

Subject

Maintenance, inspection and test of Fire-Protection Systems and Appliances on board the Isle of Man-registered ships

ClassNK

Technical Information

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To whom it may concern

The Isle of Man Ship Registry has informed ClassNK of Industry Circular No.6, "Periodic Inspection, Testing and Maintenance of Compressed Gas Cylinders, Fire Extinguishers and Fixed Fire-Protection Systems". As necessary, please refer to the original text of the Guideline which is available on Isle of Man Government Internet Homepage (<http://www.iomshipregistry.com>).

This Circular sets out the requirements for inspection, testing and maintenance of compressed gas cylinders, fire extinguishers and fire protection systems and appliances.

1. General

- (1) All fire protection systems and appliances should at all times be in good order and available for immediate use while the ship is in service.
- (2) If a fire protection system is under repair the Ship Registry shall be contacted stating what suitable arrangements have been made to ensure safety is not diminished. If the Ship Registry is satisfied with the arrangements approval will be given and where necessary an exemption shall be issued.

2. Maintenance and testing

- (1) Instructions for on-board maintenance 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.
 - (i) Maintenance and repair instructions
 - (ii) Schedule of periodic maintenance
 - (iii) List of replaceable parts
 - (iv) Log for records of inspections and maintenance, listing identified non-conformities and their targeted completion dates.

3. General testing and inspections

This only applies to items not mentioned in other section.

(1) Weekly

- (i) All public address systems and general alarm systems are functioning properly.

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NOTES:

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(2) Monthly

- (i) All fireman's outfits, fire extinguishers, fire hydrants, hoses and nozzles are in place, properly arranged and in a ready to use condition
- (ii) All fixed fire-extinguishing installations using extinguishing gas are free from leakage.

(3) Quarterly

- (i) The international shore connection is in a ready to use condition, and provided with appropriate securing devices.
- (ii) Lockers providing storage for fire-fighting equipment contain proper inventory and equipment is in a ready to use condition.
- (iii) All fire doors and fire dampers are tested for local operation.
- (iv) All CO₂ bottle connections for cable operating system clips should be checked for tightness on fixed fire-extinguishing installation.
- (v) All hydrants are tested for operation.

(4) Annually

- (i) Fire detection systems are tested for proper operation, as appropriate.
- (ii) All fire doors and dampers are tested for remote operation.
- (iii) All antifreeze systems (where fitted) are tested for proper solutions.
- (iv) All fire hoses are hydrostatically tested.

4. Fire Extinguishers

Fire Extinguisher includes portable and semi-portable unit of all types.

Refer to Appendix 2 for the inspection guide for portable fire extinguishers.

(1) Inspection

- (i) All extinguishers should be inspected monthly to check for proper location, charging pressure and condition by a competent person.
- (ii) Each extinguisher should be marked clearly to indicate the date upon which it has been inspected.

(2) Testing

- (i) All types of portable extinguishers are to be hydraulically tested in accordance with a recognized standard or the manufacturer's instruction at intervals not exceeding 10 years, unless the extinguisher is found to be defective during an inspection.
- (ii) The hydraulic test period for semi portable fire extinguishers should be conducted as per the manufacturer's guidelines.
- (iii) Hydraulic testing must be carried out by an accredited service agent or test facility.
- (iv) At least one portable extinguishers of each type manufactured in the same year and kept on-board a ship should be discharged at five yearly intervals (as part of a fire drill)
- (v) Instructions for recharging extinguishers should be supplied by the manufacturer and be available for use on-board

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- (vi) Prior to recharging an extinguisher a thorough inspection and internal examination must be carried out.
- (vii) The test pressure and test date must be marked clearly on each extinguisher. "Hard-stamping" is only acceptable for CO₂ extinguishers and propellant bottles.
- (viii) Test certificates or test records must be provided and retained on board for inspection.
- (ix) Propellant cartridges for fire extinguishers (e.g. CO₂ cartridges) with a capacity not exceeding 600ml, do not require hydraulic testing. The shelf life is 20 years although it is recommended they are not refilled after 15 years. The cartridges should be inspected annually and weight-checked. Any bottles showing signs of wastage, deterioration or weight loss in excess of 10% should be replaced.
- (x) Propellant bottles in excess of 600ml for semi portable fire extinguishers should be hydraulically tested every 10 years.

5. Cylinders for SCBA, Medical Oxygen and Compressed Air Cylinders for Survival Craft Air Systems

SCBA cylinders includes compressed air cylinders for all breathing apparatus, escape sets and rescue equipment.

(1) Inspection

- (i) SCBA cylinders should be inspected weekly to ensure there are no leakages.
- (ii) All cylinders, high pressure fittings and hoses should be externally examined annually by a competent person.
- (iii) Medical oxygen has a limited shelf life of 3 years and should be landed ashore for re-charging at the expiry date.
- (iv) Breathing apparatus air-recharging systems should be checked annually to ensure the air quality is to a recognized national standard. (e.g. BS EN 12021, or USCGA grade D or better.)
- (v) SCBA cylinders should be used on a rotation basis in drills and should have their air charge used or blown-off and re-filled as per the manufacturer's guidelines.

(2) Testing

- (i) Medical oxygen pressure regulators should be serviced at least every 5 years.
- (ii) The maximum interval between hydraulic tests for solid drawn steel cylinders for SCBA (as defined above) and for survival craft self-contained air support cylinders is 5 years. Composite cylinders may require more frequent testing as stipulated by manufacturer's instructions.
- (iii) Medical oxygen cylinders have a maximum interval between hydraulic tests of 5 years.
- (iv) Hydraulic testing must be carried out by an accredited service agent or test facility.
- (v) Following the hydraulic test, a thorough inspection and internal examination must be carried out prior to recharging.
- (vi) The test pressure and test date must be stamped clearly on each steel cylinder. Composite cylinders will require a permanent marking or tag.
- (vii) Test certificates must be provided and retained on board for inspection.

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6. Cylinders for High-Pressure Fixed Gas Fire Extinguishing Systems

(1) Inspection

- (i) Annual inspections should be carried out by a competent person and should include those items recommended by the system manufacturer and as a minimum should include the following:
- (ii) Visual inspection of all gas storage cylinders and their external condition, securing arrangements, hoses, linkage cables etc..
- (iii) Visual inspection of system piping for any signs of damage or corrosion.
- (iv) At least 10% of the cylinders should be subject to a weight or liquid level check
- (v) Biennial inspections of the gas storage cylinders should be carried out by an accredited service agent. This inspection should be conducted in conjunction with the service for the entire system and should include:
 - (vi) Visual inspection of each cylinder, fittings and securing arrangements.
 - (vii) Function test of the system controls, alarms and timer relays with the cylinder bank disconnected and using test cylinders to simulate operation of the system.
 - (viii) An accurate determination of the contents of all bottles and comparison with original readings (e.g. liquid level gauging, test weighing, etc.).
 - (ix) Blow-through with air to ensure the associated pipelines and nozzles are clear.
 - (x) Any cylinders showing signs of mechanical damage, excessive corrosion, or loss of contents exceeding 10% of installed quantity for CO₂ or 5% for Halon should be withdrawn from service and sent ashore for full periodic service and inspection. If more than 10 years have elapsed since initial pressure test at manufacturer, they will require to be hydraulically tested before filling.
- (xi) It should be noted that the ambient temperature and type of content check used must be included in the inspection report. Level check is only accurate at ambient temperatures below 26 °C for CO₂.

(2) Testing

- (i) The hydraulic pressure test period for these high-pressure cylinders:
- (ii) First pressure test within 20 years of initial pressure test at manufacture, provided annual inspections have been carried out with satisfactory results.
- (iii) Subsequent pressure tests every 5 years thereafter.

(3) Testing for High-Pressure Halogenated Hydrocarbon (Halon) systems

- (i) The Isle of Man Ship Registry strongly advises owners to consider replacing their existing Halon systems before the hydrostatic test of the cylinders is due. However, where problems arise the following may be considered for which special application must be made on a ship-by ship basis.
- (ii) Due to the environmental implications of emptying, testing and re-charging of these cylinders and the reduced risk of internal corrosion due to the absorption of moisture by the Nitrogen pressurization gas, the Isle of Man will accept postponement of pressure testing providing the external condition of the cylinders remains acceptable.

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- (iii) In order to extend the cylinder test period beyond 20 years, the Isle of Man require a thorough examination of all cylinders be carried out by an accredited service agent. Where each cylinder is found to be in a satisfactory condition with no significant signs of pitting, corrosion, fretting or cracking, this Administration will permit the hydraulic test of all the cylinders to be postponed for a further 5 years, i.e. 25 years from initial test date for which a letter will be issued to the vessel upon receipt of the inspection report.
7. Foam Systems, to include all foam types: FP; AFFF; FFFP; ARFFF
- (1) Foam sampling - Fixed systems:
- (i) An analysis of foam samples must be undertaken after 3 years from date of manufacture and annually thereafter.
 - (ii) Samples should be:
 - (a) As representative as practical, e.g. taken from top, middle and bottom of tanks where arrangement permits, and placed in an uncontaminated container.
 - (b) Analyzed by an independent or manufacturer's laboratory and the results of analyses must be kept on board and readily available for inspection.
- (2) Foam sampling - Portable systems
- (i) Check the batch numbers and establish the age of the compound. If within the manufacturer's recommended shelf life, then the compound does not need to be tested provided the drums remain sealed with no visible signs of degradation.
 - (ii) If the drum has been opened or records of manufacture are not available then the ship's staff can complete on-board testing on an annual basis per batch, in accordance with manufacturer's instruction to ensure the foam compound remains effective. The drums should be replaced when they exceed the manufacturers recommended shelf life.
- (3) Inspection and testing of fixed foam installations
- (i) Routine planned maintenance in accordance with the manufacturer's recommendations should be supplemented with a thorough inspection of the system and check of its full functionality once every 2 years by an accredited service agent.
 - (ii) In addition to the regular shipboard inspections and where practicable, an occasional system test to produce foam in a drill scenario should be considered subject to any local restrictions relating to pollution. Where possible, the mixing ratio of the foam should be verified. Any concentrate used should be replenished as required with the same manufacturer's foam type to ensure compatibility.
 - (iii) Care should be taken to ensure that the system is correctly flushed on completion to prevent blockage of small bore pipework and internal corrosion. In addition great care should be taken to ensure that system valves are left in the correct operational position to prevent contamination of the foam tank.

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8. Fixed Dry Powder Systems

- (1) Annually, the system should be inspected by a competent person and the dry powder charge should be agitated with nitrogen, using "bubbling" connections where provided.
- (2) Due to the powder's affinity for moisture, any nitrogen gas introduced for agitation must be moisture free.
- (3) In addition to the regular shipboard inspections, the systems should be inspected at least once every 2 years by an accredited service agent.
- (4) Inspection
 - (i) Blow-through with nitrogen to ensure associated pipes and nozzles are clear.
 - (ii) Operation test of local and remote controls and section valves.
 - (iii) Contents verification of propellant gas cylinders containing nitrogen (including remote operating stations).
 - (iv) Sample of dry powder should be tested for moisture absorption.
- (5) Testing
 - (i) Dry powder tanks should be examined for signs of corrosion when the dry powder has failed a sample test and is being replaced.
 - (ii) A hydraulic test should be carried out by an accredited service agent if an internal examination reveals signs of corrosion or any other relevant defects.
 - (iii) The powder containment vessels safety valves and discharge hoses should be subjected to a full working pressure test every 2 years.
 - (iv) The replenishment and test regime for these high-pressure nitrogen cylinders is identical to that for CO₂ cylinders for fixed gas fire extinguishing systems.

9. Automatic Sprinkler and Fixed Pressure Water Spray Systems

- (1) These systems should be inspected and tested by a competent person as per the manufactures instructions, and as a minimum should include the following:
- (2) Inspection

The system should be regularly inspected to ensure that all valves are in the correct position for operation. Levels and pressures should be maintained in pressurized storage tanks and there should be no obvious leakage. Dry pipe sprinkler systems shall have appropriate pressures as indicated by gauges.
- (3) Testing
 - (i) Monthly: autostart function of sprinkler system pumps should be tested to ensure they automatically operate on system pressure loss.
 - (ii) Quarterly: all automatic alarms and control gear for the sprinkler systems should be tested using the test valves and procedures for each section.
 - (iii) Annually: the following should be carried out:
 - (a) Water spray fixed fire fighting systems should be tested for correct operation
 - (b) Sprinkler pumps should be flow tested to ensure design pressures and flows
 - (c) Alarms, pressure switches, and control gear settings should be verified
 - (d) The sprinkler system connections from the ship's fire main should be tested
 - (e) All associated relief valves should be tested

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- (f) 5 yearly, 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 pipework is free from corrosion and blockage.
- (4) In the case of sprinkler systems protecting passenger accommodation, an Isle of Man Ship Registry Surveyor will inspect and test the system using the criteria stated above during Passenger Ship Safety Certificate Renewal surveys.

10. Hydraulic pressure testing

- (1) The test pressure applied for all cylinders and extinguishers should be 1.5 x maximum working pressure, which should be held for at least one minute.
- (2) The test pressure should be clearly stamped on each compressed gas cylinder and clearly marked on each extinguisher.
- (3) Where cylinders are sent ashore for re-charging, the pressure test requirements for the Local Authority may override, but should not be less stringent, than the above requirements.

11. Rejection

- (1) Extinguishers or cylinders failing any inspection or test shall be rendered unserviceable and disposed of accordingly.
- (2) Any entry in the records must be made to show when any extinguisher or cylinder has been rejected and for what reason.

12. Records

- (1) Records of inspection, maintenance and testing of all extinguishers and cylinders must be maintained and readily available on board for inspection.
- (2) These records should clearly identify each individual extinguisher or cylinder and its inspection status.

13. Competent Person

For the purpose of this Industry Circular only, a competent person is defined as:

- (1) A member of the ship's crew who has the necessary training and who carried out the work onboard under direct supervision of a senior officer holding an advanced fire fighting certificate (experienced person holding a Merchant Shipping STCW II/2 or III/2 certificate of competency and an Advanced Fire Fighting certificate). All work should be carried out as part of a planned maintenance system with all necessary procedures, work instructions, manuals, tools, spares and calibrated test equipment readily available. Or
- (2) An accredited service agent.

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Minimum requirements for spare charges required to be carried on-board

Portable Fire Extinguishers	For Ships constructed before 01 July 2002 50% for each type of fire extinguisher required to be provided. If they cannot be recharged on-board* an additional portable fire extinguisher of the same type, or its equivalent, shall be provided. For ships constructed on or after 01 July 2002 100% for the first 10 then 50% of the remaining extinguishers. Not more than 60 total spare charges are required. If they cannot be recharged on-board* an additional portable fire extinguisher of the same quantity, type and capacity shall be provided. * For example portable CO2 extinguishers
Portable Foam Applicator Unit	1 spare tank of 20 litres foam concentrate.
Semi Portable Foam, Dry powder and CO2 Extinguishers	Nil
SCBA Air bottles	Ship constructed before 01 July 2002 Every breathing apparatus shall be provided with fully charged spare cylinders having a spare storage capacity of at least 2,400 litres of free air except that- i) if the ship is carrying five sets or more the total spare free air shall not be required to exceed 9,600 litres; or ii) if the ship is equipped with means for re-charging the air cylinders on-board this spare air may be reduced to 1,200 litres per cylinder and total storage of free air need not exceed 4,800 litres. Ship constructed on or after 01 July 2002 Two spare charges shall be provided for each required breathing apparatus. Passenger ships carrying not more than 36 passengers and cargo ships that are equipped with suitably located means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required apparatus. In passenger ships carrying more than 36 passengers, at least two spare charges for each breathing apparatus shall be provided. Passenger ships carrying > 36 passengers constructed on or after 01 July 2010 shall be fitted with a suitably located means for fully recharging breathing apparatus cylinders, free from contamination. The means for recharging shall be either – i) breathing air compressors supplied from the main and emergency switchboard, or independently driven, with a minimum capacity of 60 litres / min per required breathing apparatus, not to exceed 420 litres / min; or ii) self-contained high-pressure storage systems of suitable pressure to recharge the breathing apparatus used on board, with a capacity of at least 1,200 litres per required breathing apparatus, not to exceed 50,000 litres of free air.
EEBD	Ships constructed before 01 July 2002 No spares required. Ships constructed after 01 July 2002 Accommodation & Machinery spaces : 50% max 4

(To be continued)

Appendix 1 Inspection and testing guide

System or Appliance	Shipboard Inspection	Periodic Inspection and Service	Hydraulic Pressure Test	Marking and Documentation
Portable & Semi Portable Fire Extinguishers	In accordance with SMS procedures and manufacturer's instruction	Annually by a competent person (see Note 1) 5 Yearly discharge (see Note 2) Portable extinguishers also refer to Appendix 2	Portable 10 Years Semi Portable refer to manufacture's guidelines	Pressure Test date to be clearly marked (see Note 3) Inspection and PT certificates on board
SCBA and Medical O2 cylinders	In accordance with SMS procedures and manufacturer's instruction	Annually by a competent person (see Note 1) NB- O2 shelf life of 3 years	Steel – 5 years Composites – see manufacturer's instruction	Pressure Test date to be hard-stamped on cylinder. PT certificates on board
Air Cylinders for Survival Craft (TEMPSC)	In accordance with SMS procedures and manufacturer's instruction	Annually by a competent person (see Note 1)	5 years	Pressure Test date to be hard-stamped on cylinder. PT certificates on board
CO2 High Pressure Cylinders – Fixed installations	Annual inspection and function checks by a competent person (see Notes 1 & 4)	Every 2 years by an accredited service agent + level check (see Note 4)	Within 20 years and every 5 years thereafter	Pressure Test date to be hard-stamped on cylinder. Inspection & PT certificates on board
Halon High Pressure Cylinders - Fixed Installations	Annual inspection and function checks in accordance with SMS procedures	Every 2 years by an accredited service agent + level check (see Note 4)	External examination at 20 years to extend 25 years (see Note 5)	Pressure Test date to be hard-stamped on cylinder. Inspection & PT certificates on board
Cylinders for Refrigerant Gas, Nitrogen	Periodically check condition	Up to 15 years (Refer to Industry Circular Number 20))	Up to 15 years (Refer to Industry Circular Number 20)	Pressure Test date to be hard-stamped on cylinder
Foam Systems (fixed and portable)	Fixed systems- an accredited service agent to carry out a full inspection of the system and functionality every 2 years	Foam sample after 3 years then annually thereafter (see Note 6) For portable foam (see Note 7)	—	Foam sample certificates on board

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Fixed Dry Powder Systems	Powder charge agitated annually (N2 blow-through) & system inspected	Every 2 years by an accredited service agent + sample of dry powder tested for moisture absorption (see Note 6)	N2 propellant cylinders – 20 years then 5 years thereafter Safety valves and hoses 2 years	Last sample date marked clearly. Powder sample certificates on board
Automatic Sprinkler And Fixed Pressure Water Spray Systems	Regular inspections in accordance with SMS procedures and manufacturer's instructions	Annually by a competent person (see Note 1) 5 yearly internal inspection of pressure tank, check and control valves	—	All inspection certificates to remain on board

Notes:

1. The competent person may be :
 - a) A member of the ship's crew who has the necessary training and who carries out the work on-board under direct supervision of a senior officer holding an advanced fire fighting certificate (experienced person holding a Merchant Shipping STCW II/2 or III/2 certificate of competency and an Advanced Fire Fighting certificate). All work should be carried out as part of a planned maintenance system with all necessary procedures, work instruction, manuals, tools, spares and calibrated test equipment readily available; or
 - b) an accredited service agent.
2. At least one portable extinguishers of each type manufactured in the same rear and kept on board a ship should be test discharged at five yearly intervals (as part of a fire drill) .
3. Pressure test dates must be clearly marked. Hard-stamping is only permitted on CO2 extinguisher cylinders and propellant bottles.
4. Annually at least 10% of the cylinders should be subject to a weight or liquid level check. Biennial inspections should be carried out by an accredited service agent in conjunction with the service for the entire system.
5. This relaxation from the 20 years test period is permitted on a ship by ship basis for which application must be made to the Isle of Man Ship Registry. Any extension is granted subject to thorough examination (including NDT) by an accredited service agent, the details of which will be provided upon application.
6. Sample analyses must be carried out by an accredited service agent ashore.
7. Portable foam sampling; if the foam is within the manufacturer's recommended shelf life the compound does not need to be tested provided the drums remain sealed with no visible signs of degradation. If the drum has been opened or records are not available on-board testing should be carried out on an annual basis per batch in accordance with the manufacturer's instruction.

(To be continued)

Appendix 2 Portable fire extinguisher inspection guide

Monthly Inspection	
External examination	Check for proper location, charging pressure and condition, which shall include an inspection for corrosion, dents or damage which may affect the safe operation of the extinguisher.
Annual Inspection	
Safety clip and indicating devices	Check to see if the extinguisher may have been operated.
Pressure indicating device	Where fitted, check to see that the pressure is within limits. Check that dust covers on pressure indicating devices and relief valves are in place.
Weight	Weight the extinguisher and check the mass compared to the fully charged extinguisher.
Hoses and nozzle	Check that hoses and nozzles are clear and undamaged.
Operating instructions	Check that they are in place and legible.
Inspection at recharge	
Water and foam charges	Remove the charge to a clean container if to be reused and check if it is still suitable for further use. Check any charge container.
Powder charges	Examine the powder for reuse. Ensure that it is free flowing and that there is no evidence of caking lumps or foreign bodies.
Gas cartridge	Examine for damage and corrosion.
Inspection at five and ten year intervals	
Inspection after discharge test	
Air passages and operating mechanism	Prove clear passage by blowing through vent holed and vent devices in the cap. Check hose, nozzle strainer, discharge tube and breather valve, as applicable. Check the operating and discharge control. Clean and lubricate as required.
Operating mechanism	Check that the safety pin is removable and that the lever is undamaged.
Gas cartridge	Examine for damage and corrosion. Weigh the cartridge to ascertain that it is within prescribed limits.
O-ring washers and hose diaphragms	Check O-rings and replace hose diaphragms if fitted.
Water and foam bodies	Inspect the interior. Check for corrosion and lining deterioration. Check separate containers for leakage or damage.
Powder body	Examine the body and check internally for corrosion and lining deterioration.
Inspection after recharge	
Water and foam	Replace the charge in accordance with the manufacturer's instruction.
Reassemble	Reassemble the extinguisher in accordance with the manufacturer's instructions.
Maintenance label	Fill in entry on maintenance label, including full weight.
Mounting of extinguishers	Check the mounting bracket or stand.
Report	Complete a report on the state of maintenance of the extinguisher.

Note - For ease of reference this inspection guide has been reproduced from IMO resolution A.951(23)

(To be continued)

For any questions about the above, please contact:

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