



TECHNICAL CIRCULAR No. 015 of 07 July 2011

To:	All Surveyors
Applicable to flag:	All Flags
Subject:	Guidelines for the Maintenance, Inspection of Fire-Protection System and Appliances
Reference:	SAFETY- Interpretation of SOLAS Chapter II-2.

1. PURPOSE

This Circular establishes new guidelines applicable to Inspection, maintenance, testing and survey requirements of all fixed and portable fire protection extinguishers, and other fire-fighting appliances. Certain maintenance procedures and inspection may be performed by competent crewmembers, while others should be performed by persons specially trained in maintenance; the onboard maintenance plan should indicate which part of the recommended inspection and maintenance should be completed by trained personnel.

It should be noted that the general requirements contained in this Circular are not an all-inclusive list of maintenance or inspection items for fire protection systems, fire fighting appliances, and emergency equipment.

2. Application

These guidelines apply to all ships.

3. GENERAL REQUIREMENTS FOR THE MAINTENANCE AND INSPECTION OF FIRE PROTECTION SYSTEM AND APPLIANCES

3.1 Operational readiness

- a. All fire protection system and appliances should be, at all times, in good order and available for immediate use while the ship is in service. If a fire protection system is under repair, then suitable arrangements acceptable to CONARINA, shall be made to ensure safety is not diminished.
- b. In cases where CONARINA determines that the equipment does not comply with the requirements of the corresponding mandatory regulations, the CONARINA surveyor will issue

the relevant Conditional Statutory Safety Certificate prior to sail.

3.2 Maintenance and Testing

Instructions for on-board maintenance, not necessarily by the ship's crew, and testing of active and passive fire protection systems and appliances should be easily understood, illustrated wherever possible, and, as appropriate, should include the following for each system or appliance:

- a. maintenance and repair instructions;
- b. schedule of periodic maintenance;
- c. list of replaceable parts; and
- d. log for records of inspections and maintenance, listing identified non-conformities and their targeted completion dates.

3.3 Weekly Testing and Inspections

Weekly testing inspections shall be carried out to ensure that:

- a. all public address systems and general alarm systems are functioning properly; and
- b. breathing apparatus cylinders do not present leakages.

3.4 Monthly testing and inspections

Monthly inspections should be carried out to ensure that:

- a. all fireman's outfits, fire extinguishers, fire hydrants, hose and nozzles are in place, properly arranged, and are in proper condition;
- b. all fixed fire-fighting system stop valves are in the proper open or closed position, dry pipe sprinkler systems have appropriate pressures as indicated by gauges; and
- c. all fire pumps are operated.

3.5 Quarterly testing and inspections

Quarterly inspections should be carried out to ensure that:

- a. the international shore connection is in proper condition;
- b. lockers providing storage for fire-fighting equipment contain proper inventory and equipment is in proper condition; and
- c. all fire doors and fire dampers are tested for local operation.

3.6 Annual inspections.

Annual inspections should be carried out to ensure that:

- a. fire detection systems are tested for proper operation, as appropriate;
- b. all fire doors and dampers are tested for remote operation;
- c. all accessible components of fixed fire-fighting systems are visually inspected for proper condition;
- d. all hydrants are tested for operation;
- e. all antifreeze systems are tested for proper solutions;
- f. all fire hoses are hydrostatically tested; and
- g. control valves of fixed fire-fighting systems should be inspected.

3.7 Five-year service

At least once every five years, the following inspections and tests should be carried out:

- a. control valves of fixed fire-fighting systems should be internally inspected.

4 SPECIFIC REQUIREMENTS FOR THE MAINTENANCE AND INSPECTION OF FIRE EXTINGUISHERS,

4.1 Annual Maintenance:

- a. all fire extinguishers must be checked for proper location, charging pressure, and condition; according to the ship's fire plan.
- b. extinguishers should be subject to periodical inspections in accordance with the manufacturer's instructions and serviced at intervals not exceeding one year. During these examinations plastic collars etc., which may conceal the condition of steel underneath, should be removed.
- c. service and inspection should only be undertaken by, or under the supervision of, a person with demonstrable competence *or an accredited service company*. The competent person may be either a member of the ship's crew who is trained and assigned to carry out this work or an accredited service company.
- d. all the extinguisher should be provided with a sign indicating it has been examined and a visual indication of discharge.
- e. records of inspections should be maintained. The records should show the date of inspection, the type of maintenance carried out and whether or not a pressure test was performed.
- f. instructions for recharging extinguishers should be supplied by the manufacturer and be available for use on board.
- g. charges of portable fire extinguishers should be renewed if, on checking, there is any indication of deterioration in the contents, but in any case after five years.
- h. carbon dioxide extinguishers and gas expellant cartridges should be recharged or renewed if gas loss by weight exceeds 10 % of original charge.
- i. Dry powder extinguishers may suffer from compaction when subject to vibration. At least one should be discharged annually and the retention of contents checked. When the retention is found to be in excess of 15% of the initial charge further extinguishers should be discharged to determine the compaction is occurring.
- j. *Any extinguisher or bottle which has excessive corrosion shall be replaced.*

4.2 Two year service:

- a. Every two years, portable fire extinguishers shall be checked by a service agent or facility certified by the manufacturer to perform this type of work and accepted by the Recognized Organization issuing the pertinent Safety Certificate. Every other year, these checks shall be carried out either by a service agent or facility (certified and accepted) or by a deck or engine officer trained and assigned to this duty.

4.3 Five year service:

- a. At least one extinguisher of each type manufactured in the same years and kept on board a ship should be test discharged at five year intervals (as part of a fire drill)

4.4 Ten year service:

- a. Containers of permanently pressurized and non-permanently pressurized portable fire extinguishers together with propellant cartridges should be hydraulically pressure tested in accordance with the recognized standard or the manufacturer at intervals not exceeding ten (10) years.
- b. The hydrostatic testing shall be carried out by an accredited service company or test facility. Test pressure and test date must be marked clearly on each

extinguisher (hard-stamping is only acceptable for CO2 extinguishers and propellant bottles. This test shall not be carried out on board.

c. Following the hydrostatic testing, a thorough inspection and internal examination must be carried out prior to recharging.

d. Test records or certificate must be provided and retained on board for inspection.

4 Spare Charges, Additional Fire Extinguishers and Refilling of Extinguishers

a. Spare charges shall be provided for 100% of the first 10 extinguishers and 50% of the remaining fire extinguishers capable of being recharged on board. Not more than 60% total spare charges are required. Instructions for recharging shall be carried on board.

b. For fire extinguishers which cannot be recharged onboard, additional portable fire extinguishers of the same quantity, type, capacity shall be carried in lieu of spare charge.

c. Periodic refilling of the cylinders should be in accordance with the manufacturer's recommendations. Only refills approved for the extinguisher may be used for recharging. Partially emptied extinguishers should be recharged.

e. Vessel's constructed on or after 1 January 2009 *should use the table showed in the MSC.1/Circ. 1275 as reference for the number and arrangement of portable fire extinguishers in accommodation spaces, service spaces, control stations machinery spaces of category A, other machinery spaces, cargo spaces, weather deck and other spaces on board ship. Such table is attached to this Merchant Marine Circular.

f. A portable fire extinguisher required for a small space may be located outside and near the entrance to that space.

g. If the wheelhouse is adjacent with the chartroom and has a door giving direct access to chartroom, no additional fire extinguisher is required in the chartroom. The same applies to safety centers if they are within the boundaries of the wheelhouse in passenger ships.

h. Two portable fire extinguishers, each having a capacity of no less than 6kg of dry powder or equivalent, should be provided when dangerous goods are carried on the weather deck, in open ro-ro spaces and vehicle spaces, and in cargo space as appropriate. Two portable fire extinguishers, each having a suitable capacity, should be provided on weather deck for tankers.

i. No portable fire extinguisher needs to be provided in cargo holds of containerships if motor vehicles with fuel in their tank for their own propulsion are carried in open or closed containers.

5 SPECIFIC GUIDELINES FOR MAINTENANCE AND INSPECTION OF FIXED GAS FIRE-EXTINGUISHING SYSTEMS

An onboard maintenance plan should be included in the ship's safety management system and should be based on the system manufacturer's recommendations including the ones listed in paragraph 3.2 above.

In addition to the general requirements for the maintenance and inspection of fire-protection

systems and appliances, the fixed gas fire-extinguishing systems must comply with the following inspection plan:

5.1 Monthly inspections:

At least every 30 days a general visual inspection should be made of the overall system condition for obvious signs of damage, and should include verification that:

- a. all releasing controls are in the proper position and readily accessible for immediate use;
- b. all discharge piping and pneumatic tubing is intact and has not been damaged;
- c. all high pressure cylinders are in place and properly secured;
- d. the alarm devices are in place and do not appear damaged; and
- e. all the installation using extinguishing gas are free from leakage.
- f. all stop valves are in the closed position.

In addition, on low pressure systems the inspections should verify that:

- a. the pressure gauge is reading in the normal range;
- b. the liquid level indicator is reading within the proper level;
- c. the manually operated storage tank main service valve is secured in the open position; and
- d. the vapour supply line valve is secured in the open position.

5.2 Quarterly inspections:

- a. all CO₂ bottle connections for cable operating system clips should be checked for tightness on fixed fire-extinguishing installations.

5.3 Annual inspections:

The following minimum level of maintenance and inspections should be carried out in accordance with the system manufacturer's instructions and safety precautions:

- a. the boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that has created uncloseable openings that would render the system ineffective;
- b. all storage containers should be visually inspected for any signs of damage, rust or loose mounting hardware. Cylinders that are leaking, corroded, dented or bulging should be hydrostatically retested or replaced;
- c. system piping should be visually inspected to check for damage, loose supports and corrosion. Nozzles should be inspected to ensure they have not been obstructed by the storage of spare parts or a new installation of structure or machinery;
- d. the manifold should be inspected to verify that all flexible discharge hoses and fittings are properly tightened; and
- e. all entrance doors to the protected space should close properly and should have warning signs, which indicate that the space is protected by a fixed carbon dioxide system and that personnel should evacuate immediately if the alarms sound. All remote releasing controls should be checked for clear operating instructions and indication as to the space served.

5.4 Two Yearly Inspections:

At least biennially (intervals of 2 years \pm 3 months) in passenger and cargo ships, the following maintenance should be carried out (to assist in carrying out the recommended maintenance, examples of service charts are set out in the appendix of reference) herewith

attached to this circular:

- a. all high pressure cylinders and pilot cylinders should be weighed or have their contents verified by other reliable means to confirm that the available charge in each is above 90% of the nominal charge. Cylinders containing less than 90% of the nominal charge should be refilled. The liquid level of low pressure storage tanks should be checked to verify that the required amount of carbon dioxide to protect the largest hazard is available;
- b. the hydrostatic test date of all storage containers should be checked; and
- c. the discharge piping and nozzles should be tested to verify that they are not blocked. The test should be performed by isolating the discharge piping from the system and flowing dry air or nitrogen from test cylinders or suitable means through the piping. In addition, the following maintenance should be carried out by service technicians/specialists:

- a. Where possible, all activating heads should be removed from the cylinder valves and tested for correct functioning by applying full working pressure through the pilot lines. In cases where this is not possible, pilot lines should be disconnected from the cylinder valves and blanked off or connected together and tested with full working pressure from the release station and checked for leakage. In both cases this should be carried out from one or more release stations when installed. If manual pull cables operate the remote release controls, they should be checked to verify the cables and corner pulleys are in good condition and freely move and do not require an excessive amount of travel to activate the system;
- b. all cable components should be cleaned and adjusted as necessary, and the cable connectors should be properly tightened. If the remote release controls are operated by pneumatic pressure, the tubing should be checked for leakage, and the proper charge of the remote releasing station pilot gas cylinders should be verified. All controls and warning devices should function normally, and the time delay, if fitted should prevent the discharge of gas for the required time period; and
- c. after completion of the work, the system should be returned to service. All releasing controls should be verified in the proper position and connected to the correct control valves. All pressure switch interlocks should be reset and returned to service. All stop valves should be in the closed position.

5.5 Ten Year Service:

- a. High pressure cylinders should be subject to periodical tests at intervals not exceeding 10 years. At the 10-year inspection, at least 10% of the total number provided should be subjected to an internal inspection and hydrostatic test. If one or more cylinders fail, a total of 50% of the onboard cylinders should be tested. If further cylinders fail, all cylinders should be tested. Flexible hoses should be replaced at the intervals recommended by the manufacturer and not exceeding every 10 years;
- b. Hydrostatic testing for the fixed CO₂ system shall be carried out by a servicing facility or agent which has been certified by the manufacturer to perform this type of work and accepted by the Recognized Organization issuing the pertinent safety certificate. Test certificates must be provided and kept on board for inspections.

Test date and pressure must be stamped on each bottle. This test shall not be carried on board;

- c. For subsequent 10-year services, alternation of the inspected cylinders must be carried out, i.e. different cylinders must be inspected from those done in the previous services if 100% of them were not inspected; and
- d. Ships of 10 years or older coming into our registry will be required to carry this test at the next scheduled dry-docking.

5.6 Additional Requirements for Halon Systems:

- a. Halon installations of fire-extinguishing systems on board ships, which keel was laid or at a similar stage of construction on or after October 1994 are prohibited. Moreover, full-scale tests of Halon fire-extinguishing systems on board ships are prohibited since January 1992 in accordance with Resolution A. 719(17)/2(b). However, an annual leakage check shall be carried out as per as MSC/Circ. 600. The Chief Engineer can carry out this test if provided with the proper equipment and training;
- b. During the annual leakage check, if any cylinder showing signs of leakage, loss of contents exceeding 5% from the installed quantity, signs of mechanical damage or excessive corrosion, must be withdrawn from service.

6 SPECIFIC GUIDELINES FOR MAINTENANCE AND INSPECTION OF FIXED FOAM FIRE-EXTINGUISHING SYSTEMS

- a. The first periodical control of foam concentrates stored on board should be performed not more than 3 years (from the original installation date), after that, every year;
- b. However, paragraph a. the chemical stability test for protein-based alcohol-resistant foam concentrate should be performed prior to delivery to the ship and annually thereafter.
- c. a record of the age of the foam concentrates and of subsequent control should be kept on board, readily available for inspection; and
- d. In accordance to MSC/Circ 1312, MSC/Circ 670 and MSC/Circ.798 the tests, control or analysis of foam will be performed by an independent or manufacturer's laboratory, which is accepted by CONARINA.

7 SPECIFIC GUIDELINES FOR MAINTENANCE AND INSPECTION OF FIXED DRY-POWDER FIRE-EXTINGUISHING SYSTEMS

7.1 Annual Inspections:

- a. The system should be inspected and the dry powder charge should be agitated with moisture free nitrogen, using "bubbling" connections where provided. **Note:** *due to the powder's affinity for moisture, any nitrogen gas introduced for agitation must be moisture free.*

7.2 Two Yearly Inspections:

a. In addition to the regular shipboard inspections, the systems should be inspected at least once every two years by an accredited service agent. This inspection should include:

- blow-through with nitrogen to ensure associated pipes and nozzles are clear;
- operation test of local and remote controls and section valves; and
- contents verification of propellant gas cylinders containing nitrogen (including remote operating stations).

b. Sample dry powder test for moisture absorption should be carried out by an accredited company ashore.

c. The powder containment vessels safety valves and discharge hoses should be subject to a full working pressure test every two (2) years.

7.3 Ten Yearly Test:

a. Powder containment vessels and associated piping should be subject to hydraulic testing carried out by an accredited service agent at intervals not exceeding 10 years.

Note: The replenishment and test regime for these high-pressure nitrogen cylinders is identical to that for CO₂ cylinders for fixed-gas fire extinguishing systems.

8 SPECIFIC GUIDELINES FOR MAINTENANCE AND INSPECTION OF AUTOMATIC SPRINKLER AND FIXED PRESSURE WATER SPRAY SYSTEMS

These systems should be regularly inspected to ensure that all valves are in the correct position for operation. Level and pressures should be maintained in pressurized storage tanks and there should be no obvious leakage. It should be tested by a competent person as per the manufacturer's instructions, and as a minimum should include the following:

8.1 Monthly Inspections and Test:

Monthly inspections should be carried out to ensure that:

- a. auto start function of sprinkler system pumps should be tested to ensure they automatically operate on system pressure loss.
- b. sprinkler system pressure tanks have correct levels of water as indicated by glass gauges;
- c. all sprinkler system pumps automatically operate on reduction of pressure in the systems;

8.2 Quarterly Tests:

a. All automatic alarms and control gear for the sprinkler systems should be tested using the test valves and procedures for each section.

8.3 Annual Tests:

- a. water spray fixed fire-fighting systems should be tested for correct operation;
- b. all fire pumps, including sprinkler system pumps should be flow tested to ensure design pressures and flows;
- c. sprinkler system connections from the ship's fire main are tested for operation;
- d. Alarms, pressure switches and control gear settings should be verified; and
- e. All associated relief valves should be tested.

8.4 Five Yearly Test:

a. In addition to the annual tests indicated above, the pressure tank and all check and control valves should be internally inspected. Also checks to be carried out to confirm that distribution pipe work is free from corrosion and blockage.

9 Self-contained Breathing apparatus (SCBA), Emergency Escape Breathing Devices (EEBD's) and Compressed Air Cylinders for Survival Craft Air Systems:

Weekly testing inspections shall be carried out to ensure that breathing apparatus cylinders maintain charged pressure.

9.1 Annual inspections:

a. All SCBA and compressed air cylinders for survival craft shall be examined at least annually by an accredited company ashore. If applicable, the breathing apparatus air-recharging systems should be checked for air quality as part of the annual statutory survey for the Cargo Ship Safety Equipment Certificate.

b. EEBD's shall be examined at least annually by suitably qualified ship's staff, or by an accredited service company.

9.2 Two Yearly inspections:

a. All SCBA's cylinders shall be checked by a service agent or facility certified by the manufacturer to perform this type of work and accepted by CONARINA. Every other year, these checks shall be carried out either by a service agent or facility or by a deck or engine officer trained and assigned to this duty.

9.3 Five yearly tests of SCBA and EEBD Air Cylinders:

a. Hydrostatic testing for all SCBA's and survival craft compressed-air cylinders shall be carried out by a servicing facility or agent certified by CONARINA once every five years or when recommended by the manufacturer if less than five years.

b. Test certificates must be provided and kept on board for inspections. Test date and pressure must be stamped or tagged on each cylinder. This test shall not be carried on board.

10 FIRE PROTECTION –PAINT LOCKERS

10.1 Paint lockers shall be protected by:

a. a carbon dioxide system, designed to give a minimum volume of free gas equal to 40% of the gross volume of the protected space; or

b. a dry powder system, designed for at least 0.5 kg powder/m³; or

c. a water spraying or sprinkler system, designed for 5 l/m² min. Water spraying systems may be connected to the fire main of the ship; or

d. The fitting of a portable fire extinguisher immediately outside the entrance to the paint locker. The number of portable extinguishers is to be adequate to the size of the paint locker as determined by CONARINA.

Note: In any case, the system shall be operable from outside the protected space.

11 SOLAS - Emergency Fire Pump

Gasoline engine driven portable emergency fire pumps are accepted on board cargo ships less than 2000 GRT. Proper precautions must be observed in the storage and handling of gasoline with this equipment.

12 Minimum Number of EEBD's in Machinery Spaces.

12.1 The maximum number of persons (i.e. engineers and ratings) working during a normal day of operation shall be understood as the sum of ratings (from the engine department) and engineers on the ship's Minimum Safe Manning Certificate. If this sum exceeds six persons, then six EEBD's will be the minimum number required in machinery spaces.

All surveyors to CONARINA must follow the above requirements during their surveys.

REFERENCES: SOLAS Chapter II-2.

Kindest Regards,
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