Subject

Periodic Inspection, Testing and Maintenance of Compressed Gas Cylinders, Fire Extinguishers and Fixed Fire-fighting System onboard the Isle of Man Flagged Vessels

ClassNK
Technical Information

No. TEC-0716
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To whom it may concern

Government of the Isle of Man has notified of Industry Circular No.6 Amended September 2006 for amended periodic inspection, testing and maintenance of compressed gas cylinders, fire extinguishers and fixed fire-fighting system onboard the Isle of Man Flagged Vessels as per attached.

This ClassNK Technical Information supersedes the previous ClassNK Technical Information No.TEC-0554 dated 10 November 2003.

For any questions about the above, please contact:

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Attachment:

1. Industrial Circular No.6 Amended September 2006
2. Industrial Circular No.2 Revised January 2007

Industry Circular No.

6

Amended September 2006

Government of the Isle of Man

Department of Trade and Industry

Notice to Surveyors, Shipowners, Managers and Classification Societies

Periodic Inspection, Testing and Maintenance of Compressed Gas Cylinders, Fire Extinguishers and Fixed Fire-fighting Systems.

This Industry Circular sets out the requirements for periodic servicing and testing of fire extinguishers, compressed gas cylinders and components of fixed fire-extinguishing systems on board Isle of Man registered vessels.

For ease of reference, a table of service and test periods has been set out in Appendix 1 to this Circular.

1. Fire Extinguishers

Fire extinguisher includes portable and semi-portable units of all types.

Inspection

- all extinguishers should be examined annually by a **competent person**.
- each extinguisher should be marked clearly to indicate the date upon which it has been examined.

Testing

- the hydraulic test period for **all types** of portable fire extinguishers should be conducted at intervals not exceeding **10 years**, unless the extinguisher is found to be defective during an inspection.
- the hydraulic test period for semi portable fire extinguishers should be conducted as per the manufacturer's guidelines.
- hydraulic testing must be carried out by an accredited service agent or test facility.
- all portable extinguishers should be discharged on a rotation basis at intervals not exceeding 5 years preferably during a training exercise with the competent person being present during the test.
- prior to recharging an extinguisher a thorough inspection and internal examination must be carried out.

- the test pressure and test date must be marked clearly on each extinguisher. Note: 'hard-stamping' is only acceptable for CO_2 extinguishers and propellant bottles.
- test certificates or test records must be provided and retained on board for inspection.

Note: Propellant bottles for fire extinguishers (e.g. CO_2 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.
Propellant bottles in excess of 600ml for semi portable fire extinguishers should be hydraulically tested every 10 years as stated in IMO Res A.951(23)

2. 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

Inspection

- all cylinders, high pressure fittings and hoses should be externally examined **annually** by a competent person.
- medical oxygen has a limited shelf life of 3 years and should be landed ashore for re-charging at the expiry date.
- breathing apparatus air-recharging systems should be checked annually to ensure the air quality is to a recognised national standard. (e.g. BS EN 12021, or USCGA grade D or better.)
- 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.

Testing

- oxygen pressure regulators should be serviced at least every **5 years**.
- 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 - stipulated by manufacturer's instructions.
- medical oxygen cylinders have a maximum interval between hydraulic tests of **5 years**.
- hydraulic testing must be carried out by an accredited service agent or test facility.
- following the hydraulic test, a thorough inspection and internal examination must be carried out prior to recharging.
- the test pressure and test date must be stamped clearly on each steel cylinder. Composite cylinders will require a permanent marking or tag.
- test certificates must be provided and retained on board for inspection.

3. Cylinders for high-pressure fixed gas fire-extinguishing systems
(for bulk CO_2 systems – refer to Industry Circular No. 2)

Inspection

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:

- visual inspection of all gas storage cylinders and their external condition, securing arrangements, hoses, linkage cables etc.
- visual inspection of system piping for any signs of damage or corrosion.
- at least 10% of the cylinders should be subject to a weight or liquid level check by a competent person.

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:

- visual inspection of each cylinder, fittings and securing arrangements.
- 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.
- an accurate determination of the contents of all bottles and comparison with original readings e.g. liquid level gauging, test weighing etc.
- blow-through with air to ensure the associated pipelines and nozzles are clear.

Any cylinders showing signs of mechanical damage, excessive corrosion, or loss of contents exceeding 10% of installed quantity for CO_2 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 manufacture, they will require to be hydraulically tested before refilling.
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 CO_2.

Note: On board inspection or test required by an accredited service agent, with the exception of pressure testing, may be carried out by a senior member of the ship's staff who has been successfully trained to carry out this work. In all cases, calibrated equipment must be used and all procedures and documentation must be in accordance with shipboard safety management systems.

Testing

The hydraulic pressure test period for these high-pressure cylinders:

- first pressure test within **20 years** of initial pressure test at manufacture, provided annual inspections have been carried out with satisfactory results.
- subsequent pressure tests every **5 years** thereafter.

Note: Testing for High-Pressure Halogenated Hydrocarbon (Halon) systems -
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.

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 pressurisation gas, the Isle of Man will accept postponement of pressure testing providing the external condition of the cylinders remains acceptable.

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.

4. Cylinders containing refrigerant gases, nitrogen and gases for burning equipment

These cylinders are not normally considered to be part of the ship's safety equipment. They are generally supplied full and exchanged or returned when empty. Ship's staff should, prior to accepting the cylinder on board, check the date stamp on the cylinders and ensure that no more than 5 years have elapsed since the last hydraulic pressure test.
For cylinders remaining on board, arrangements should be made for an exchange cylinder from ashore if more than 5 years have elapsed since the last hydrostatic test.

5. Foam Systems, to include all foam types: FP; AFFF; FFFP; ARFFF

Foam sampling - Fixed systems:

An analysis of foam samples must be undertaken **after 3 years** from date of manufacture and **annually thereafter.**

Samples should be:

- as representative as practical, e.g. taken from top, middle and bottom of tanks where arrangement permits, and placed in an uncontaminated container.
- analysed by an independent or manufacturer's laboratory and the results of analyses must be kept on board and readily available for inspection.

Foam sampling - Portable Systems:

Check the batch numbers and establish the age of the compound. If within the manufacturers' recommended shelf life, then 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 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 instructions to ensure the foam compound remains effective. The drums should be replaced when they exceed the manufacturers recommended shelf life.

Inspection and testing of Fixed Foam installations:

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.

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 manufacture's foam type to ensure compatibility.

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.

6. Fixed Dry Powder Systems

Annually, the system should be inspected and the dry powder charge should be agitated with 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.
In addition to the regular shipboard inspections, the systems should be inspected at least once **every two years** by an accredited service agent.

Inspection

- blow-through with nitrogen to ensure associated pipes and nozzles are clear.
- operation test of local and remote controls and section valves.
- contents verification of propellant gas cylinders containing nitrogen (including remote operating stations).
- sample of dry powder should be tested for moisture absorption.

Testing

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**. The powder containment vessels safety valves and discharge hoses should be subjected to a full working pressure test every **2 years**.

Note: On board inspection or test required by an accredited service agent, with the exception of pressure testing, may be carried out by a senior member of the ship's staff who has been successfully trained to carry out this work. In all cases, calibrated equipment must be used and all procedures and documentation must be in accordance with shipboard safety management systems.

Note: The replenishment and test regime for these high-pressure nitrogen cylinders is identical to that for CO_2 cylinders for fixed-gas fire extinguishing systems.

7. Automatic Sprinkler and Fixed Pressure Water Spray Systems

These systems should be inspected and tested by a **competent person** as per the manufactures instructions, and as a minimum should include the following:

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 pressurised storage tanks and there should be no obvious leakage.

Testing

Monthly: autostart function of sprinkler system pumps should be tested to ensure they automatically operate on system pressure loss.

Quarterly: all automatic alarms and control gear for the sprinkler systems should be tested using the test valves and procedures for each section.

Annually: the following should be carried out:

- water spray fixed fire-fighting systems should be tested for correct operation
- sprinkler pumps should be flow tested to ensure design pressures and flows
- alarms, pressure switches and control gear settings should be verified
- the sprinkler system connections from the ship's fire main should be tested
- all associated relief valves should be tested

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.

In the case of sprinkler systems protecting passenger accommodation, our surveyors will inspect and test the system as necessary during Passenger Ship Safety Certificate Renewal surveys.

8. Hydraulic Pressure Testing

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. The test pressure should be clearly stamped on each compressed gas cylinder and clearly marked on each extinguisher.

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.

9. Rejection

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

10. Records

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

11. Competent Person

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

- a member of the ship's crew who has the necessary training and who carries 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
- an accredited service agent.

12. Spare Charges required to be carried on board

Portable Fire Extinguishers	100% for the first 10 then 50% thereafter to a maximum of 60 charges. If they cannot be recharged on board then 100% spare extinguishers of the same type.
Portable Foam Applicator Unit	1 spare tank of 20 litres foam concentrate
Semi Portable Foam Extinguishers	Nil
Semi Portable Dry Powder Extinguishers	Nil
Semi Portable CO_2 Extinguishers	Nil
SCBA Air bottles	In addition to 1,200 litres per set there is to be total spare free air of 2,400 litres per set. If the vessel is carrying 5 or more sets then the total spare free air need not exceed 9,600 litres. If the vessel has the capability to recharge the cylinders on board this spare air may be reduced to 1,200 litres – the total storage of free air need not exceed 4,800 litres.
EEBD	Ships constructed before 01/07/2002 – No spares required. Ships constructed after 01/07/2002– Accommodation 50% max 4, Machinery spaces 50% (refer to Industry Circular No 8)

Isle of Man Ship Registry
September 2006

Appendix 1

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 instructions	**Annually** by a competent person (see Note 1) **5 Yearly** discharge (see Note 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 O_2 cylinders	In accordance with SMS procedures and manufacturer's instructions	**Annually** by a competent person. (see Note 1) NB - O_2 shelf life of 3 years	Steel - **5 years** Composites **-** see manufacturer's instructions	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 instructions.	**Annually** by a competent person (see Note 1)	**5 years**	Pressure Test date to be hard-stamped on cylinder. PT certificates on board
CO_2 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)	Within **20 years** and every **5 years** thereafter	Pressure Test date to be hard-stamped on cylinder. Inspection and 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 to **25 years** (see note 5)	Pressure Test date to be hard-stamped on cylinder. Inspection and PT certificates on board
Cylinders for Refrigerant Gas, Nitrogen, and Burning Equipment	Periodically check condition	-	**5 years** (see note 6)	Pressure test date to be hard-stamped on cylinder.
Foam Systems (fixed and portable)	In accordance with SMS procedures and manufacturer's instructions	Foam sample after **3 years** then **annually** thereafter. (see Note 7)	-	Foam sample certificates on board.
Fixed Dry Powder systems	Powder charge agitated annually (N_2 blow-through) & system inspected	Every **2 years** by an accredited service agent + sample of dry powder tested for moisture absorption**.** (see Note 7)	N_2 Propellant cylinders -**20 years** then **5 years** thereafter. Containment vessels and piping every **10 years.** 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 onboard.

Reference notes on next page.

Notes:

1. The competent person may be a member of the ship's crew who is trained and assigned to this task or an accredited service agent. (See section 11 above for full definition.)

2. All portable extinguishers should be discharged at intervals not exceeding 5 years.

3. Pressure test dates must be clearly marked. Hard-stamping is only permitted on CO_2 extinguisher cylinders and propellant bottles.

4. On board inspection or test required by an accredited service agent, with the exception of pressure testing, may be carried out by a senior member of the ship's staff who has been fully trained to carry out this work. In all cases, calibrated equipment must be used and all procedures and documentation must be in accordance with shipboard safety management systems.

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 Administration. 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. These cylinders are generally supplied full and exchanged when empty and as such are not considered as part of the ships safety equipment. Ship's staff should, prior to acceptance, ensure no more than 5 years have elapsed since the last pressure test. Cylinders remaining on board should be exchanged ashore if more than 5 years have elapsed since last Pressure Test.

7. Sample analyses must be carried out by an accredited service agent ashore.

Industry Circular No.

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Revised January 2007

Government of the Isle of Man

Department of Trade and Industry

Notice to Surveyors, Shipowners, Managers, and Classification Societies.

Bulk CO_2 Fire fighting Systems,

Survey requirements for Isle of Man ships.

The investigation of a recent fire casualty during which the ship's bulk CO_2 system was used revealed that the system did not operate as intended due to a failure of one of the supply pipes. This pipe had suffered heavy localised corrosion under fitted insulation and failed when the gas was discharged.

As a consequence of this investigation recommendations were made and the Isle of Man Administration would now advise all owners, managers, surveyors and Classification Societies of the present Isle of Man requirements for survey and inspection of bulk CO_2 systems.

1. Bulk CO_2 system containment tanks should be examined annually during the ship's Safety Equipment survey and the examination should include;

   (a) close examination of all pipe connections to the tank where they join with the tank which will include the removal of selected areas of insulation as necessary.

   (b) removal of selected areas of insulation on other connecting pipes and delivery pipes and examination of the pipe condition to include non destructive testing to determine residual wall thickness where any extensive corrosion or other evidence of deterioration exists.

   (c) examination of selected areas of the tank shell under insulation to determine the shell condition using appropriate means if necessary to determine wall thickness.

   (d) removal of insulation and examination of underlying steelwork in any area where there is evidence of corrosion through staining or other signs.

2. Annual inspections as detailed in (1) should be programmed to examine, in so far as possible, different areas of the system at each annual inspection.

3. Any examination which reveals evidence of deterioration in pipework or in the tank should be followed up to determine the extent of deterioration, including an internal examination if necessary and any required repairs or replacements should be made.

4. Provided that the above inspection regime is adhered to and records maintained to demonstrate that it is so, then bulk CO_2 systems may remain in service for a maximum period of 20 years without internal examination.

Isle of Man Ship Registry

January 2007

Please note - The Isle of Man Ship Registry cannot give Legal Advice. Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel. You should consider seeking independent legal advice if you are unsure of your own legal position.