



Tentative Interim Amendment

NFPA 11

Standard for Low-, Medium-, and High-Expansion Foam

2005 Edition

Reference: New Chapter
TIA 05-1 (NFPA 11)
((SC 06-3-2/TIA Log 833))

Pursuant to Section 5 of the NFPA Regulations Governing Committee Projects, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2005 edition. The TIA was processed by the Foam Committee, and was issued by the Standards Council on March 21, 2006 with an effective date of April 10, 2006.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedures. It is interim because it is effective only between editions of the standard. A TIA automatically becomes a proposal of the proponent for the next edition of the standard; as such, it then is subject to all of the procedures of the standards-making process

1. *Revise 1.1 and 1.2 as follows:*

1.1 *Scope.

1.1.1 This standard covers the design, installation, operation, testing, and maintenance of low-, medium-, and high-expansion, and compressed air foam systems for fire protection.

1.1.2 It is not the intent of this standard to specify where foam protection is required.

1.2 Purpose.

1.2.1 This standard is intended for the use and guidance of those responsible for designing, installing, testing, inspecting, approving, listing, operating, or maintaining fixed, semi-fixed, or portable low-, medium-, and high-expansion, and compressed air foam fire-extinguishing systems for interior or exterior hazards.

1.2.2 Nothing in this standard is intended to restrict new technologies or alternative arrangements, provided the level of safety prescribed by the standard is not lowered.

2. *Add definitions to chapter 3 as follows:*

3.3.1 Compressed Air Foam (CAF). A homogenous foam produced by the combination of water, foam concentrate, and air or nitrogen under pressure.

3.3.2 Compressed Air Foam Generating Method. A method of generating compressed air foam recognized in this standard using a mixing chamber to combine air or nitrogen under pressure, water, and foam concentrate in the correct proportions. The resulting compressed air foam is conducted through piping or hoses to the hazard being protected.

3.3.3 Compressed Air Foam Discharge Device. A device specifically designed to discharge compressed air foam in a predetermined pattern.

3.3.4 Compressed Air Foam System (CAFS). A system employing compressed air foam discharge devices or hoses attached to a piping system through which foam is transported from a mixing chamber. Discharge of CAFS begins with automatic actuation of a detection system, or manual actuation that opens valves permitting compressed air foam generated in the mixing chamber, to flow through a piping system and discharged over the area served by the discharge devices or hoses.

A. Hazards that Compressed Air Foam Systems are permitted to protect include the following:

1. Flammable liquids [flash points below 38° C (100° F)] having a vapor pressure not exceeding 276 KPa (40 psia).
2. Combustible liquids [flash point of 38° C (100° F) and above].

B. Compressed Air Foam Systems are not permitted to be used on the following fire hazards:

1. Polar solvents.
2. Chemicals, such as cellulose nitrate, that release sufficient oxygen or other oxidizing agents to sustain combustion.
3. Energized unenclosed electrical equipment.
4. Water-reactive metals such as sodium, potassium, and NaK (sodium – potassium alloys).
5. Hazardous water-reactive materials, such as triethyl-aluminum and phosphorous pentoxide.
6. Liquefied flammable gas.

3. Add a new 3.3.8.3 Class C as follows:

3.3.8.3 Class C. Fire that involves energized electrical equipment where the electrical resistivity of the extinguishing media is of importance.

4. Revise current section 7.3.4 as follows:

7.3.4 Plans shall include or be accompanied by the following information, where applicable:

- 1) Physical details of the hazard, including the location, arrangement, and hazardous materials involved.
- 2) Type and percentage of foam concentrate.
- 3) Required solution application rate.
- 4) Water requirements.
- 5) Calculations specifying required amount of concentrate.
- 6)* Hydraulic calculations.

- 7) Calculation specifying required amount of air.
- 8) CAFS flow calculations report.
- 9) Identification and capacity of all equipment and devices.
- 10) Location of piping, detection devices, operating devices, discharge devices, and auxiliary equipment.
- 11) Schematic wiring diagram.
- 12) Explanation of any special features.

5. Insert a new Chapter 7 and renumber existing chapters 7 through 11 to chapters 8 through 12 as follows:

Chapter 7 Compressed Air Foam Systems

7.1 General.

7.1.1 This chapter shall provide requirements for the correct use of compressed air foam system components.

7.1.2 All components shall be listed for their intended use.

7.1.2.1 Where listings for components do not exist, components shall be approved.

7.2 Water Supplies.

7.2.1 Quality.

7.2.1.1 The water supply to compressed air foam systems shall be permitted to be hard or soft, fresh or salt, but shall be of a quality so that adverse effects on foam formation or foam stability do not occur.

7.2.1.2 No corrosion inhibitors, emulsion breaking chemicals, or any other additives shall be present without prior consultation with the foam concentrate supplier.

7.2.2 Quantity.

7.2.2.1 The water supply shall be of a quantity to supply all the discharge devices and compressed air foam hoses that shall be permitted to be used simultaneously for the specified time.

7.2.2.2 This quantity of water shall include not only the volume required for the compressed air foam apparatus but also water that shall be permitted to be used in other fire fighting operations, in addition to the normal plant requirements.

7.2.3 Pressure. The pressure available at the inlet to the compressed air foam system under required flow conditions shall be at least the minimum pressure for which the system has been designed.

7.2.4 Temperature. Water temperatures shall be between 4°C (40°F) and 37.8°C (100°F).

7.2.5 Design. The water system shall be designed and installed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

7.2.6 Storage. Water supply shall be protected against freezing in climates where freezing temperatures are expected.

7.3 Foam Concentrate.

7.3.1 Quality.

7.3.1.1 Foam concentrate shall be listed.

7.3.1.2 The foam concentrate used in a compressed air foam system shall be that listed for use with the equipment.

7.3.1.2.1 The performance of the system shall be dependent on the composition of the foam concentrate as listed with associated fuels and protection storage arrangement (consult applicable standard for storage arrangement protection).

7.3.1.2.2 The quality of the concentrate for proper performance under the installation requirements of this standard shall be determined by suitable tests.

7.3.2 Quantity. The amount of foam concentrate in the system shall be at least sufficient for the largest single hazard protected, or a group of hazards that are to be protected simultaneously.

7.3.3 Storage Tanks.

7.3.3.1 Storage tanks shall be of corrosion-resisting materials and construction compatible with the foam concentrate.

7.3.3.1.1 Consideration shall be given to design of the storage tanks to minimize evaporation of concentrate.

7.3.3.2 Markings shall be provided on storage tanks to identify the type of concentrate and its intended concentration in solution.

7.3.4 Storage Conditions. Foam concentrate shall be stored within the listed temperature limitations.

7.3.5 Reserve Supply of Foam Concentrate.

7.3.5.1 A reserve supply of foam concentrate sufficient to meet system design requirements shall be provided in order to put the system back into service after operation.

7.3.5.2 The reserve supply shall be in separate tanks or compartments, in drums or cans on the premises, or available from an approved outside source within 24 hours.

7.3.6 Compatibility of Foam Concentrate.

7.3.6.1 Different types of foam concentrates shall not be mixed for storage.

7.3.6.2 Different brands of the same type of concentrate shall not be mixed unless data are provided by the manufacturer to prove that they are compatible and are accepted by the authority having jurisdiction.

7.4 Air Supply.

7.4.1 Quantity.

7.4.1.1 Primary Air Supply. The amount of air shall be at least sufficient for the largest single hazard protected, or a group of hazards that are to be protected simultaneously.

7.4.1.2 Reserve Air Supply. A reserve supply of air sufficient to meet system design requirements shall be provided in order to put the system back into service after operation or available from an approved outside source within 24 hours.

7.4.2 Storage Containers.

7.4.2.1 Storage containers shall be listed.

7.4.2.2 Pressurized storage containers shall be designed to comply with the requirements of the U.S. Department of Transportation or the Canadian Transport Commission.

7.4.2.1.1 Containers shall be designed, fabricated, inspected, certified, and stamped in accordance with Section VIII of ASME *Boiler and Pressure Vessel Code*.

7.4.2.3 Pressurized storage containers shall not be located where they are subject to severe weather conditions or to mechanical, chemical, or other damage.

7.4.2.4 Each pressurized storage container shall be provided with a releasing device.

7.4.3 Supervision. Air pressure shall be supervised for high and low pressure.

7.4.4 Regulators. Regulators controlling the air pressure for compressed air foam systems shall be listed for the intended purpose.

7.4.5 Plant Air. Plant air shall be permitted to be utilized where the facility has an air supply that complies with the requirements of a dedicated main and reserve air supply, including the quality, quantity, pressure, and reliability requirements of the listing, and shall be subject to the approval of the authority having jurisdiction.

7.4.6 Air Compressor. Air compressors used as a dedicated source of air supply shall be listed for use on fire protection systems.

7.5 Compressed Air Foam Generating Method.

7.5.1 The method used to generate compressed air foam shall be listed.

7.6 Distribution Systems.

7.6.1 Piping.

7.6.1.1 Pipe Materials. Pipe shall be in accordance with Section 4.7.1.

7.6.2 Fittings

7.6.2.1. All pipe fittings shall be in accordance with Section 4.7.3.

7.7 Compressed Air Foam Discharge Devices.

7.7.1 Compressed air foam discharge devices shall be listed for the intended purpose.

7.7.2 Discharge devices shall be located and installed so that they are not subject to mechanical, chemical, climatic, or other conditions that would render them inoperative.

7.8 Operation and Control of Systems.

7.8.1 Operation and control of systems shall be in accordance with Section 4.9

7.9 System Types.

7.9.1 Compressed air foam systems conforming to this chapter shall be fixed deluge-type or fixed spray-type systems, wherein compressed air foam shall discharge simultaneously from all nozzles upon system activation.

7.9.2 The system is permitted to be designed to protect a single or multiple zones.

7.10 Limitations.

7.10.1 Compressed air foam systems shall be designed and installed in accordance with their listing for the specific hazards and protection objectives specified in the listing.

7.10.2 These limitations are described in the manufacturer's listed design manual, which shall be part of the listing of the system.

7.11 System Design. The system shall be designed in accordance with the manufacturer's design manual which shall be part of the listing.

7.12 Installation of Piping and Fittings. Piping for compressed air foam systems shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

7.13 Installation of Automatic Detection. Automatic detection devices shall be installed in accordance with NFPA 72, *National Fire Alarm Code*.

7.14 CAFS Discharge Device Choice and Location.

7.14.1 Discharge devices shall be of the type listed for the intended purpose.

7.14.2 Discharge devices shall be located in accordance with listing limitations on spacing, floor coverage, and alignment.

7.15 Discharge Density. The design discharge density shall be in accordance with the applicable occupancy standards and in accordance with the manufacturer's listing but in no case less than 1.63 l/min/square meter (0.04 gpm/square foot).

7.15.1 Where fixed spray type systems are used to protect 3 dimensional equipment, the minimum density shall be applied over the projected area of rectangular prism envelope for the equipment and its appurtenances.

7.16 Discharge Duration. The system shall be designed to discharge compressed air foam for a minimum period of 10 minutes over the entire area for deluge-type systems and a minimum of 5 minutes for fixed spray-type systems and shall be in accordance with the manufacturer's listing. Back-up fire sprinkler protection may be applied as required by authority having jurisdiction.

7.17 System Flow Calculation.

7.17.1 General. Compressed air foam flow involves a mixture of both hydraulic and pneumatic elements which shall be addressed together in the system design to preserve the foam bubble structure until foam is discharged on a hazard.

7.17.2 System flow calculations shall be performed using a calculation method for compressed air foam within the limitations of the manufacturer's design manual.

7.17.3 Compressed air foam piping lengths and configurations of fittings and nozzles shall be in accordance with the manufacturer's listed limitations.

7.18 Plans and Specifications. Plans and specifications shall be in accordance with Chapter 8.

7.19 Testing and Acceptance.

7.19.1 Compressed air foam systems shall be tested in accordance with Chapter 10.

7.20 Maintenance.

7.20.1 Compressed air foam systems shall be maintained in accordance with Chapter 11.

6. Add new sections 10.2.6.1, 10.2.6.1.1, and 10.6.2.1 as follows:

10.2.6.1 All compressed air foam system piping interiors shall be carefully visually examined and, if necessary, cleaned during installation of the pipe.

10.2.6.1.1 Compressed air foam system piping shall be flushed after installation, using the system's air supply in lieu of flushing with water.

10.6.2.1 For Compressed Air Foam Systems, the following data shall be recorded as part of any discharge test:

1) Static water pressure.

2) Residual water pressure at the control valve.

3) System air pressure.

4) Concentration of the foam solution.

5) Foam quality (expansion and ¼ drain time) or foam discharge shall be conducted, or the foam discharge shall be visually inspected to ensure that it is satisfactory for the purpose intended (refer to Appendix D of the Standard for Evaluation of foam Concentration Expansion and Drainage Time).

7. Revise Chapter 11 to add following paragraphs: (Existing 11. 7 “Operating Instructions and Training” becomes new 11.9.).

11.2.3 Compressed Air Foam Producing Equipment.

11.2.3.1 Compressed air foam generating equipment and accessories shall be inspected annually.

11.2.3.2 Discharge devices shall be visually inspected annually for evidence of mechanical damage.

11.7 High Pressure Cylinders. High pressure cylinders used in compressed air foam systems shall not be recharged without a hydrostatic test (and remarking) if more than 5 years have elapsed from the date of the last test. Cylinders that have been in continuous service without discharging shall be permitted to be retained in service for a maximum of 12 years, after which they shall be discharged and re-tested before being returned to service.

11.8 Operating Instructions and Testing.

11.8.1 Operating and maintenance instructions and layouts shall be posted at control equipment with a second copy on file.

11.8.2 All persons who are expected to inspect, test, maintain, or operate apparatus shall be thoroughly trained and training shall be kept current.