

NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 3-95

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Subj: PERIODIC INSPECTION AND TESTING OF FIXED HALON FIRE FIGHTING
EQUIPMENT ABOARD MERCHANT VESSELS

1. **PURPOSE.** The purpose of this Circular is to publish periodic inspection and testing requirements equivalent to those given in 46 CFR Chapter I and Navigation and Vessel Inspection Circular (NVIC) 6-72, Part VI, enclosure (1) as amended by Change 1 published 28 February 1977, applicable to halon fire extinguishing system storage cylinders.
2. **DIRECTIVES AFFECTED:** None
3. **BACKGROUND:**
 - a. Original requirements for periodic hydrostatic testing and inspection of shipboard fixed halon fire extinguishing system cylinders paralleled those in place for carbon dioxide system cylinders. However, carbon dioxide gas cylinders often contain small quantities of water vapor and carbonic acid in solution with carbon dioxide gas. These constituents can cause internal corrosion in steel cylinders. Halon fire extinguishing cylinders contain bromotrifluoromethane (CBrF₃) and a super pressurization charge of dry nitrogen. Bromotrifluoromethane gas does not cause corrosion of steel. (Cylinders used to ship pure CBrF₃ are exempt from hydrostatic testing under 49 CFR 173.) Nitrogen used in halon cylinders is obtained from air liquefaction and distillation processes that produce nitrogen sufficiently free from moisture that it does not cause corrosion.
 - b. The United States Navy studied the need for hydrostatic testing of halon cylinders on its vessels and concluded that routine hydrostatic testing was generally not necessary.
 - c. The National Fire Protection Association (NFPA) publishes a standard for the design, installation and use of fixed halon fire extinguishing systems, NFPA 12A. This standard is widely used throughout North America for land based halon systems. NFPA standard 12A prescribes periodic inspection and testing requirements for halon systems. These requirements no longer require routine hydrostatic testing and instead require external visual examinations to monitor cylinder corrosion.
4. **DISCUSSION.**
 - a. Enclosure (1) is an alternative to the periodic testing requirements for fixed halon fire extinguishing system storage cylinders. This alternative testing and inspection policy should reduce costs associated with routine periodic hydrostatic cylinder testing, replacement of lost halon, cylinder transportation and system down time.

- b. This alternative inspection and testing policy will reduce ozone depleting air pollution by reducing the handling and processing of halon gas. Handling and processing procedures can lead to inadvertent releases of halon gas into the environment which is identified as detrimental to the ozone layer.
- c. Hazards to vessel crew and service personnel will be reduced by this policy since the handling and rigging of charged cylinders onto and off of vessels for periodic hydrostatic testing will be minimized.
- d. Minimum halon cylinder testing and inspection requirements are summarized as follows:

NVIC 6-72 AND CFR REQUIREMENTS:

- Weigh cylinders 1 year
- Check pressure gauge 1 year
- Flex loops hydro test 12 years
- Cylinder hydro test 12 years/5 years if discharged

ALTERNATIVE REQUIREMENTS DETAILED IN ENCLOSURE (1):

- Check liquid level 1 year
- Check pressure gauge 1 year
- Flex loops hydro test 12 years
- Visual external insp. 5 years
- Cylinder hydro test None unless discharged

5. IMPLEMENTATION. The provisions of enclosure (1), GUIDELINES FOR PERIODIC INSPECTION AND TESTING OF STEEL HALON STORAGE CYLINDERS, of this circular may be applied as an alternative to those periodic testing and inspection requirements for fixed halon fire extinguishing system storage cylinders and flexible loops given in 46 CFR 31.10-18, 46 CFR 71.25-20, 46 CFR 91.25-20, 46 CFR 107.235, 46 CFR 147.65, 46 CFR 167.45-1, 46 CFR 169.247, 46 CFR 189.25-20 and Part VI, enclosure (1) to NVIC 6-72, as amended by Change 1 published 28 February 1977. The provisions of this circular apply only to steel storage cylinders, and flexible loops, of fixed halon fire extinguishing systems.



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End: (1) Guidelines for Periodic Inspection and Testing of Steel Halon Storage Cylinders

GUIDELINES FOR PERIODIC INSPECTION AND TESTING OF STEEL HALON STORAGE CYLINDERS.

1. EQUIVALENCY:

1.1 This enclosure, in its entirety, may be substituted for the periodic hydrostatic testing and inspection requirements for fixed halon fire extinguishing system storage cylinders and flexible loops given in 46 CFR 31.10-18, 46 CFR 71.25-20, 46 CFR 1.25-20, 46 CFR 107.235, 46 CFR 147.65, 46 CFR 167.45-1, 46 CFR 169.247, 46 CFR 189.25-20 and Part VI, enclosure (1) to Navigation and Vessel Inspection Circular 6-72, as amended by Change 1 published 28 February 1977. This NVIC applies to DOT specification 3A, 3AA, 3A480X, 4B, 4BA, 4BW, and 4E steel cylinders.

2. OTHER REQUIREMENTS:

2.1 This enclosure supplements all other standing requirements of 46 CFR, including those applicable to readiness, inspection, testing, maintenance, design and application of halon fire fighting systems. The inspection guidance given in this enclosure details minimum requirements. It is recognized that vessel crews will conduct additional routine inspections of fire fighting equipment, including pressure gauge readings, to ensure system readiness.

3. ANNUAL INSPECTIONS:

3.1 Effective January 1, 1996, the annual inspections given in this section shall apply.

3.2 Cylinders shall be removed from mounting racks and weighed every year.

3.2.1 Contents of cylinders fitted with integral floating dipstick liquid level indicators can be measured with the dipstick indicator in lieu of removal and weighing. Liquid level readings should be adjusted to account for temperature variations.

3.2.2 Subject to the approval of the cognizant Officer in Charge, Marine Inspection (OCMI), liquid level identification measures such as ultrasonic/audiogauging or radioisotope gauging may be used in lieu of annual removal and weighing provided that all of the following are met:

- a) Measurement equipment is calibrated for the cylinder wall thickness and halon liquid.
- b) Calibration is verified by weighing the cylinders which indicate the lowest levels of halon in each release group, but in no case less than a minimum of 10% of the inspected cylinders in each release group.
- c) The acceptable liquid level is identified by the original system installer or coincides with all other cylinder liquid levels of the same release group.
- d) Measurements are made by personnel skilled in ultrasonic/audiogauging or radioisotope gauging techniques.

3.3 Measured weights or liquid levels shall be recorded and compared with recommended fill levels and previous readings. Liquid level comparisons shall take into consideration differences in readings resulting from temperature variations.

3.3.1 If a cylinder weight, or liquid level adjusted for temperature, shows a 5% loss, the cylinder shall be refilled.

3.4 Cylinder pressure gauges should be routinely checked and pressures recorded annually. If a cylinder pressure, adjusted for temperature, shows a 10% loss of pressure, the cylinder shall be refilled.

4. FIVE YEAR INSPECTIONS:

4.1 Effective 12 years after commissioning of the system or five years after the latest hydrostatic test, whichever is later, the tests and inspections given in this section shall apply.

4.2 Steel cylinders continuously in service without discharging shall be removed from mounting racks and given a complete external visual inspection every 5 years. The visual external inspection shall be made in accordance with Compressed Gas Association (CGA) pamphlet C-6, Section 3, (1993 edition) except that the cylinders need not be emptied (tare weight need not be measured) and cylinders shall not be stamped while under pressure.

4.2.1 The complete external surface area of the cylinder including the neck, areas under mounting straps, areas subject to contact with other metallic objects, the cylinder bottom, boot and foot ring, shall be visually inspected.

4.2.2 Visual external inspections following CGA pamphlet C-6 shall be made by personnel trained in visual inspection of steel cylinders. The results of the inspection shall be recorded in an inspection report to be retained on the vessel and made available for inspection. A permanent (plastic) record tag showing the date of the inspection shall be attached to each cylinder.

4.3 Cylinders shall be removed from mounting racks and weighed every five years in conjunction with visual inspections.

4.3.1 Floating liquid level indicators, integral with the cylinder construction, may be used in combination with cylinder temperature and pressure to determine the amount of stored halon in lieu of weighing.

4.3.2 Ultrasonic testing/audiogauging is not a substitute for five year cylinder weighing.

4.4 Cylinders that have become discharged, damaged, rejected, or condemned shall be removed from service. Before cylinders may be placed back in service in a fixed halon installation, they must be inspected, tested or reconditioned in accordance with the provisions of 49 CFR 173 as if they were being used as shipping containers.

5. HOSES AND FLEXIBLE CONNECTIONS:

5.1 Flex loops, hoses and their associated components shall be visually inspected for damage, corrosion or deterioration every year.

5.2 Flex loops, hoses and their attached components shall be inspected and tested in accordance with National Fire Protection Association standard number 12A (1992 edition), paragraph 4-3.1 except that hydrostatic testing shall be performed every 12 years in lieu of every 5 years.

6. CORROSION PROTECTION:

6.1 Corrosion protective paint and other protective coatings shall be maintained in good condition on all external cylinder surfaces.

7. TEMPERATURE VARIATIONS:

7.1 When determining cylinder pressure, the original cylinder fill density must be obtained from the system manufacturer and the temperature/pressure relation shall be obtained from tables published by the system manufacturer, a fire protection equipment service agency regularly engaged in halon cylinder servicing, or the National Fire Protection Association. When determining cylinder liquid level, the liquid level/temperature relation shall be obtained from the system manufacturer.

8. RECORDS:

8.1 Records of all inspections and tests required by this enclosure shall be maintained on the vessel and shall be readily available for inspection. A copy of the examination procedures, including CGA pamphlet, NFPA 12A, and temperature variation tables shall be available for inspection during the visual examination.

8.2 Annual inspection records shall include for each cylinder: cylinder serial number, test methods employed, inspection results, readings and measurements, date and location of tests, testing agency, inspection and testing agency's point of contact and owner's point of contact.

8.3 In addition to records described in 8.2 above, when external visual examinations in accordance with CGA C-6 are conducted, a thorough inspection report shall be provided.

8.3.1 Records shall include cylinder serial number, identifying symbol, DOT specification, manufacturer, and date of manufacture.

8.3.2 The condition and type of the external protective coating shall be recorded.

8.3.3 A record of cylinder inspection for corrosion, pitting, dents, cuts, digs, gouges, leaks, fire damage, bulges, neck defects, and attachments shall be made.

8.3.4 The disposition of the cylinder shall be recorded showing that the cylinder was returned to service, rejected or condemned (scrapped).

9. ADDITIONAL INFORMATION:

9.1 Further guidance and recommended practices are given in each system's owner's manual. In addition, standards for fixed halon systems are given in National Fire Protection Association standard number 12A. Requirements governing refilling and transportation of cylinders are given in 49 CFR Chapter I, Subchapter C. Inspection and testing of piping and controls is given in 46 CFR 31.10-18, 46 CFR 71.25-20, 46 CFR 91.25-20(a)(3), 46 CFR 167.45-1, 46 CFR 169.247 and 46 CFR 189.25-20.

9.2 Referenced publications may be obtained as follows:

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