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主旨：國際海事組織所屬海事安全委員會(MSC)第103次、第104次會議採用之決議及通告案，請參考使用，請查照。

說明：

- 一、依據船舶法第30條規定，適用國際公約之船舶，應依各項國際公約之規定施行檢查。針對旨揭會議所通過之決議及通告案，茲採用MSC.488(103)、MSC.1/Circ.1578、MSC.1/Circ.1318/Rev.1、MSC.493(104)、MSC.494(104)、MSC.1/Circ.1039/Rev.1、MSC.1/Circ.1040/Rev.2等7項納入我國航政監理指引(如附件)，以提升船舶航行安全，與國際接軌。
- 二、案內決議及通告案全文及檔案另載於本局網站公約專區(網址：<https://www.motcmpb.gov.tw/Home/Node?siteId=1&nodeId=10445>)，請自行下載參考使用。

正本：中華民國輪船商業同業公會全國聯合會、台灣區造船工業同業公會、財團法人中國驗船中心、財團法人船舶暨海洋產業研發中心、中華海員總工會、中華民國船長公會、國立臺灣海洋大學、國立高雄科技大學、台北海洋學校財團法人台北海洋科技大學、長榮海運股份有限公司長榮船員訓練中心、財團法人中華航業人員訓練中心、本局各航務中心

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交通部航港局航政指引(MSC 第 103、104 次會議)

項次	決議案基本資訊			
3	決議案號：	MSC.1/Circ.1318/Rev.1		
	中英文 標題：	經修訂之固定式二氧化碳滅火系統維護和檢查準則 (Revised Guidelines for The Maintenance and Inspections of Fixed Carbon Dioxide Fire-Extinguishing Systems)		
	適用船舶：	SOLAS 適用之船舶(ex.國際航線客船及國際航線 500GT 以上貨船)		
	類型(性質)：	準則(建議性)	相關國際公約	SOLAS 第 II-2 章
	相關文件：	N/A		
	摘要內容：	<p>一、 背景：SOLAS II-2/14.2.1.2 規定：滅火系統與設備需保持在良好的工作狀態並隨時可用。</p> <p>二、 本準則之目的係為船舶上的固定式二氧化碳滅火系統之維護和檢查標準提供建議，並補充滅火系統製造商之維護說明，以證明該系統保持在 SOLAS II-2/14.2.1.2 規定之良好工作狀態。本準則同時提供船上維護計畫內容以及各定期檢查項目建議，並提供相關查核表之範本，提供船舶所有人參考使用。</p> <p>三、 本次修正有關二氧化碳鋼瓶之水壓試驗(hydrostatic test)要求，二氧化碳鋼瓶總數的百分之十（10%）仍應在 10 年檢查時進行測試，但 20 年檢查時須對所有尚未測試之二氧化碳鋼瓶（90%）進行測試。此後，所有的二氧化碳鋼瓶（100%）都應在每 10 年檢查時進行測試；此外，應至少每 5 年對所有控制閥進行一次內部檢查。</p> <p>四、 因部分維護程序和檢查可由勝任之船員執行，而部分維護程序和檢查應由受過此類系統維護方面之專門培訓人員執行。船上維護計畫應載明那些檢查/維護程序應由受過培訓的人員完成。</p>		

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MSC.1/Circ.1318/Rev.1
25 May 2021

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

- 1 The Maritime Safety 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* (MSC.1/Circ.1318).
- 2 In order to address the need to clarify the hydrostatic testing regime for high-pressure CO₂ cylinders and to align the relevant requirements in the Guidelines with those in the *Revised guidelines for the maintenance and inspection of fire protection systems and appliances* (MSC.1/Circ.1432), the Committee, at its 103rd session (5 to 14 May 2021), approved amendments to the above-mentioned Guidelines, prepared by the Sub-Committee on Ship Systems and Equipment, at its seventh session, with a view to dissemination as MSC.1/Circ.1318/Rev.1. The text of the *Revised guidelines for the maintenance and inspections of fixed carbon dioxide fire-extinguishing systems* is set out in the annex.
- 3 Member Governments are invited to apply the annexed Revised 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.
- 4 This circular supersedes MSC.1/Circ.1318.

ANNEX

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

1 General

These Revised 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 Revised 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 \pm 3 months) in passenger ships or at each intermediate, periodical or renewal survey¹ 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 test². 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. Before the 20-year anniversary and every 10-year anniversary thereafter, all cylinders should be subjected to a hydrostatic test. Flexible hoses should be replaced at the intervals recommended by the manufacturer and not exceeding every 10 years. When cylinders are removed for testing, the cylinders should be replaced such that the quantity of fire-extinguishing medium continues to satisfy the requirements of 2.2.1 of chapter 5 of the FSS Code, subject to SOLAS regulation II-2/14.2; 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 \pm 3 months) in passenger ships or at each renewal survey¹ 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. 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;

¹ Refer to the *Survey Guidelines under the Harmonized System of Survey and Certification (HSSC)*, 2019 (resolution A.1140(31)).

² Refer to standard ISO 18119:2018 – Gas cylinders – Seamless steel and seamless aluminium-alloy gas cylinders and tubes – Periodic inspection and testing.

- .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.

7 Five-year service

At least once every five years, internal inspection of all control valves should be performed.

APPENDIX

EXAMPLE SERVICE CHARTS

HIGH PRESSURE CO₂ SYSTEM

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

No.	Description	Carried out	Not carried out	Not applicable	Comment
17	Warning alarms (audible/visual) tested				
18	Fan stop tested*				
19	10% of cylinders and pilot cylinder/s pressure tested every 10 years. All cylinders and pilot cylinder/s pressure tested before the 20-year anniversary and every 10-year anniversary thereafter				
20	Internal inspection of all control valves performed at least once every five years				
21	Distribution lines and nozzles blown through, by applying dry working air				
22	All doors, hinges and locks inspected*				
23	All instruction and warning signs on installation inspected				
24	All flexible hoses renewed and check valves in manifold visually inspected every 10 years				
25	Release controls and distribution valves reconnected and system put back in service				
26	Inspection date tags attached				

* If fitted as part of the CO₂ system.

LOW PRESSURE CO₂ SYSTEM

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

No.	Description	Carried out	Not carried out	Not applicable	Comment
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	Internal inspection of all control valves performed at least once every five years				
16	Main manifold valve tested				
17	Distribution valves inspected				
18	Distribution valves tested				
19	Release stations inspected				
20	Total flooding release mechanism inspected				
21	Total flooding release mechanism tested				
22	Time delay devices tested for correct setting*				
23	Warning alarms tested				
24	Fan stop tested*				
25	Distribution lines and nozzles inspected				
26	Distribution lines and nozzles tested				
27	Distribution lines and nozzles blown through				
28	All doors, hinges and locks inspected*				
29	All instruction plates inspected				
30	Tank main service valve reopened and secured open				
31	System put back in service				
32	Inspection date tags attached				

* If fitted as part of the CO₂ system.