MARITIME AND PORT AUTHORITY OF SINGAPORE
SHIPPING CIRCULAR TO SHIPOWNERS
NO. 12 OF 2017

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Applicable to: Ship owners, ship managers, operators, masters and crew of Singapore-registered ships and fixed carbon dioxide fire extinguishing systems service technicians/specialists companies.

ADVISORY ON THE MAINTENANCE AND INSPECTION OF THE FIXED CARBON DIOXIDE FIRE FIGHTING EXTINGUISHING SYSTEM AND THE ENGINE ROOM ESCAPE HATCH DOOR

1. Two safety failures were identified in a recent engine room fire incident involving a Singapore registered ship:

   (i) the activating valve heads assembly of the fixed carbon dioxide fire extinguishing bottles had failed to function; and

   (ii) the engine room emergency escape hatch door was unable to be opened from the inside.

2. It was identified that, over time, the activating valve heads assembly of the carbon dioxide bottles of the fixed carbon dioxide fire extinguishing systems for the engine room had corroded; and some of the valve heads assembly had failed to function. The failure of the activating valve heads assembly of the carbon dioxide bottles could have been avoided had all the IMO's recommendations been observed.

3. It was also found that the engine room emergency escape hatch door was inoperable from the engine room.

4. Ship owners, ship managers and masters are advised to bring to the attention of the ship's crew the importance of routine checks, vigilant detection and early reporting of any faulty or malfunction of systems, equipment or appliances

particularly those concerning safety, life-saving and fire-fighting, to enable prompt servicing and maintenance.

5. Please refer to the MSC.1/Circ.1318 on Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire Extinguishing Systems (see Annex 1) and to the Merchant Shipping (Safety Convention) Regulation (see Annex 2) for your guidance and compliance.

6. The shipping community may also be able to access the Merchant Shipping (Safety Convention) Regulations online at www.statutes.agc.gov.sg.

7. Any queries regarding this circular should be addressed to Capt. Khalled Jalil (Tel: 6375 1931).

CAPT DAKNASH GANASEN
DIRECTOR OF MARINE
MARITIME AND PORT AUTHORITY OF SINGAPORE

ANNEX 1 - MSC.1/Circ.1318 - Guidelines for the Maintenance and Inspections of Fixed Carbon Dioxide Fire Extinguishing Systems

ANNEX 2 - Merchant Shipping (Safety Convention) Regulation, Chapter II-2; Regulation 13 and 14

ANNEX 1

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MSC.1/Circ.1318
11 June 2009

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 The Committee, at its eighty-sixth session (27 May to 5 June 2009), having considered the proposal by the Sub-Committee on Fire Protection, at its fifty-third session, approved Guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems, as set out in the annex.

2 Member Governments are invited to apply the annexed Guidelines when inspecting fixed carbon dioxide fire-extinguishing systems on board all ships and bring them to the attention of ship designers, shipowners, equipment manufacturers, and other parties concerned.

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ANNEX

GUIDELINES FOR THE MAINTENANCE AND INSPECTIONS OF FIXED CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

1 General

These Guidelines provide the minimum recommended level of maintenance and inspections for fixed carbon dioxide fire-extinguishing systems on all ships, and are intended to demonstrate that the system is kept in good working order as specified in SOLAS regulation II-2/14.2.1.2. These Guidelines are intended to supplement the fire-extinguishing system manufacturer's approved maintenance instructions. Certain maintenance procedures and inspections may be performed by competent crewmembers, while others should be performed by persons specially trained in the maintenance of such systems. The onboard maintenance plan should indicate which parts of the recommended inspections and maintenance should be completed by trained personnel.

2 Safety

Whenever carbon dioxide fire-extinguishing systems are subjected to inspection or maintenance, strict safety precautions should be followed to prevent the possibility that individuals performing or witnessing the activities are placed at risk. Prior to performing any work, a safety plan should be developed to account for all personnel and establish an effective communications system between the inspection personnel and the on-duty crew. Measures to avoid accidental discharges such as locking or removing the operating arms from directional valves, or shutting and locking the system block valve should be taken as the initial procedure for the protection of personnel performing any maintenance or inspections. All personnel should be notified of the impending activities before work is begun.

3 Maintenance and inspection plan

Fixed carbon dioxide fire-extinguishing systems should be kept in good working order and readily available for immediate use. Maintenance and inspections should be carried out in accordance with the ship's maintenance plan having due regard to ensuring the reliability of the system. The onboard maintenance plan should be included in the ship's safety management system and should be based on the system manufacturer's recommendations including:

.1 maintenance and inspection procedures and instructions;

.2 required schedules for periodic maintenance and inspections;

.3 listing of recommended spare parts; and

.4 records of inspections and maintenance, including corrective actions taken to maintain the system in operable condition.

4 Monthly inspections

4.1 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:

.1 all stop valves are in the closed position;

.2 all releasing controls are in the proper position and readily accessible for immediate use;

.3 all discharge piping and pneumatic tubing is intact and has not been damaged;

.4 all high pressure cylinders are in place and properly secured; and

.5 the alarm devices are in place and do not appear damaged.

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

.1 the pressure gauge is reading in the normal range;

.2 the liquid level indicator is reading within the proper level;

.3 the manually operated storage tank main service valve is secured in the open position; and

.4 the vapour supply line valve is secured in the open position.

5 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:

.1 the boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that have created uncloseable openings that would render the system ineffective;

.2 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;

.3 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;

.4 the manifold should be inspected to verify that all flexible discharge hoses and fittings are properly tightened; and

.5 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.

6 Minimum recommended maintenance

6.1 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each intermediate, periodical or renewal survey* in 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):

.1 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;

.2 the hydrostatic test date of all storage containers should be checked. High pressure cylinders should be subjected 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; and

.3 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.

6.2 At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each renewal survey* in cargo ships, the following maintenance should be carried out by service technicians/specialists trained to standards accepted by the Administration:

.1 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.

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* Refer to Survey guidelines under the Harmonized System of Survey and Certification, 2007 (resolution A.997(25)).

** Refer to standard ISO 6406 – Periodic inspection and testing of seamless steel gas cylinders.

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;

.2 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

.3 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.

APPENDIX

EXAMPLE SERVICE CHARTS

HIGH PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	Number of main cylinders	
3	Main cylinders capacity (each)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Oldest cylinder pressure test date	
8	Protected space(s)	
9	Date flexible hoses fitted/renewed	

Description of inspection/Tests

No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Release controls and distribution valves secured to prevent accidental discharge				
2	Contents in main cylinders checked by weighing				
3	Contents in main cylinders checked by liquid level indicator				
4	Contents of pilot cylinders checked				
5	All cylinder valves visually inspected				
6	All cylinder clamps and connections checked for tightness				
7	Manifold visually inspected				
8	Manifold tested for leakage, by applying dry working air				
9	Main valve and distribution valves visually inspected				
10	Main valve and distribution valves tested for operation				
11	Time delay devices tested for correct setting*				
12	Remote release system visually inspected				
13	Remote release system tested				
14	Servo tubing/pilot lines pressure tested at maximum working pressure and checked for leakages and blockage				
15	Manual pull cables, pulleys, gang releases tested, serviced and tightened/adjusted as necessary				
16	Release stations visually inspected				
17	Warning alarms (audible/visual) tested				
18	Fan stop tested*				
19	10% of cylinders and pilot cylinder/s pressure tested every 10 years				
20	Distribution lines and nozzles blown through, by applying dry working air				
21	All doors, hinges and locks inspected*				
22	All instruction and warning signs on installation inspected				
23	All flexible hoses renewed and check valves in manifold visually inspected every 10 years				
24	Release controls and distribution valves reconnected and system put back in service				
25	Inspection date tags attached				

* If fitted as part of the CO_2 system.

LOW PRESSURE CO_2 SYSTEM

Date:	Name of ship/unit:	IMO No.:	

Technical description

No.	Text	Value
1	Manufacturer	
2	No. of tanks	
3	Tanks capacity (tonnes)	
4	Number of pilot cylinders	
5	Pilot cylinder capacity (each)	
6	Number of distribution lines	
7	Protected space(s)	

Description of inspection/Tests

No.	Description	Carried out	Not carried out	Not applicable	Comment
1	Tank main service valve closed and secured to prevent accidental discharge				
2	Distribution valves verified closed				
3	Check correct function of level indicator				
4	Contents of CO_2 tank checked by tank level indicator				
5	Contents of CO_2 tank checked by riser tube reading				
6	Contents of CO_2 tank checked by level control valve				
7	Supports of tank inspected				
8	Insulation on tank inspected				
9	Safety valves of tank inspected				
10	Safety valves of tank tested				
11	Contents of pilot cylinders checked				
12	Start/stop function of cooling compressors tested				
13	All connected electrical alarms and indicators tested				
14	Main manifold valve inspected				
15	Main manifold valve tested				
16	Distribution valves inspected				
17	Distribution valves tested				
18	Release stations inspected				
19	Total flooding release mechanism inspected				
20	Total flooding release mechanism tested				
21	Time delay devices tested for correct setting*				
22	Warning alarms tested				
23	Fan stop tested*				
24	Distribution lines and nozzles inspected				
25	Distribution lines and nozzles tested				
26	Distribution lines and nozzles blown through				
27	All doors, hinges and locks inspected*				
28	All instruction plates inspected				
29	Tank main service valve reopened and secured open				
30	System put back in service				
31	Inspection date tags attached				

* If fitted as part of the CO_2 system.

ANNEX 2

Merchant Shipping (Safety Convention) Regulations, Chapter II-2; Part D – Escape, Regulation 13 – Means of Escape

(*a*) *Purpose*

The purpose of this Regulation is to provide means of escape so that persons on board can safely and swiftly escape to the lifeboat and liferaft embarkation deck. For this purpose, the following functional requirements shall be met:

(i) safe escape routes shall be provided;

(ii) escape routes shall be maintained in a safe condition, clear of obstacles; and

(iii) additional aids for escape shall be provided as necessary to ensure accessibility, clear marking and adequate design for emergency situations.

Merchant Shipping (Safety Convention) Regulations, Chapter II-2; Part E – Operational Requirements, Regulation 14 – Operational Readiness and Maintenance

(*a*) *Purpose*

The purpose of this Regulation is to maintain and monitor the effectiveness of the fire safety measures the ship is provided with. For this purpose, the following functional requirements shall be met:

(i) fire protection systems and fire-fighting systems and appliances shall be maintained ready for use; and

(ii) fire protection systems and fire-fighting systems and appliances shall be properly tested and inspected.

(*b*) *General requirements*

At all times while the ship is in service, the requirements of paragraph (*a*)(i) shall be complied with. A ship is not in service when:

(1) it is in for repairs or lay-up (either at anchor or in port) or in dry-dock;

(2) it is declared not in service by the owner or the owner's representative; and

(3) in the case of passenger ships, there are no passengers on board.

(i) Operational readiness

(1) The following fire protection systems shall be kept in good order so as to ensure their required performance if a fire occurs:

(A) structural fire protection including fire resisting divisions, and protection of openings and penetrations in these divisions;

(B) fire detection and fire alarm systems; and

(C) means of escape systems and appliances.