

Annex E Extinguisher Inspection and Maintenance Information from NFPA Standards

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

E.1 Introduction. This annex is provided as an aid to the user of NFPA 302 by identifying those portions of NFPA standards that pertain to inspection and frequency of maintenance of fixed extinguishing systems and portable fire extinguishers. It is not intended that this annex provide complete information regarding all aspects of servicing fire protection equipment. It is important to note that this information was not copied using NFPA's extract policy and is not intended to be a part of the requirements of NFPA 302 unless specified in Chapter 1 through Chapter 12. While the 2013 edition of NFPA 10, the ~~2011-2015~~ edition of NFPA 12, the ~~2009~~ 2015 edition of NFPA 12A, and the ~~2012-2015~~ edition of NFPA 2001 were the most current at the time of the publication of this edition of NFPA 302, more recent editions might have been issued.

E.2 Definitions. See NFPA 10, *Standard for Portable Fire Extinguishers*, NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, and NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, for definition of terms used in this annex.

E.3 Inspection, Maintenance, and Recharging Portable Fire Extinguishers.

E.3.1 General.

E.3.1.1 This section is concerned with the rules governing inspection, maintenance, and recharging of fire extinguishers. These factors are of prime importance in ensuring operation at the time of a fire. The procedure for inspection and maintenance of fire extinguishers varies considerably. Minimal knowledge is necessary to perform a monthly "quick check" or inspection in order to follow the inspection procedure as outlined in Section 7.2 of NFPA 10. [10:A.7.1]

E.3.1.2 Persons performing maintenance and recharging of extinguishers should meet one of the following criteria:

- (1) Factory training and certification for the specific type and brand of portable fire extinguisher being serviced
- (2) Certification by an organization acceptable to the authority having jurisdiction
- (3) Registration, licensure, or certification by a state or a local authority having jurisdiction

[10: A.7.1.2.1]

E.3.1.3 The owner or designated agent or occupant of a property in which fire extinguishers are located shall be responsible for such inspection, maintenance, and recharging. (See E.3.1.2 and E.3.1.4.) [10:7.1.1]

E.3.1.4 Persons performing maintenance and recharging of extinguishers shall be trained and shall have available the appropriate manufacturer's servicing manual(s), the correct tools, recharge materials, lubricants, and manufacturer's replacement parts or parts specifically listed for use in the fire extinguisher. [10:7.1.2.2]

E.3.1.5 Tags or labels intended for recording inspections, maintenance, or recharging shall be affixed so as not to obstruct the fire extinguisher use, fire extinguisher classification, or manufacturer's labels. [10:7.1.4.1]

E.3.1.6 Labels indicating fire extinguisher use or classification, or both, shall be permitted to be placed on the front of the fire extinguisher. [10:7.1.4.2]

E.3.2 Inspection Frequency.

E.3.2.1 Fire extinguishers shall be manually inspected when initially placed in service. [10:7.2.1.1]

E.3.2.1.1 Frequency of fire extinguisher inspections should be based on the need of the area in which fire extinguishers are located. The required monthly inspection is a minimum. [10:A.7.2.1.1]

E.3.2.1.2 Fire extinguishers and Class D extinguishing agents shall be inspected either manually or by means of an electronic monitoring device/system at intervals not exceeding 31 days. [10:7.2.1.2]

E.3.2.1.3 Fire extinguishers and Class D extinguishing agents shall be manually inspected daily or weekly when conditions exist that indicate the need for more frequent inspections. [10:7.2.1.3]

E.3.2.2 Inspection Procedures. Periodic inspection or electronic monitoring of fire extinguishers shall include a check of at least the following items:

- (1) Location in designated place
 - (2) No obstruction to access or visibility
 - (3) Pressure gauge reading or indicator in the operable range or position
 - (4) Fullness determined by weighing or hefting
 - (5) Condition of tires, wheels, carriage, hose, and nozzle for wheeled extinguishers
 - (6) Indicator for non-rechargeable extinguishers using push-to-test pressure indicators
- [10:7.2.2]

E.3.2.2.1 In addition to E.3.2.2, fire extinguishers shall be visually inspected in accordance with E.3.2.2.2 if they are located where any of the following conditions exist:

- (1) High frequency of fires in the past
- (2) Severe hazards
- (3) Locations that make fire extinguishers susceptible to mechanical injury or physical damage
- (4) Exposure to abnormal temperatures or corrosive atmospheres [10:7.2.2.1]

E.3.2.2.2 Where required by E.3.2.2.1, the following inspection procedures shall be in addition to those addressed in E.3.2.2:

- (1) Verify that operating instructions on nameplates are legible and face outward
- (2) Check for broken or missing safety seals and tamper indicators
- (3) Examine for obvious physical damage, corrosion, leakage, or clogged nozzle [10:7.2.2.2]

E.3.2.3 Corrective Action. When an inspection of any fire extinguisher reveals a deficiency in any of the conditions listed in E.3.2.2, immediate corrective action shall be taken. [10:7.2.3]

E.3.2.3.1 Rechargeable Fire Extinguishers. When an inspection of any rechargeable fire extinguisher reveals a deficiency in any of the conditions in E.3.2.2(3), E.3.2.2(4), E.3.2.2(5), or E.3.2.2.2(1) through E.3.2.2.2(3), the extinguisher shall be subjected to applicable maintenance procedures. [10:7.2.3.1]

E.3.2.3.2 Non-rechargeable Dry Chemical Fire Extinguisher. When an inspection of any non-rechargeable dry chemical fire extinguisher reveals a deficiency in any of the conditions listed in E.3.2.2(3), E.3.2.2(4), E.3.2.2(6), or E.3.2.2.2(1) through E.3.2.2.2(3), the extinguisher shall be removed from further use, discharged, and destroyed at the direction of the owner or returned to the manufacturer. [10:7.2.3.2]

E.3.2.3.3 Non-rechargeable Halon Agent Fire Extinguisher. When an inspection of any non-rechargeable fire extinguisher containing a halon agent reveals a deficiency in any of the conditions listed in E.3.2.2(3), E.3.2.2(4), E.3.2.2(6), or E.3.2.2.2(1) through E.3.2.2.2(3), the extinguisher shall be removed from service, shall not be discharged, and shall be returned to the manufacturer, a fire equipment dealer, or a distributor to permit recovery of the halon. [10:7.2.3.3]

E.3.2.4 Inspection Recordkeeping.

E.3.2.4.1 Personnel making manual inspections shall keep records of all fire extinguishers inspected, including those found to require corrective action. [10:7.2.4.1.3]

E.3.2.4.2 Where manual inspections are conducted, records for manual inspections shall be kept on a tag or label attached to the fire extinguisher, on an inspection checklist maintained on file, or by an electronic method. [10:7.2.4.1.1]

E.3.2.4.3 Where manual inspections are conducted, the month and year the manual inspection was performed and the initials of the person performing the inspection shall be recorded. [10:7.2.4.1.2]

E.4 Inspection and Maintenance of Fixed CO2 Systems.

E.4.1 General.

E.4.1.1 Persons who inspect, test, or maintain, carbon dioxide systems should be trained and periodically tested for competence in the functions they perform. Attending training programs

offered by equipment manufacturers and other training organizations should be considered. [12:A.4.8.4]

E.4.1.2 When maintenance or testing is being conducted on the system, it shall be locked out, or the protected space and affected spaces (migration) shall be evacuated. [12:4.3.3.4.35]

E.4.2 Inspection.

E.4.2.1 At least every 30 days, an inspection shall be conducted to assess the system's operational condition. [12:4.8.1]

E.4.2.2 An inspection of the system is a quick check to give reasonable assurance that the extinguishing system is fully charged and operable. It is done by seeing that the system is in place, that it has not been actuated or tampered with, and that there is no obvious physical damage or condition to prevent operation. As a minimum, the inspection should determine the following:

- (1) High-pressure cylinders are in place and properly secured.
 - (2) For a low-pressure storage unit, the pressure gauge shows normal pressure, that tank shutoff valve is open, and that the pilot pressure supply valve is open. The liquid level gauge should be observed. If at any time a container shows a loss of more than 10 percent, it should be refilled, unless the minimum gas requirements are still provided.
 - (3) Carbon dioxide storage is connected to discharge piping and actuators.
 - (4) All manual actuators are in place and tamper seals are intact.
 - (5) Nozzles are connected, properly aligned, and free from obstructions and foreign matter.
 - (6) Detectors are in place and free from foreign matter and obstructions.
 - (7) The system control panel is connected and showing "normal-ready" condition.
- [12:A.4.8.1]

E.4.2.3 All system hose, including those used as flexible connectors, shall be tested every 5 years in accordance with 4.8.2 of NFPA 12. [12:4.8.2.3]

E.4.3 Maintenance.

E.4.3.1 A manufacturer's test and maintenance procedure shall be provided to the owner for testing and maintenance of the system. This procedure shall provide for the initial testing of the equipment as well as for periodic test inspection and maintenance of the system. Actuation, impairment, and restoration of this protection shall be reported promptly to the authority having jurisdiction. [12:4.8.3.1]

E.4.3.2 The following shall be verified by competent personnel at least annually using available documentation required in 4.4.2.14 of NFPA 12.

- (1) Check and test the carbon dioxide system for operation.
- (2) Check that there have been no changes to the size, type, and configuration of the hazard and system.
- (3) Check and test all time delays for operation.

- (4) Check and test all audible alarms for operation.
 - (5) Check and test all visible signals for operation.
 - (6) Check that all warning signs are installed in accordance with 4.3.2 of NFPA 12.
 - (7) Check and test each detector using methods specified in *NFPA 72*.
- [12:4.8.3.2]

E.4.3.2.1 The goal of this maintenance and testing shall be not only to ensure that the system is in full operating condition, but shall also indicate the probable continuance of that condition until the next inspection. [12:4.8.3.2.1]

E.4.3.2.2 Discharge tests shall be made when any maintenance indicates their advisability. [12:4.8.3.2.2]

E.4.3.2.3 Prior to testing, safety procedures shall be reviewed. (*See Section 4.3 and A.4.3 of NFPA 12.*) [12:4.8.3.2.3]

E.4.3.3 A maintenance report with recommendations shall be filed with the owner. [12:4.8.3.3]

E.4.3.4 High-Pressure Cylinder Weights.

E.4.3.4.1 At least semiannually, all high-pressure cylinders shall be weighed, and the date of the last hydrostatic test noted. (*See 4.6.5.2 of NFPA 12.*) [12:4.8.3.5.1]

E.4.3.4.2 If, at any time, a container shows a loss in net content of more than 10 percent, it shall be refilled or replaced. [12:4.8.3.5.2]

E.4.3.5 Low-Pressure Container Liquid Levels.

E.4.3.5.1 At least weekly, the liquid level gauges of low pressure containers shall be observed. [12:4.8.3.6.1]

E.4.3.5.2 If at any time a container shows a loss of more than 10 percent, it shall be refilled, unless the minimum gas requirements are still provided. [12:4.8.3.6.2]

E.4.3.6 Automatic detection shall be by any listed or approved method or device that is capable of detecting and indicating heat, flame, smoke, combustible vapors, or an abnormal condition in the hazard such as a process trouble that is likely to produce fire. [12:4.5.3]

E.4.3.6.1 Detectors installed at the maximum spacing as listed or approved for fire alarm use can result in excessive delay in agent release. [12:A.4.5.3]

For additional information on detectors, refer to *NFPA 72*. [12:A.4.5.3]

E.4.3.7 The goal of this maintenance and testing shall be not only to ensure that the system is in full operating condition, but shall also indicate the probable continuance of that condition until the next inspection. [12:4.8.3.2.1]

E.5 Inspection and Tests of Fixed Halogenated Agent Systems.

E.5.1 General.

E.5.1.1 All persons who could be expected to inspect, test, maintain, operate, or decommission and remove fire extinguishing systems shall be thoroughly trained and kept thoroughly trained in the functions they are expected to perform. [12A:6.6]

E.5.1.2 Personnel working in a halon-protected enclosure shall receive training regarding halon safety issues. [12A:6.6.1]

E.5.2 Inspection.

E.5.2.1 At least semiannually, all systems shall be thoroughly inspected, tested, and documented for proper operation by trained competent personnel. Tests shall be in accordance with the appropriate NFPA or Canadian standards. [12A:6.1.1]

E.5.2.2 Some protected area conditions could require inspections more frequent than semiannually. A service contract with an approved fire protection contractor is recommended. The inspection and test is to be conducted in accordance with the manufacturer's recommendations and procedures and appropriate NFPA standards and guides. Inspection criteria include but are not limited to the following:

(1) *Detection.* All detectors are to be checked for proper alarm, supervision, and trouble functions.

(2) *Actuation.*

(a) Remove automatic actuation controls from agent containers. Test detection system to operate the necessary circuit(s) to simulate agent release.

(b) Operate all manual devices to simulate agent release.

(c) After testing, reset and reinstall all actuation controls.

(3) *Containers.*

(a) Examine all containers for evidence of corrosion or mechanical damage.

(b) Check container bracketing and supports to determine that their condition is satisfactory.

(4) *Piping and Nozzles.*

(a) Examine piping for any evidence of corrosion.

(b) Examine pipe hangers and straps to see that the piping is securely supported.

(c) Check nozzles for proper position and alignment and determine that the orifices are clear and unobstructed.

(d) Check nozzle seals, if applicable, for signs of deterioration and replace if necessary.

(5) *Auxiliary Equipment.*

(a) Operate all auxiliary and supplementary components such as switches, door and window releases, interconnected valves, damper releases, air-handling equipment shutdown, and supplementary alarms to ensure that they are in proper operating condition.

(b) Return all devices to normal "operating" condition after testing.

[12A:A.6.1]

E.5.2.3 The documented report, with recommendations, shall be filed with the owner.

[12A:6.1.2]

E.5.2.4 The agent quantity and pressure of refillable containers shall be checked. If a container shows a loss in net weight of more than 5 percent or a loss in pressure (adjusted for temperature) of more than 10 percent, it shall be refilled or replaced. When the amount of agent in the container is determined by special measuring devices in lieu of weighing, these devices shall be listed. [12A:6.1.34]

E.5.2.5 All halon removed from refillable containers during service or maintenance procedures shall be collected for recycling.

[12A:6.1.45]

E.5.2.6 Factory-charged non-refillable containers that do not have a means of pressure indication shall be weighed at least semiannually. If a container shows a loss in net weight of more than 5 percent, it shall be replaced. All factory charged non-refillable containers removed from useful service shall be returned for recycling of the agent. [12A:6.1.56]

E.5.2.7 The weight and pressure of the container shall be recorded on a tag attached to the container. [12A:6.1.67]

E.5.3 Containers.

E.5.3.1 DOT, CTC, or similar design Halon 1301 cylinders shall not be recharged without a retest if more than 5 years have elapsed since the date of the last test and inspection. [12A:6.2.1]

E.5.3.1.1 The retest shall be permitted to consist of a complete visual inspection as described in the CFR, Title 49. [12A:6.2.1.1]

E.5.3.1.2 In Canada, the corresponding information shall be as set forth ~~in-by~~ the Canadian Transport ~~Commission's Regulations for the Transportation of Dangerous Commodities by Rail Agency~~ [12A:6.2.1.2]

E.5.3.2 Cylinders continuously in service without discharging shall be given a complete external visual inspection every 5 years, in accordance with Compressed Gas Association pamphlet C-6, Section 3, except that the cylinders need not be emptied or stamped while under pressure. [12A:6.2.2]

E.5.3.3 Where external visual inspection indicates that the container has been damaged, additional strength tests shall be required. [12A:6.2.3]

CAUTION: If additional tests used include hydrostatic testing, containers should be thoroughly dried before refilling. [12A:6.2.3]

E.5.4 Hoses.

E.5.4.1 All system hoses shall be examined annually for damage. If visual examination shows any deficiency, the hose shall be immediately replaced or tested as specified in 6.3.1 of NFPA 12A. [12A:6.3]

E.5.4.2 All hoses shall be tested every 5 years in accordance with 6.3.1 of NFPA 12A. [12A:6.3.2]

E.5.5 Enclosure Inspection. At least every 6 months the halon-protected enclosure shall be thoroughly inspected to determine if penetrations or other changes have occurred that could adversely affect halon leakage. [12A:6.4]

E.5.5.1 Where the inspection indicates that conditions exist that could result in inability to maintain the halon concentration, they shall be corrected. If uncertainty still exists, the enclosures shall be retested for integrity. [12A:6.4.1]

E.5.6 Maintenance.

E.5.6.1 These systems shall be maintained in full operating condition at all times. Use, impairment, and restoration of this protection shall be reported promptly to the authority having jurisdiction. [12A:6.5.1]

E.5.6.2 Any troubles or impairments shall be corrected at once by competent personnel. [12A:6.5.2]

E.5.6.3 Any penetrations made through the halon-protected enclosure shall be sealed immediately. The method of sealing shall restore the original fire resistance rating and tightness of the enclosure. [12A:6.5.3]

E.6 Inspection and Tests of Clean Agent Systems.

E.6.1 Training.

E.6.1.1 All persons who could be expected to inspect, test, maintain, or operate fire extinguishing systems shall be thoroughly trained and kept thoroughly trained in the functions they are expected to perform. [2001:7.6.1]

E.6.1.2 Personnel working in an enclosure protected by a clean agent shall receive training regarding agent safety issues. [2001:7.6.2]

E.6.2 Safety. Safe procedures shall be observed during installation, servicing, maintenance, testing, handling, and recharging of clean agent systems and agent containers. [2001:7.8]

E.6.3 Inspection and Testing.

E.6.3.1 The installing contractor shall provide instructions for the operational features and inspection procedures specific to the clean agent system installed on the vessel. [2001:8.11.4]

E.6.3.2 At least annually, all systems shall be thoroughly inspected and tested for proper operation by personnel qualified in the installation and testing of clean agent extinguishing systems. Discharge tests shall not be required. [2001:7.1.1]

E.6.3.3 The inspection report with recommendations shall be filed with the owner of the system, and shall be permitted to be stored and accessed using paper or electronic media. [2001:7.1.2]

E.6.3.4 At least semi-annually, the agent quantity and pressure of refillable containers shall be checked. [2001:7.1.3]

E.6.3.5 For halocarbon clean agents, if a container shows a loss in agent quantity of more than 5 percent or a loss in pressure (adjusted for temperature) of more than 10 percent, it shall be refilled or replaced. [2001:7.1.3.1]

E.6.3.6 For inert gas clean agents that are not liquefied, pressure is an indication of agent quantity. If an inert gas clean agent container shows a loss in pressure (adjusted for temperature) of more than 5 percent, it shall be refilled or replaced. Where container pressure gauges are used for this purpose, they shall be compared to a separate calibrated device at least annually. [2001:7.1.3.2]

E.6.3.7 Where the amount of agent in the container is determined by special measuring devices, these devices shall be listed. [2001:7.1.3.3]

E.6.3.8 All halocarbon clean agent removed from refillable containers during service or maintenance procedures shall be collected and recycled or disposed of in an environmentally sound manner and in accordance with existing laws and regulations. [2001:7.1.4]

E.6.3.9 Factory-charged, non-refillable containers that do not have a means of pressure indication shall have the agent quantity checked at least semiannually. If a container shows a loss in agent quantity of more than 5 percent, it shall be replaced. All factory-charged, non-refillable containers removed from useful service shall be ~~returned for recycling of the agent or disposed of in an environmentally sound manner and in accordance with existing laws and regulations~~ recovered and recycled or disposed of in accordance with any applicable laws and regulations. [2001:7.1.5]

E.6.3.10 For halocarbon clean agents, the date of inspection, gross weight of cylinder plus agent or net weight of agent, type of agent, person performing the inspection, and, where applicable, the pressure at a recorded temperature shall be recorded on a tag attached to the container. For inert gas clean agents, the date of inspection, type of agent, person performing the inspection, and the pressure at a recorded temperature shall be recorded on a tag attached to the container. [2001:7.1.67]

E.6.3.11 Containers.

E.6.3.11.1 U.S. Department of Transportation (DOT), Canadian Transport Commission (CTC), or similar design clean agent containers shall not be recharged without retesting if more than 5 years have elapsed since the date of the last test and inspection. For halocarbon agent storage containers, the retest shall be permitted to consist of a complete visual inspection as described in 49 CFR. [2001:7.2.1]

E.6.3.11.1.1 Transporting charged containers that have not been tested within 5 years could be illegal. Federal and local regulations should be consulted. [2001: A.7.2.1]

E.6.3.11.2 Cylinders continuously in service without discharging shall be given a complete external visual inspection every 5 years or more frequently if required. The visual inspection shall be in accordance with Section 3 of CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, except that the cylinders need not be emptied or stamped while under pressure. Inspections shall be made only by competent personnel and the results recorded on both of the following:

- (1) A record tag permanently attached to each cylinder
- (2) A suitable inspection report [2001:7.2.2]

E.6.3.11.3 A completed copy of the inspection report shall be furnished to the owner of the system or an authorized representative. These records shall be retained by the owner for the life of the system. [2001:7.2.2.1]

E.6.3.11.4 Where external visual inspection indicates that the container has been damaged, additional strength tests shall be required. [2001:7.2.3]

E.6.3.12 Hoses.

E.6.3.12.1 All system hose shall be examined annually for damage. If visual examination shows any deficiency, the hose shall be immediately replaced or tested as specified in 7.3.2 of NFPA 2001. [2001: 7.3.1]

E.6.3.12.2 All hose shall be tested every 5 years. [2001:7.3.2.1]

E.6.4 Enclosure Inspection. Other than as identified in 7.4.1 of NFPA 2001, the enclosure protected by the clean agent shall be thoroughly inspected at least every 12 months to determine if penetrations have occurred that could lead to agent leakage, if other changes have occurred that could change volume of hazard, or both. Where the inspection indicates conditions that could result in the inability of the enclosure to maintain the clean agent concentration, the conditions shall be corrected. If uncertainty still exists, the enclosure shall be retested for integrity in accordance with 7.7.2.3-5 of NFPA 2001. [2001:7.4]

E.6.4.1 An enclosure inspection shall not be required every 12 months if a documented administrative control program exists that addresses barrier integrity. [2001:7.4.1]

E.6.5 Maintenance.

E.6.5.1 These systems shall be maintained in full operating condition at all times. Actuation, impairment, and restoration of this protection shall be reported promptly to the authority having jurisdiction. [2001:7.5.1]

E.6.5.2 Any troubles or impairments shall be corrected in a timely manner consistent with the hazard protected.
[2001:7.5.2]

E.6.5.3 Any penetrations made through the enclosure protected by the clean agent shall be sealed immediately. The method of sealing shall restore the original fire resistance rating of the enclosure. [2001:7.5.3]