC.1/Circ.1312 – for low-expansion foam or in accordance with MSC.1/Circ.798 – for medium-expansion foam. The first test should be performed within 3 years from the foam concentrate delivery to the ship and the subsequent ones – every year.

D. Fire-fighting and Rescue Equipment

The following thing should be done:

.1 checking the arrangement of the required equipment (portable and mobile fire-extinguishers, sets of fire-fighter outfits, rescue kit).

E. Hangar Facilities

The following should be conducted:

.1 visual examination of hangar – checking the condition of insulation, means of closure of the openings;

.2 inspection of the hangar fire-extinguishing system;

.3 operation test of fire detectors installed in hangar.

F. Helicopter Refuelling Facilities

The following should be conducted:

.1 external examination of such system components as fuel tanks together with their securing arrangements and fuel leak drainage, valves, piping and earthing;

.2 checking that fuel filters are clean;

.3 operation test of fuel pump;

.4 checking the fuel pump safety valve setting;

.5 operation test of fuel isolating valves;

.6 operation test of fuel pump remote shut-down.

G. Operation Manuals for Helicopter Servicing Equipment

The following should be conducted:

.1 checking that operation manual including safety procedures and precautions to be followed during helicopter refuelling operations is available on board.

2.46 Carriage of Dangerous Goods

The following should be conducted:

.1 visual examination of cargo spaces to confirm that no alterations have been made to the construction;

.2 operation test of the control of fire-extinguishing system for each cargo space;

.3 operation test of automatic start of a fire pump on fire hydrant opening (for permanently pressurized systems);

.4 operation test of the remote fire pump starting from the navigation bridge (for systems with dry-type piping);

.5 testing the supply of four jets of water to any part of the cargo space intended for the carriage of dangerous goods. Two of the jets should be supplied by a single length of hose each, whereas the other ones may be supplied by two coupled hose lengths each. In ro-ro spaces, all four jets of water, each supplied by a single length of hose, should reach any part of the space;

.6 checking that the required 3 additional fire hoses with nozzle are available on board the ship;

.7 inspection of water-spraying system for cooling the cargo:
- external examination of such system components as isolating/section valves, pipes and spraying nozzles;
- operation test of all isolating/section valves;
- operation test of the system – water supplied from one section;

.8 operation test of the cargo space flooding system;

.9 operation test of cargo space drainage system:
- external examination of such system components as bilge wells, isolating valves and piping;
- operation test of the drainage system valves – to be performed from the position in the vicinity of the fire-extinguishing system controls;
- operation test of water drainage;

.10 inspection of the system for cooling the cargo being carried with other suitable medium, e.g. high-expansion foam system;

.11 checking that electrical equipment fitted in cargo spaces is not a potential source of ignition of flammable vapours and that any other equipment which may constitute a source of ignition of flammable vapours is not installed in the cargo spaces;

.12 operation test of the fixed fire detection and fire alarm system in cargo space;

.13 inspection of a sample extraction smoke detection system in cargo space;

.14 operation test of the cargo space ventilation;

.15 checking that exhaust fans are of non-sparking type (i.e. are not the potential source of ignition) and that suitable wire mesh guards are provided over inlet and outlet openings;

.16 operation test of the cargo space natural ventilation;

.17 operation test of the cargo space bilge pumping;

.18 operation test of scuppers;

.19 checking that personnel protection means (the required chemical protective clothing and breathing apparatus) are complete and in serviceable condition;

.20 checking the disposition of the required portable fire-extinguishers;

.21 external examination – checking the condition of A-60 Class fire division between the cargo space and machinery space of category A;

.22 operation test of water-spraying fire-extinguishing system in ro-ro spaces;

.23 checking the separation of enclosed ro-ro space.

3 CLASS RENEWAL SURVEY

3.1 General

The renewal survey of fire protection covers the Annual Survey scope and, additionally, the activities specified in this Chapter.

Unless expressly provided otherwise for the particular system/equipment, hydraulic tests of system cylinders/pressure vessels and piping are required every ten years for cylinders/pressure vessels and piping up to 20 years of age, and every five years for cylinders/ pressure vessels and piping over 20 years of age.

3.2 Fire Divisions

The following should be conducted:

.1 close-up examination of fire divisions of a selected sample of Class A and Class B fire divisions – checking the condition and securing of insulation, checking the insulation adhesion to bulkheads, ceilings and ventilation ducts, checking the condition of the division surface materials:
- in accommodation spaces, service spaces and in control stations,
- in machinery spaces,
- in cargo spaces,

.2 close-up examination of a selected sample of draught stops within accommodation area – checking the condition and securing of insulation, visual examination of the draught stop integrity.

3.3 Water Fire Main Systems

The following should be conducted:

.1 hydraulic test, to a pressure of at least 1.25 p_{rob}, of the system pipes passing through hull tanks;

.2 tightness test of the system piping at the maximum pressure of main fire pump;

.3 hydraulic test, to a pressure of at least 1.25 p_{rob}, of pressure tank, to be performed every ten years – for fire main systems with wet-type piping;

.4 hydraulic test, to the maximum working pressure (1.2 MPa), of all fire hoses – to be performed in accordance with PN-EN 671-3 every five years. The test should be performed only by an approved service supplier;

.5 checking the time from starting the fire pump till the moment the water is supplied to the remotest fire hydrant – for water fire main systems with dry-type piping;

.6 checking the emergency fire pump suction capability under the most unfavourable, for the pump operation, ship service condition – to be performed with the use of ballast system.

3.4 Automatic Sprinkler Systems on Passenger Ships (additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP)

The following should be conducted:

.1 internal examination of the system section/isolating valves;

.2 water quality testing in each piping section, if not previously tested as outlined in 2.12.17 within the last 5 years, as specified in MSC.1/Circ.1516;

.3 water quality testing, in accordance with manufacturer's guidelines, for each section where the water is refilled after being drained or flushed. Testing of the renewed water quality should be conducted and recorded as a new baseline reference to assist future water quality monitoring for each corresponding section, as specified in MSC.1/Circ.1516;

.4 checking condition of any pressure vessel batteries, or renew testing in accordance with manufacturer's recommendations;

.5 hydraulic test of pressure tank to a pressure of at least 1.25 p_{rob} – to be performed every ten years;

.6 operation test of the pressure tank safety valve;

.7 emptying the system, blowing through all pipes of the system with compressed air or nitrogen – to be performed every five years;

.8 filling the system piping with fresh water and checking the setting of controls and position of section valves.

3.5 Equivalent High-pressure Sprinkler Systems (Water Mist Systems)

In addition to the activities specified in 3.4, the following should be done:

.1 hydraulic test of all pressure vessels and cylinders to a pressure of at least 1.5 p_{rob}. For the reason of corrosion of pressure vessels and cylinders containing water and foam concentrate (if used), the hydraulic test should be performed every five years; whereas for inert gas cylinders – every ten years;

.2 operation test of safety valves of cylinders and pressure vessels;

.3 water quality laboratory test[36)] after filling the system with water (the content of chlorides, solid particles, other debris, which may cause discharge nozzles' clogging) – for compliance with the system manufacturer's recommendations/reservations as specified in the system approval certificate.

Note: Inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

3.6 Water-spraying Fire-extinguishing Systems for Protection of Ro-Ro, Special Category and Vehicle Spaces on Ro-Ro Ships and for Protection of Cargo Spaces and Superstructure Walls on Gas Tankers (additional mark: RO-RO SHIP, RO-RO/ PASSENGER SHIP, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 internal examination of the system section/isolating/control valves;

.2 flushing all the pipes with fresh water, draining and purging the pipes with compressed air.

3.7 Equivalent High-pressure Water-based Systems for Ro-Ro Spaces and Special Category Spaces

In addition to the activities specified in 3.6, the following should be done:

.1 hydraulic test of all pressure vessels and cylinders to a pressure of at least 1.5 p_{rob}. For the reason of corrosion of pressure vessels and cylinders containing water and foam concentrate (if used), the hydraulic test should be performed every five years; whereas for inert gas cylinders – every ten years;

.2 operation test of the safety valves of cylinders and pressure vessels;

.3 blowing through, with compressed air or nitrogen, all pipes and discharge nozzles of the system;

.4 emptying the system and blowing through, with compressed air or nitrogen, all pipes of the system – to be performed every five years for systems with wet-type piping;

.5 filling the system pipes with fresh water, checking the setting of controls and position of section valves – for systems with wet-type piping;

.6 the water quality laboratory test after filling the system with water – for systems with wet-type piping.

Note: Inspection of the system should be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

3.8 Water-spraying Fire-extinguishing Systems for Protection of Machinery Spaces and Cargo Pump-rooms

The following should be conducted:

.1 internal examination of the system section/isolating/control valves;

.2 flushing all the pipes with fresh water, draining and purging the pipes with compressed air.

3.9 Equivalent High-pressure Water-based Systems for Protection of Machinery Spaces and Cargo Pump-Rooms

In addition to the activities specified in 3.8, the following should be done:

.1 hydraulic test of all pressure vessels and cylinders to a pressure of at least 1.5 p_{rob}. For the reason of corrosion of pressure vessels and cylinders containing water and foam concentrate (if used), the

[36)] The test should be performed only by a recognized laboratory.

hydraulic test should be performed every five years; whereas for inert gas cylinders – every ten years;

.2 operation test of the safety valves of cylinders and pressure vessels;

.3 blowing through, with compressed air or nitrogen, all pipes and discharge nozzles of the system;

.4 emptying the system and blowing through, with compressed air or nitrogen, all pipes of the system, to be performed every five years – for systems with wet-type piping;

.5 filling the system pipes with fresh water, checking the setting of controls and position of section valves – for systems with wet-type piping;

.6 the water quality laboratory test after filling the system with water – for systems with wet-type piping.

Note: Inspection of the system should be performed only by an approved service station or a firm duly authorized by the system manufacturer.

3.10 Fixed Local Water-based Systems for Machinery Spaces of Category A

The following should be conducted:

.1 internal examination of section valves and automatic control valve/isolating valve fitted on the water supply pipe;

.2 hydraulic test of all pressure vessels and cylinders to a pressure of at least 1.5 p_{rob}. For the reason of corrosion of pressure vessels and cylinders containing water and foam concentrate (if used), the hydraulic test should be performed every five years; whereas for inert gas cylinders – every ten years;

.3 operation test (water supply) of at least one section of the system piping – for systems with wet-type piping. For unattended machinery spaces – testing the automatic starting of water supply on activation of fire detectors. The section should be so selected that all sections of the system be tested during subsequent inspections;

.4 blowing through, with compressed air or nitrogen, all pipes and discharge nozzles of the system – for systems with dry-type piping;

.5 emptying the system and blowing through, with compressed air or nitrogen, all pipes of the system, to be performed every five years – for systems with wet-type piping;

.6 filling the system pipes with fresh water, checking the setting of controls and position of section valves – for systems with wet-type piping;

.7 water quality laboratory test after filling the system with water – for high-pressure systems with wet-type piping.

3.11 Fixed Local Water-spraying Fire-extinguishing Systems and Water Screen Systems

The following should be conducted:

.1 internal examination of the system section/isolating valves;

.2 blowing through, with compressed air or nitrogen, all pipes and discharge nozzles of the system.

3.12 Fixed High-expansion Foam Fire-extinguishing Systems

The following should be conducted:

.1 internal examination of control/isolating valves on water supply and foam concentrate pipes;

.2 tightness test of water supply and foam concentrate pipes at the maximum pressure provided by the pump;

.3 operation test of all foam proportioners or other foam mixing devices – checking the mixing ratio (the mixing ratio tolerance should be between +30% and –10% of the nominal mixing ratio specified for the system);

.4 foam proportioners' test may be replaced by the test of foam generation and supply and the assessment of generated foam quality;

.5 flushing all the foam concentrate pipes with fresh water, draining the pipes and purging with air after the tests are complete.

3.13 Fixed Low-expansion Foam Fire-extinguishing Systems

The following should be conducted:

.1 internal examination of control/isolating valves on water supply and foam concentrate pipes;

.2 checking that all discharge nozzles are free of debris and contamination;

.3 tightness test of water supply and foam concentrate pipes at the maximum pressure provided by the pump;

.4 operation test of all foam proportioners or other foam mixing devices – checking the mixing ratio (the mixing ratio tolerance should be between +30% and –10% of the nominal mixing ratio specified for the system);

.5 foam proportioners test may be replaced by the test of foam generation and supply and the assessment of the generated foam quality;

.6 flushing all the foam concentrate pipes with fresh water, draining the pipes and purging with air after the tests are complete.

3.14 Fixed Deck Foam Fire-extinguishing Systems on Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, PRODUCT CARRIER B, CHEMICAL TANKER)

The following should be conducted:

.1 internal examination of control/isolating valves on water supply and foam concentrate pipes;

.2 tightness test of water supply and foam concentrate pipes at the maximum pressure provided by the pump;

.3 operation test of all foam proportioners or other foam mixing devices – checking the mixing ratio (the mixing ratio tolerance should be between +30% and –10% of the nominal mixing ratio specified for the system);

.4 foam proportioners test may be replaced by the test of foam monitor – checking the foam generation and supply on the ship deck[37)] and the assessment of the generated foam quality;

.5 flushing all the foam concentrate pipes with fresh water, draining the pipes and purging with air after the tests are complete.

3.15 High-pressure Carbon Dioxide (CO_2) Fire-extinguishing Systems

The following should be conducted:

.1 internal examination of all control/isolating valves of the system;

.2 internal examination and hydraulic test of at least 10% of the total number of high pressure CO_2 cylinders on board to a pressure of 22.5 MPa – for cylinders with filling ratio 0.75 *kg*/*l* and

[37)] During the test, the ship deck should be protected to prevent foam from getting overboard and contaminating the port/shipyard basin.

18.75 MPa – for cylinders with filling ratio 0.67 *kg/l* , to be per-formed every ten years for cylinders up to 20 years of age and every five years – for cylinders over 20 years of age as well as after each repair to any cylinder irrespective of its age. The cylin-ders in the worst condition should be chosen for testing. If any cylinder fails, a total 50% of the onboard cylinders should be tested. If another cylinder fails, all cylinders should be tested;

.3 internal examination and hydraulic test of all pilot CO_2 cylinders to a pressure and at intervals specified above in .2;

.4 tightness test of pipes/manifold from cylinder to section valves/ distribution valves, by compressed air or nitrogen;

.5 hydraulic test, to a pressure of 5.0 MPa, of all CO_2 pipes from section valves/distribution valves to the protected spaces and pipes from safety valves passing through accommodation spaces and service spaces;

.6 blowing through, with air compressed to a pressure of at least 2.0 MPa, the pipes to remove contamination and drying the pipes after the hydraulic tests are complete;

.7 testing, with nitrogen compressed to a pressure of 1.3 p_{rob} , all remote control pilot lines from the pilot cylinders to distribution valves/cylinder valves. The test should be performed every two years on passenger ships;

.8 checking that all flexible hoses for connecting cylinders have been replaced at the intervals recommended by the manufacturer and not exceeding ten years[38)];

.9 operation test of servomechanisms for remote opening of CO_2 cylinders;

.10 operation test of each time delay device. Checking that time delay of CO_2 discharge to the protected space, from the opening of the release cabinet until opening the cylinder valves, is within 20÷45 *s*. The test should be performed every two years on passengers ships;

.11 operation test of remote opening of the main/distribution valves after discharging extinguishing, medium having the required working pressure, through pilot lines, from each fire-extinguishing station after opening the controls No. 1 in the release cabinet. The test should be performed every two years on passenger ships;

.12 operation test of all heads for remote opening of CO_2 cylinders after their dismantling from cylinder valves and discharging the extinguishing medium having the required working pressure through pilot line pipelines, from each fire-extinguishing station, after opening the controls No. 2 in release cabinet. The test should be performed every two years on passenger ships;

.13 operation test of manual opening of the main valve/distribution valves at the maximum CO_2 pressure acting on the valve;

.14 operation test of all actuating rods and rollers for remote opening of CO_2 cylinders with the use of actuating rods. The test should be performed every two years on passenger ships;

.15 checking that all section/distribution valves and adjustable flanges are in the correct position and that all CO_2 cylinders and pilot cylinders are properly connected to their lines after the test is complete. Checking that each pilot line is reset to open the required number of cylinders for the protection of the particular space. Verifying that each pilot line pipeline is reset to open the correct distribution valve.

Note: The system inspection may be performed only by an approved service supplier.

3.16 Low-pressure Carbon Dioxide (CO_2) Fire-extinguishing Systems

In addition to the activities specified in 3.15, the following should be done:

.1 checking the condition of CO_2 cylinder outer surface for the signs of corrosion after the removal of cylinder insulation over the area of at least 100 cm^2;

.2 internal examination of CO_2 cylinder, to be performed every 10 years after each emptying of the cylinder over five years of age. Depending on internal examination results, hydraulic test of the cylinder may be required;

.3 operation test of CO_2 cylinder safety valves;

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38) Instead of flexible hoses replacement, hydraulic test of the hoses to a pressure as required for cylinder hydraulic test is permitted.

.4 hydraulic test of pipes (manifold) from CO_2 cylinder to section/distribution valves to a pressure of at least 1.5 cylinder safety valve pressure setting;

.5 hydraulic test, to a pressure of at least 1.25 cylinder safety valve pressure setting, of CO_2 pipes from section/distribution valves to the protected spaces and pipes from safety valves passing through accommodation spaces and service spaces.

3.17 Local Carbon Dioxide (CO_2) Fire-extinguishing Systems

The following should be conducted:

.1 internal examination of all control/distribution valves of the system;

.2 internal examination and hydraulic test of all cylinders;

.3 hydraulic test, to a pressure of 19.0 MPa, of pipes from cylinders to isolating/distribution valves (manifold);

.4 checking that all flexible hoses for connecting cylinders have been replaced at the intervals recommended by the manufacturer and not exceeding ten years and that they have been subjected to hydraulic test to a pressure as required for cylinder test.

3.18 Equivalent Gas Fire-extinguishing Systems for Protection of Machinery Spaces and Cargo Pump-rooms (using such extinguishing media as: halons, other halogen derivatives of hydrocarbons - halon substitutes and inert gases)

The following should be conducted:

.1 internal examination of all control/distribution valves of the system;

.2 internal examination and hydraulic test, to a pressure of 1.5 p_{rob}, of 10% of the total number of extinguishing medium (inert gas) cylinders on board – to be performed every ten years. If any cylinder fails, a total 50% of the onboard cylinders should be tested. If another cylinder fails, all cylinders should be tested;

.3 internal examination and hydraulic test of all remote control pilot cylinders to a pressure of 1.5 p_{rob} – to be performed every ten years;

.4 internal examination and hydraulic test of all halon-halon substitutes cylinders to a pressure of at least 1.5 p_{rob} – to be performed every ten years and after each discharge of the cylinders. Due to problems connected with maintaining the tightness of halon/halon substitutes cylinders, to avoid contamination of atmosphere, internal examination and hydraulic test may be replaced by the measurement of halon cylinder walls, made by an approved service supplier;

.5 pressure test, with compressed nitrogen of a pressure 1.3 p_{rob}, of all pneumatic remote control pilot line pipelines, from pilot cylinders to distribution valves/cylinder valves – to be performed every ten years;

.6 hydraulic test, to a pressure of at least 1.5 p_{rob}, of pipes (manifold) from extinguishing medium cylinders (for inert gases) to isolating/distribution valves – to be performed every ten years;

.7 checking that all flexible hoses for connecting cylinders have been replaced at the intervals recommended by the manufacturer and not exceeding every ten years[39)].

Note: Inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

3.19 Aerosol Fire-extinguishing Systems for Machinery Spaces

The following should be conducted:

.1 internal examination of all control/distribution valves of the system;

.2 replacement of aerosol generators in accordance with the manufacturer's recommendations;

.3 internal examination and hydraulic test, to a pressure of 1.5 p_{rob}, of all dispersed aerosol canisters – to be performed every ten years;

.4 pressure test, with compressed nitrogen of pressure 1.3 p_{rob}, of all remote control pneumatic pilot lines, from pilot cylinders to aerosol generators – to be performed every ten years.

[39)] Instead of the replacement of flexible hoses, hydraulic test of the hoses to a pressure as required for cylinder hydraulic test is permitted

Note: Inspection of the system may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

3.20 Powder Fire-extinguishing Systems on Chemical Tankers and Gas Tankers (additional mark: CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 internal examination and hydraulic test, to pressure of 1.5 p_{rob}, of all powder containers – to be performed every ten years and after each emptying of the container. The hydraulic test may be replaced by the measurement of the container walls. Depending on the internal examination results, the hydraulic test may be waived;

.2 operation test of powder containers' safety valves;

.3 internal examination and hydraulic test, to pressure of 1.5 p_{rob}, of at least 10% of gas (powder carrier) pressure vessels and all remote control pilot cylinders – to be performed every ten years;

.4 laboratory test[40)] of the powder quality;

.5 tightness test, to a pressure of at least 1.25 p_{rob}, of pipelines from the container to isolating valve – to be performed every ten years.

3.21 Fire-extinguishing Systems for Deep-fat Cooking Equipment

The following thing should be done:

.1 hydraulic test, to a pressure of 1.5 p_{rob}, of the system extinguishing medium container – to be performed every ten years.

3.22 Galley Range Exhaust Ducts

The following should be conducted:

.1 hydraulic test, to a pressure of 1.5 p_{rob}, of the system extinguishing medium pressure vessel – to be performed every ten years;

.2 hydraulic test, to a pressure of 1.5 p_{rob}, of the fire extinguishing system pipes – to be performed every ten years.

3.23 Inert Gas Systems on Tankers and Gas Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 internal examination of the system components exposed to corrosion, such as: blowers, flue gas scrubbers, flue gas isolating valve, gas regulating valve, water seal and non-return valve;

.2 hydraulic test of all inert gas pressure vessels to a pressure of 1.5 p_{rob} – to be performed every ten years;

.3 tightness test, to a pressure of 1.25 p_{rob}, of the inert gas system piping – to be performed every ten years.

3.24 Fixed Fire Detection and Alarm Systems and Sample Extraction Smoke Detection Systems

The following should be conducted:

.1 close-up examination of control panel with the front panel removed. Checking the contacts and internal elements for the signs of burns and corrosion;

.2 operation test of each fire detector and manually operated call point – checking alarm inputs on control panel (for the system incapable of identifying each detector);

.3 operation test of detector failure alarm (for the system capable of identifying each detector);

.4 operation test of the alarm of main and emergency power supply loss;

.5 checking the emergency power supply accumulator batteries.

[40)] The test may be performed only by the powder manufacturer or recognized laboratory

3.25 Fixed Hydrocarbon Gas Detection Systems in Tanker Hull Spaces, Systems of Continuous Monitoring Hydrocarbon/Flammable Gas Concentration in Cargo Pump-rooms Used on Tankers and Gas Detection Systems Used on Tankers (additional mark: CRUDE OIL TANKER, PRODUCT CARRIER A, CHEMICAL TANKER, LIQUEFIED GAS TANKER)

The following should be conducted:

.1 close-up examination of gas analysis unit with the front panel removed. Checking the contacts and internal elements for the signs of burns and corrosion;

.2 calibration of the gas analysis unit setting to correspond to 10% or 30% of the lower flammability level of hydrocarbon/flammable vapours of the carried cargo – in accordance with the manufacturer's recommendations.

3.26 Low-location lighting of escape routes on passenger ships (additional mark: PASSENGER SHIP, RO-RO/ PASSENGER SHIP)

The following should be done:

.1 testing the luminanace of all low-location lighting – checking the lighting intensity, in accordance with the recommendations specified in IMO Res. A.752(18) and ISO 15370.

.2 Photoluminescent materials used in photoluminescent systems should ensure luminance of at least 15 mcd/m^2 measured after at least 10 *min* from the removal of all external light sources. The system should provide continuous luminance of at least 2 mcd/m^2 for 60 *min*.

.3 Electrically powered systems should provide luminance in accordance with section 8.2 in IMO Res. A.752(18).

.4 Unless single reading of luminance measurement in a particular area/space fulfils the above mentioned requirements, measurements should be taken in at least ten points established at constant spacing. If more than 30% of the readings are below the required values, then the low-location system should be replaced. Unless 20%÷30% readings fulfil the requirements, another inspection and luminance tests should be conducted or the system should be replaced.

.5 audible alarm test for evacuation guidance systems used as an alternative to low-location lighting systems arranged in accordance with MSC/Circ.1167 – sound assessment for compliance with the manufacturer's recommendations as specified in the *Certificate of approval*.

Note: Luminance test or audible alarm may be performed only by an approved service supplier or a firm duly authorized by the system manufacturer.

3.27 Ventilation Systems – Fire Dampers

The following should be done:

.1 operation test of one of automatic fire dampers in main fire divisions by simulation of exceeded temperature setting.

3.28 Fire-fighter's Outfit, Breathing Apparatus and Emergency Escape Breathing Devices (EEBDs)

The following should be conducted:

.1 hydraulic test, to a pressure of at least 1.5 p_{rob}, of all steel cylinders of breathing apparatus, emergency escape breathing devices and other air recharging cylinders – to be performed every five years. Cylinders made of aluminium and composite materials are subject to hydraulic test in accordance with the manufacturer's recommendations;

.2 internal examination of the regulating valves of breathing apparatus air cylinders and control valves of air recharging arrangements – to be performed every five years.

Note: The hydraulic tests of cylinders and internal examination of control valves may be performed only by an approved service supplier.

3.29 Portable and Mobile Fire-extinguishers

The following should be conducted:

.1 the replacement of such fire-extinguishers' components as elastic hoses, discharge nozzles, control valves – to be performed every ten years;

.2 internal examination and hydraulic test, to a pressure of at least 1.5 p_{rob}, of all fire-extinguisher containers and powder carrier cartridges) – to be performed every ten years;

.3 for mobile fire-extinguishers – close-up examination of at least one extinguisher of each type manufactured in the same year.

Note: The inspection of fire-extinguishers may be carried out only by an approved service supplier.

3.30 Welding Gases (oxygen or acetylene) Installations

The following should be done:

.1 hydraulic test[41)], to a pressure of at least 1.5 p_{rob}, of all cylinders containing welding gases – to be performed every five years;

.2 hydraulic test, to a pressure of at least 1.5 p_{rob}, of all pipes from cylinders to the pressure-reducing valves – to be performed every five years;

.3 inspection of the pressure-reducing valves.

3.31 Gas Fuel Systems for Domestic Purposes

The following should be done:

.1 hydraulic test[42)] of all gas receptacles, to a pressure of at least 1.5 p_{rob}, to be performed every five years.

.2 hydraulic test, to a pressure of at least 1.5 p_{rob}, of all pipes from cylinders to the pressure-reducing valves – to be performed every five years;

.3 inspection of the pressure-reducing valves.

3.32 Medical Oxygen Cylinders

The following should be done:

.1 hydraulic test[43)], to a pressure of at least 1.5 p_{rob}, of all oxygen cylinders – to be performed every five years;

.2 hydraulic test, to a pressure of at least 1.5 p_{rob}, of all pipes from cylinders to the pressure-reducing valves – to be performed every three years;

.3 inspection of the pressure-reducing valves.

3.33 Fire-extinguishing Systems and Equipment on Fire-fighting Ships (additional mark: FIRE FIGHTING SHIP…)

A. Fire-extinguishing System with Water and Foam Monitors (for protection of external objects)

The following should be conducted:

.1 internal examination of control/isolating valves on water supply pipes and foam concentrate pipes;

.2 tightness test of water supply and foam concentrate pipes at the maximum pressure provided by the pump;

.3 operation test of all foam proportioners or other foam mixing devices – checking the mixing ratio (the mixing ratio tolerance should be between +30% and –10% of the nominal mixing ratio specified for the system);

.4 foam proportioners test may be replaced by the test of foam monitor – checking the foam generation and supply on the ship deck and the generated foam quality assessment. During the test, the ship deck should be protected to prevent the foam from getting overboard and contaminating the port/shipyard basin;

.5 flushing all the foam concentrate pipes with fresh water, draining the pipes and purging with air after the tests are complete.

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41) The hydraulic test and inspection may be performed only by an approved service supplier

42) The hydraulic test and inspection may be performed only by an approved service supplier

43) The hydraulic test and inspection may be performed only by an approved service supplier

B. Water Screen Systems

The following should be conducted:

.1 internal examination of isolating/section valves;

.2 blowing through, with compressed air or nitrogen, all pipes and discharge nozzles.

3.34 Helicopter Facilities

A. Foam Fire-extinguishing System

The activities specified in A.1 of sub-chapter 3.33 should be conducted.

List of IMO documents referred to in this *Publication*

1. Res.A.951(23): Improved Guidelines for Marine Portable Fire Extinguishers.
2. Res.A.1053(27): Survey guidelines under the harmonized system of survey and certification (HSSC), 2011.
3. Res.A.1076(28): Amendments to Survey guidelines under the harmonized system of survey and certification (HSSC), 2011.
4. MSC/Circ.670: Guidelines for the performance and testing criteria and surveys of high-expansion foam concentrates for fixed fire-extinguishing systems.
5. MSC.1/Circ.798: Guidelines for the performance and testing criteria and surveys of medium-expansion foam concentrates for fixed fire-extinguishing systems.
6. MSC/Circ.1167: Functional Requirements and Performance Standards for the Assessment of Evacuation Guidance Systems.
7. MSC/Circ.1168: Interim Guidelines for the Testing, Approval and Maintenance of Evacuation Guidance Systems Used as an Alternative to Low-location Lighting Systems.
8. MSC.1/Circ.1312/Corr.1: Revised Guidelines for the Performance and Testing Criteria, and Surveys of Foam Concentrates for Fixed Fire-extinguishing Systems.
9. MSC.1/Circ.1318: Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire-extinguishing Systems.
10. MSC.1/Circ.1432: Revised Guidelines for the Maintenance and Inspections of Fire Protection Systems and Appliances.
11. MSC.1/Circ.1516: Amendments to the revised guidelines for the maintenance and inspection of fire protection systems and appliances.

List of amendments effective as of 1 October 2017

Item	*Title/Subject*	*Source*
2.4.1	Guidelines regarding survey of A and B fire class doors have been amended	Conclusions based on non-compliance statistics of PSC audits
2.34	Guidelines regarding survey of hydrocarbon gas detection systems on tankers/ chemical tankers have been clarified	Comment of the users
2.37.10	Guidelines for the checking of the number of spare breathing apparatus cylinders for crew drills have been added	SC275/Rev.1
3.15.4	Guidelines regarding pressure test of CO_2 manifold have been amended	Comment of the users - MSC.1/Circ.1318
3.29	Guidelines regarding replacement of extinguishing agent in portable fire extinguishers during class renewal survey have been deleted	Comment of the users

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