



FIRE PROTECTION SYSTEMS, APPLIANCES AND COMPRESSED GAS CYLINDERS PERIODIC MAINTENANCE, INSPECTION AND TESTING

Technical Notice SLS.6 Rev.3

*Notice to Shipowners, Ship Operators, Managers, Masters,
Owners' Representatives and Recognised Organisations*

This Technical Notice is developed in line with IMO [MSC.1/Circ.1432](#) as amended by [MSC.1/Circ.1516](#), [MSC.1/Circ.1318](#) and [Resolution A.951\(23\)](#).

All fire protection systems and appliances shall at all times be 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 to the satisfaction of the Recognized Organization and Administration shall be made to ensure that safety is not diminished.

FIXED FIRE DETECTION AND ALARM SYSTEMS

Weekly Testing and Inspections

Verify all fire detection and fire alarm control panel indicators are functional by operating the lamp/indicator test switch.

Monthly Testing and Inspections

Test a sample of detectors and manual call points so that all devices have been tested within five years.

Annual Testing and Inspections

1. test all fire detection systems and fire detection systems used to automatically release fire-extinguishing systems for proper operation, as appropriate;
2. visually inspect all accessible detectors for evidence of tampering obstruction, etc., so that all detectors are inspected within one year; and.
3. test emergency power supply switchover.

PUBLIC ADDRESS AND GENERAL ALARM SYSTEM

Weekly Testing and Inspections

Verify all public address systems and general alarm systems are functioning properly.

FIRE DOORS

Weekly Testing and Inspections

Verify all fire door control panel indicators, if provided, are functional by operating the lamp/indicator switch.



Quarterly Testing and Inspections

Test all fire doors located in main vertical zone bulkheads for local operation.

Annual Testing and Inspections

Test all remotely controlled fire doors for proper release.

LOW LOCATION LIGHTING

Weekly Testing and Inspections

Verify low-location lighting systems are functional by switching off normal lighting in selected locations.

5-Yearly Service

Test the luminance of all systems in accordance with the procedures in Resolution A.752(18).

VENTILATION SYSTEMS AND FIRE DAMPERS

Quarterly Testing and Inspections

Test all fire dampers for local operation.

Annual Testing and Inspections

1. test all fire dampers for remote operation;
2. verify galley exhaust ducts and filters are free of grease build-up; and
3. test all ventilation controls interconnected with fire-protection systems for proper operation.

FIRE MAINS, FIRE PUMPS, HYDRANTS, HOSES AND NOZZLES

Monthly Testing and Inspections

1. verify all fire hydrants, hose and nozzles are in place, properly arranged, and are in serviceable condition;
2. operate all fire pumps to confirm that they continue to supply adequate pressure; and
3. emergency fire pump fuel supply adequate, and heating system in satisfactory condition, if applicable.

Quarterly Testing and Inspections

Verify international shore connection(s) is in serviceable condition.

Annual Testing and Inspections

1. visually inspect all accessible components for proper condition;
2. flow test all fire pumps for proper pressure and capacity. Test emergency fire pump with isolation valves closed;
3. test all hydrant valves for proper operation;



4. pressure test a sample of fire hoses at the maximum fire main pressure, so that all fire hoses are tested within five years;
5. verify all fire pump relief valves, if provided, are properly set;
6. examine all filters/strainers to verify they are free of debris and contamination; and
7. nozzle size/type correct, maintained and working.

FIREFIGHTER'S OUTFIT

Monthly Testing and Inspections

Verify lockers providing storage for fire-fighting equipment contain their full inventory and equipment is in serviceable condition.

SELF-CONTAINED BREATHING APPARATUS (SCBA)

Spare Charges

The following spare charges are to be provided for each SCBA

SHIP TYPE	SPARE CHARGES
Cargo ship without dedicated cylinder recharging facility	2
Cargo ship with dedicated cylinder recharging facility	1
Passenger ship carrying less than 36 passengers	1
Passenger ships carrying more than 36 passengers	At least 2

Weekly Testing and Inspections

A general examination of the SCBA, including cylinder gauges to confirm they are in the correct pressure range.

Annual Testing and Inspections

1. Check SCBA air recharging system(s), if provided, for air quality at a laboratory that is accredited to ISO/IEC 17025:2005, in accordance with BS-EN 12021 – *Respiratory protective devices – compressed air for breathing apparatus* or an equivalent national standard;
2. Check SCBA face masks and air demand valves are in serviceable condition; and
3. Check SCBA according to maker's instructions.

5-Yearly Service

1. Steel cylinders should be tested at an approved shore-based servicing station at the test pressure stipulated by the manufacturer and/or Recognized Organization.
2. Aluminium and composite cylinders should be tested at an approved shore-based servicing station at the intervals and the test pressure stipulated by the manufacturer and/or Recognized Organization.



EMERGENCY ESCAPE BREATHING DEVICES (EEBDs)

Maintenance and Records

Maintenance shall be carried out by the ship's crew in accordance with the manufacturer's instruction. Records of inspections and maintenance shall be duly maintained.

Weekly Testing and Inspections

A general examination of the EEBDs, including cylinder gauges to confirm they are in the correct pressure range.

Annual Testing and Inspections

Check EEBDs' according to maker's instructions.

Hydrostatic Pressure Test

Hydrostatic pressure testing shall be carried out at the intervals specified by the manufacturer at a shore based testing facility and records of pressure tests are to be maintained.

MARINE PORTABLE FIRE EXTINGUISHERS

Instructions and Records

Manufacturer's instructions for recharging marine portable fire extinguishers should be available for use on board. Records of inspection, maintenance and tests should be maintained.

Spare Charges

1. For extinguishers of the same type that are capable of being recharged on board, spare charges shall be provided for 100% of the first 10 fire extinguishers and for 50% of the remaining extinguishers. Not more than a total of 60 spare charges need to be provided.
2. For extinguishers that cannot be recharged on board, additional extinguishers of the same quantity, type and capacity shall be provided for 100% of the first 10 extinguishers and for 50% of the remaining extinguishers. Not more than a total of 60 additional extinguishers need to be provided.

Annual Testing and Inspections

1. Service and inspection may be carried out by a ship's officer (appointed by the Company) in accordance with the established and dedicated maintenance schedule of the Safety Management System. The manufacturer's instructions in addition to the below guidance shall be taken into account. On board servicing and inspection is restricted to extinguishers of the non-permanently pressurized type.
2. Servicing and inspection of the permanently-pressurized extinguishers shall be carried out at a shore servicing facility.
3. Water and foam charges to be removed to a clean container. If they are to be reused check if it is still suitable for further use. Check any charge container.
4. If powder charges are to be re-used, ascertained that the powder is free flowing and that there is no evidence of caking lumps or foreign bodies.
5. Gas cartridges to be checked for damage and corrosion



5-Yearly Service

At least one extinguisher of each type manufactured in the same year and kept on board a ship should be test discharged as part of a fire drill.

1. Periodic inspection and inspection after discharge test should comprise of the following:

- 1.1 Prove clear passage by blowing through vent holes 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.
- 1.2 Check that the safety pin is removable and that the lever is undamaged.
- 1.3 Examine for damage and corrosion. Weigh the cartridge to ascertain that it is within prescribed limits.
- 1.4 Check o-rings and replace hose diaphragms if fitted.
- 1.5 Inspect the interior, check for corrosion and lining deterioration. Check separate containers for leakage or damage.
- 1.6 examine the body and check internally for corrosion and lining deterioration.

2. Inspection after recharge should comprise of the following:

- 2.1 Replace the charge in accordance with the manufacturer's instructions.
- 2.2 Reassemble the extinguisher in accordance with the manufacturer's instructions.
- 2.3 Fill in entry on maintenance label, including full weight.
- 2.4 Check the mounting bracket or stand.
- 2.5 Complete a report on the state of maintenance of the extinguishers.

10-Yearly Service

1. Periodic inspection and inspection after discharge test should comprise of the following:

- 1.1 Prove clear passage by blowing through vent holes 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.
- 1.2 Check that the safety pin is removable and that the lever is undamaged.
- 1.3 Examine for damage and corrosion. Weigh the cartridge to ascertain that it is within prescribed limits.
- 1.4 Check o-rings and replace hose diaphragms if fitted. Inspect the interior, check for corrosion and lining deterioration. Check separate containers for leakage or damage.
- 1.5 Examine the body and check internally for corrosion and lining deterioration.
- 1.6 Extinguishers and propellant cartridges should be hydraulically tested in accordance with the manufacturer's instructions. Notwithstanding, whenever the loss in pressure of permanently pressurized marine portable fire- extinguishers exceeds 10% of the nominal pressure the extinguishers shall be hydrostatically pressure tested before being recharged.



The test pressures should be in accordance with the following table.

<u>Fire Extinguishers and Propellant Cartridges</u>	<u>Test Pressure</u>
<u>Water</u>	At least 1.5 times w.p. (or 2 N/mm ² if the w.p. is unknown)
<u>Foam</u>	
<u>Dry Chemical</u>	
<u>Powder (permanently pressurized)</u>	
<u>Powder (non-permanently pressurized)</u>	
<u>Carbon Dioxide</u>	At least 25 N/mm ²
<u>Propellant Cartridges</u>	At least 2 times w.p. or 25 N/mm ² or 35 N/mm ²
<u>CO₂ type with safety devices</u>	
<u>CO₂ type without safety devices</u>	

w.p. – working pressure

During statutory surveys the attending Surveyor of the Recognized Organization may request hydrostatic pressure testing if the condition of the fire-extinguisher(s) so warrant. The test date and test pressure should be “hard-stamped” on the cylinders of CO2 extinguishers and on propellant cartridges. As regards extinguishers of a type other than CO2 the test date and test pressure should be entered in the tag attached to the extinguisher.

2. Inspection after recharge should comprise of the following:
 - 2.1 Replace the charge in accordance with the manufacturer’s instructions.
 - 2.2 Reassemble the extinguisher in accordance with the manufacturer’s instructions.
 - 2.3 Fill in entry on maintenance label, including full weight.
 - 2.4 Check the mounting bracket or stand.
 - 2.5 Complete a report on the state of maintenance of the extinguishers.

PORTABLE FOAM APPLICATORS

Monthly Testing and Inspections

Verify all portable foam applicators are in place, properly arranged, and are in proper condition.

Annual Testing and Inspections

1. verify all portable foam applicators are set to the correct proportioning ratio for the foam concentrate supplied and the equipment is in proper order;
2. verify all portable containers or portable tanks containing foam concentrate remain factory sealed, and the manufacturer's recommended service life interval has not been exceeded;
3. portable containers or portable tanks containing foam concentrate, excluding protein based concentrates, less than 10 years old, that remain factory sealed can normally be accepted without the periodical foam control tests required in MSC.1/Circ.1312 being carried out;
4. protein based foam concentrate portable containers and portable tanks should be thoroughly checked and, if more than five years old, the foam concentrate should be subjected to the periodical foam control tests required in MSC.1/Circ.1312, or renewed; and



5. the foam concentrates of any non-sealed portable containers and portable tanks, and portable containers and portable tanks where production data is not documented, should be subjected to the periodical foam control tests required in MSC.1/Circ.1312.

WHEELED (MOBILE) FIRE EXTINGUISHERS

Monthly Testing and Inspections

Verify all extinguishers are in place, properly arranged, and are in proper condition.

Annual Testing and Inspections

1. perform periodical inspections in accordance with the manufacturer's instructions;
2. visually inspect all accessible components for proper condition;
3. check the hydrostatic test date of each cylinder; and
4. for dry powder extinguishers, invert extinguisher to ensure powder is agitated.

5-Yearly Service

Visually examine at least one extinguisher of each type manufactured in the same year and kept on board.

10-Yearly Service

All extinguishers together with propellant cartridges should be hydrostatically tested in accordance with recognized standards or the manufacturer's instructions at an approved servicing and testing station.

GALLEY DEEP FAT COOKING FIRE-EXTINGUISHING SYSTEMS

Annual Testing and Inspections

Check galley and deep fat cooking fire-extinguishing systems in accordance with the manufacturer's instructions.

FIXED AEROSOL EXTINGUISHING SYSTEMS

Monthly Testing and Inspections

1. verify all electrical connections and/or manual operating stations are properly arranged, and are in proper condition; and
2. verify the actuation system/control panel circuits are within manufacturer's specifications.

Annual Testing and Inspections

Verify condensed or dispersed aerosol generators have not exceeded their mandatory replacement date. Pneumatic or electric actuators should be demonstrated working, as far as practicable.



10-Yearly Service

Condensed or dispersed aerosol generators to be renewed in accordance with manufacturer's recommendations.

FIXED DRY CHEMICAL POWDER SYSTEMS

Monthly Testing and Inspections

Verify all control and section valves are in the proper open or closed position, and all pressure gauges are in the proper range.

Annual Testing and Inspections

1. visually inspect all accessible components for proper condition;
2. verify the pressure regulators are in proper order and within calibration; and
3. agitate the dry chemical powder charge with nitrogen in accordance with system manufacturer's instructions.

(Note: Due to the powder's affinity for moisture, any nitrogen gas introduced for agitation must be moisture free.)

Biennial Testing and Inspections

1. blow dry nitrogen through the discharge piping to confirm that the pipe work and nozzles are clear of any obstructions;
2. operationally test local and remote controls and section valves;
3. verify the contents of propellant gas cylinders (including remote operating stations);
4. test a sample of dry chemical powder for moisture content; and
5. subject the powder containment vessel, safety valve and discharge hoses to a full working pressure test.

10-Yearly Service

Subject all powder containment vessels to hydrostatic or non-destructive testing carried out by an accredited service agent.

FOAM FIRE-EXTINGUISHING SYSTEM

Monthly Testing and Inspections

Verify all control and section valves are in the proper open or closed position, and all pressure gauges are in the proper range.

Quarterly Testing and Inspections

Verify the proper quantity of foam concentrate is provided in the foam system storage tank.

Annual Testing and Inspections

1. visually inspect all accessible components for proper condition;
2. functionally test all fixed system audible alarms;



3. flow test all water supply and foam pumps for proper pressure and capacity, and confirm flow at the required pressure in each section (Ensure all piping is thoroughly flushed with fresh water after service.);
4. test all system cross connections to other sources of water supply for proper operation;
5. verify all pump relief valves, if provided, are properly set;
6. examine all filters/strainers to verify they are free of debris and contamination;
7. verify all control/section valves are in the correct position;
8. blow dry compressed air or nitrogen through the discharge piping or otherwise confirm the pipework and nozzles of high expansion foam systems are clear of any obstructions, debris and contamination. This may require the removal of nozzles, if applicable;
9. samples of all foam concentrates carried on board are to be subjected to the periodical control tests in MSC.1/Circ.1312, for low expansion foam, or MSC/Circ.670 for high expansion foam at an approved independent/manufacturer laboratory. (Note: Except for non-alcohol resistant foam, the first test need not be conducted until 3 years after being supplied to the ship.); and
10. test all fuel shut-off controls connected to fire-protection systems for proper operation.

5-Yearly Service

1. perform internal inspection of all control valves;
2. flush all high expansion foam system piping with fresh water, drain and purge with air;
3. check all nozzles to prove they are clear of debris; and
4. test all foam proportioners or other foam mixing devices to confirm that the mixing ratio tolerance is within +30 to -10% of the nominal mixing ratio defined by the system approval.

WATER MIST, WATER SPRAY AND SPRINKLER SYSTEM

Weekly Testing and Inspections

1. verify all control panel indicators and alarms are functional;
2. visually inspect pump unit and its fittings; and
3. check the pump unit valve positions, if valves are not locked, as applicable.

Monthly Testing and Inspections

1. verify all control, pump unit and section valves are in the proper open or closed position;
2. verify sprinkler pressure tanks or other means have correct levels of water;
3. test automatic starting arrangements on all system pumps so designed;
4. verify all standby pressure and air/gas pressure gauges are within the proper pressure ranges; and
5. test a selected sample of system section valves for flow and proper initiation of alarms. (Note – The valves selected for testing should be chosen to ensure that all valves are tested within a one-year period.)

Quarterly Testing and Inspection

Assess system water quality in the header tank and pump unit against the manufacturer's water quality guidelines.

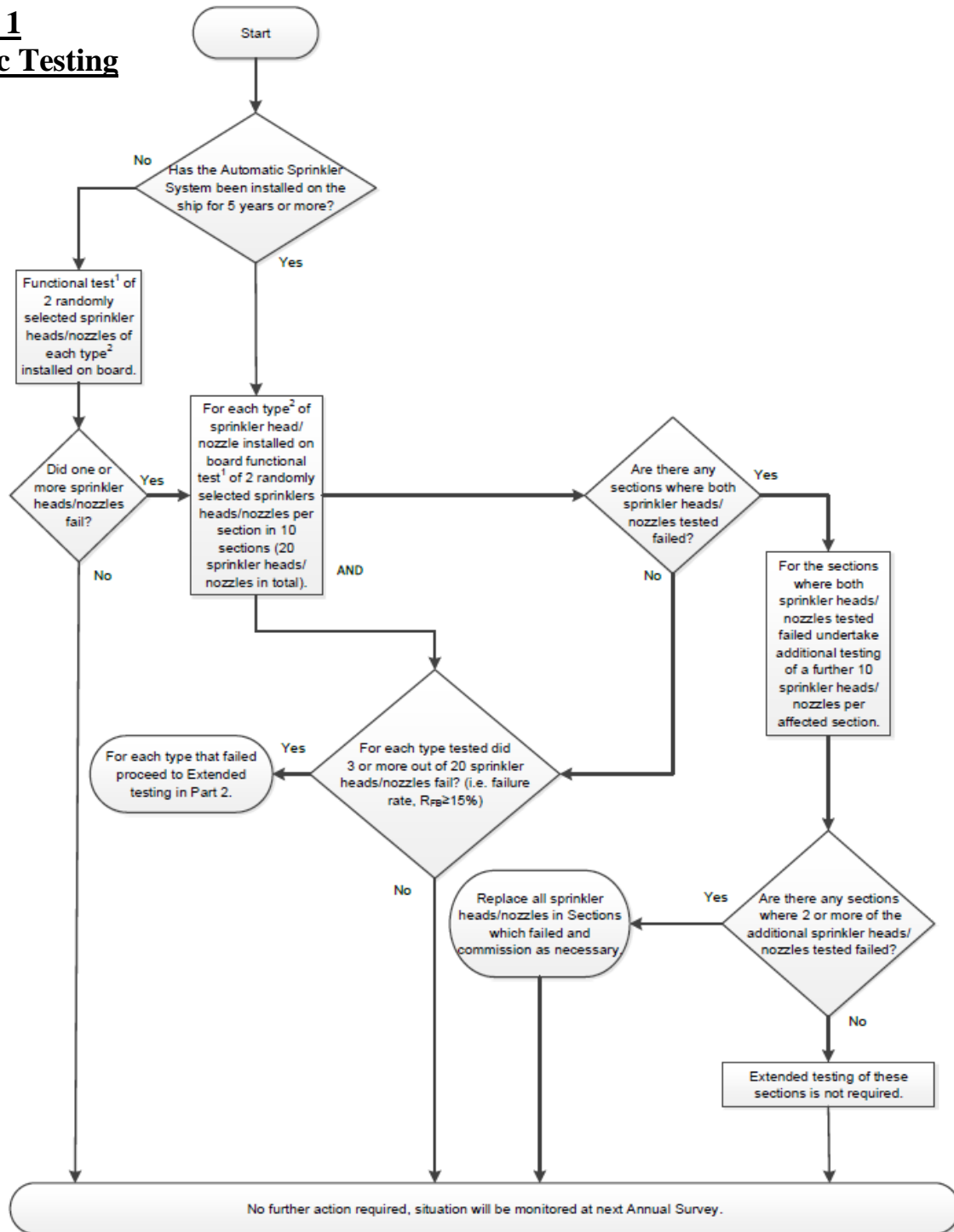


Annual Testing and Inspections

1. verify proper operation of all water mist, water-spray and sprinkler systems using the test valves for each section;
2. visually inspect all accessible components for proper condition;
3. externally examine all high pressure cylinders for evidence of damage or corrosion;
4. check the hydrostatic test date of all high pressure cylinders;
5. functionally test all fixed system audible and visual alarms;
6. flow test all pumps for proper pressure and capacity;
7. test all antifreeze systems for adequate freeze protection;
8. test all system cross connections to other sources of water supply for proper operation;
9. verify all pump relief valves, if provided, are properly set;
10. examine all filters/strainers to verify they are free of debris and contamination;
11. verify all control/section valves are in the correct position;
12. blow dry compressed air or nitrogen through the discharge piping of dry pipe systems, or otherwise confirm the pipework and nozzles are clear of any obstructions. This may require the removal of nozzles, if applicable;
13. test emergency power supply switchover, where applicable;
14. visually inspect all sprinklers focusing in areas where sprinklers are subject to aggressive atmosphere (like saunas, spas, kitchen areas) and subject to physical damage (like luggage handling areas, gyms, play rooms, etc.) so that all sprinklers are inspected within one year. Sprinklers with obvious external damage, including paint, should be replaced and not included in the number of sprinklers tested in subparagraph .17;
15. check for any changes that may affect the system such as obstructions by ventilation ducts, pipes, etc.;
16. test a minimum of one section in each open head water mist system by flowing water through the nozzles. The sections tested should be chosen so that all sections are tested within a five-year period; and
17. test automatic sprinklers and automatic water mist nozzles in accordance with the flow charts *Part 1 – Basic Testing* and *Part 2 – Extended Testing*.
18. during basic testing, and extended testing when applicable, of automatic sprinkler heads/nozzles as outlined in subparagraph 17, water quality testing should be conducted in each corresponding piping section. Note – should a tested sprinkler fail, assessing the corresponding water quality at that time would assist in determining the cause of failure

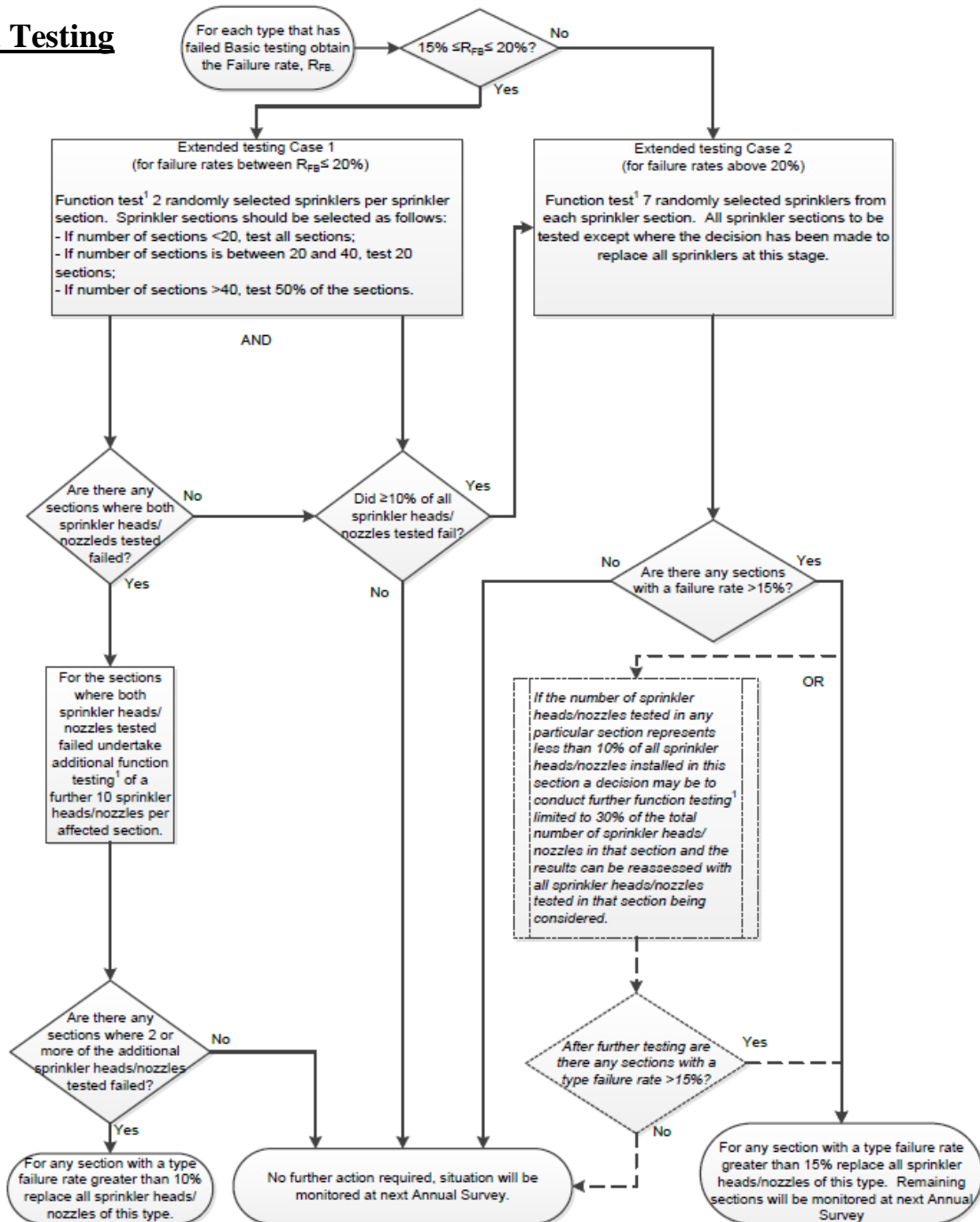


Part 1 Basic Testing





Part 2 Extended Testing



Explanatory Notes to flow charts Part 1 – Basic Testing and Part 2 – Extended Testing



- 1 *Functional Test* is defined as a test that demonstrates the operation and flow of water from sprinkler head/nozzle.
- 2 *Type* is defined as each different manufacturer model of sprinkler head/nozzle.
- 3 *Static/standby pressure* is defined as the constant pressure maintained in the system at all times prior to activation.
- 4 All testing should be carried out at static/standby pressure.
- 5 *Failure rate* (R_{FB}) is the number of sprinkler heads/nozzles to fail testing divided by test sample size multiplied by 100.

5-Yearly Service

1. flush all ro-ro deck deluge system piping with water, drain and purge with air;
2. perform internal inspection of all control/section valves; water quality testing should be conducted in all corresponding piping sections, if not previously tested as outlined in paragraph 18 of section *Annual Testing and Inspections* within the last five years;
3. check condition of any batteries, or renew in accordance with manufacturer's recommendations; and
4. for each section where the water is refilled after being drained or flushed, water quality should meet manufacturer's guidelines. Testing of the renewed water quality should be conducted and recorded as a baseline reference to assist future water quality monitoring for each corresponding section

10-Yearly Service

Perform a hydrostatic test and internal examination for gas and water pressure cylinders according to EN 1968:2002 + A1.

FIXED GAS FIRE-EXTINGUISHING SYSTEMS (OTHER THAN CO₂)

Weekly Testing and Inspections

1. verify all fixed fire-extinguishing system control panel indicators are functional by operating the lamp/indicator test switch; and
2. verify all control/section valves are in the correct position.

Monthly Testing and Inspections

Verify containers/cylinders fitted with pressure gauges are in the proper range and the installation free from leakage.

Annual Testing and Inspections

1. visually inspect all accessible components for proper condition;
2. externally examine all high pressure cylinders for evidence of damage or corrosion;
3. check the hydrostatic test date of all storage containers;
4. functionally test all fixed system audible and visual alarms;
5. verify all control/section valves are in the correct position;
6. check the connections of all pilot release piping and tubing for tightness;
7. examine all flexible hoses in accordance with manufacturer's recommendations;
8. test all fuel shut-off controls connected to fire-protection systems for proper operation;



9. the boundaries of the protected space should be visually inspected to confirm that no modifications have been made to the enclosure that have created openings that cannot be closed and thus would render the system ineffective; and
10. if cylinders are installed inside the protected space, verify the integrity of the double release lines inside the protected space, and check low pressure or circuit integrity monitors on release cabinet, as applicable.

Biennial Testing and Inspections

1. all high pressure extinguishing agents 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 95 per cent of the nominal charge. Cylinders containing less than 95 per cent of the nominal charge should be refilled; and
2. blow dry compressed air or nitrogen through the discharge piping or otherwise confirm the pipe work and nozzles are clear of any obstructions. This may require the removal of nozzles, if applicable.

5-Yearly Service

Perform internal inspection of all control valves.

10-Yearly Service

1. perform a hydrostatic test and internal examination of 10 per cent of the system's extinguishing agent and pilot cylinders. If one or more cylinders fail, a total of 50 per cent of the onboard cylinders should be tested. If further cylinders fail, all cylinders should be tested;
2. flexible hoses should be replaced at the intervals recommended by the manufacturer and not exceeding every 10 years;

FIXED HIGH PRESSURE CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

Monthly Testing and Inspections

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.

Annual Testing and 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 openings that cannot be closed and thus 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.

2 / 3 – Yearly Testing and Inspections

1. At least biennially (intervals of 2 years \pm 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):
 - 1.1 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.
 - 1.2 the hydrostatic test date of all storage containers should be checked.
 - 1.3 the discharge piping and nozzles should be tested to verify that they are not blocked.
 - 1.4 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.
2. At least biennially (intervals of 2 years \pm 3 months) in passenger ships the following maintenance should be carried out by service technicians/specialists that are in possession of a Certificate of Approval as Service Suppliers issued by a Recognized Organization:
 - 2.1 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;
 - 2.2 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
 - 2.3 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.

5-Yearly Service

In cargo ships, the following maintenance should be carried out by technicians/specialists that are in possession of a Certificate of Approval as Service Suppliers issued by a Recognized Organization:

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;
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.

10-Yearly Service

1. At least 10% of the total number of high pressure cylinders and pilot cylinders shall be subjected to internal inspection and hydrostatic testing. If one or more cylinders fail then a total of 50% of the cylinders shall be tested. If further cylinders fail then all cylinders shall undergo a hydrostatic test.
2. Flexible hoses should be replaced at the intervals recommended by the manufacturer but in any case every 10 years;

FIXED LOW PRESSURE CARBON DIOXIDE FIRE-EXTINGUISHING SYSTEMS

Inspections shall be programmed to examine, in so far as it is possible, different areas. If the inspections reveal evidence of deterioration in the pipe work or tank shell this shall be followed up to determine the extent of deterioration and if necessary an internal examination should be conducted. Any repair or replacement shall be carried out the specifications of the Recognized Organization.



Monthly Testing and Inspections

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. the alarm devices are in place and do not appear damaged.
5. the pressure gauge is reading in the normal range;
6. the liquid level indicator is reading within the proper level;
7. the manually operated storage tank main service valve is secured in the open position; and
8. the vapour supply line valve is secured in the open position.

Annual Testing and 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 openings that cannot be closed and thus would render the system ineffective;
2. all storage tank should be visually inspected for any signs of damage, rust or loose mounting hardware;
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; and
4. 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.

2 / 3 – Yearly Testing and Inspections

1. At least biennially (intervals of 2 years \pm 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):
 - 1.1 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;
 - 1.2 the hydrostatic test date of all storage containers should be checked; and
 - 1.3 the discharge piping and nozzles should be tested to verify that they are not blocked.

MEDICAL OXYGEN CYLINDERS

Annual Testing and Inspections

Cylinders should be inspected annually by the manufacturer or his authorized agent. Alternatively, annual inspection may be carried out on board by a senior member of the ship's staff provided manufacturer's instructions are available on board and adhered to.



3-Yearly Testing and Inspections

1. Cylinders should be re-charged with medical oxygen at intervals not exceeding 3 years but in any case prior to the stipulated expiration date.
2. Pressure pipes connecting the cylinder to the regulator should be subject to a pressure test every 3 years or at more frequent intervals if so prescribed by the manufacturer.

5-Yearly Service

1. Hydrostatic pressure testing of cylinders shall be carried out at an approved shore-based servicing station every 5 years or at more frequent intervals if so prescribed by the manufacturer.
2. Pressure regulators should be serviced at a shore-servicing facility at least every 5 years.
3. Medical oxygen re-charging periods should be harmonized with the due date for hydrostatic pressure testing of the medical oxygen cylinders



EXAMPLE SERVICE CHART FOR 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				
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 CO2 system.

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EXAMPLE SERVICE CHART FOR LOW PRESSURE CO2 SYSTEM

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

No.	Text	Value
1	Manufacturer	
2	Number 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 CO2 tank checked by tank level indicator				
5	Contents of CO2 tank checked by riser tube reading				
6	Contents of CO2 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 CO2 system.

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11 September 2015

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