

11C

NFPA 11C

Standard for

Mobile Foam

Apparatus

1995 Edition



National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Standards-Making Organization



Documents

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The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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1999 Spring Association Technical Meeting

Report on Proposals

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A compilation of NFPA Technical Committee Reports on Proposals for public review and comment prior to October 2, 1998, and consideration at the NFPA Spring Association Technical Meeting

Please bring to the
1999 Spring Association
Technical Meeting
Baltimore Convention Center
Baltimore, MD
May 17-20, 1999



National Fire Protection Association

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PART I

(Log #CP1)

11C- 1 - (Entire Document): Accept
SUBMITTER: Technical Committee on Fire Department Apparatus
RECOMMENDATION: The Technical Committee on Fire Department Apparatus proposes a withdraw to NFPA 11C, Standard for Mobile Foam Apparatus.
SUBSTANTIATION: In January 1998, the NFPA Standard Council transferred the responsibility for NFPA 11C from the Technical Committee on Foam to the Technical Committee on Fire Department Apparatus. The Fire Department Apparatus Committee has integrated the requirements of NFPA 11C into NFPA 1901. As this material can be maintained in NFPA 1901, there is no need to continue NFPA 11C as a separate document. See Proposal 1901-216 (Log #52) in the A99 Report on Proposals for NFPA 1901.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 22
NOT RETURNED: 5 Craven, Darley, Guyotte, Ruth, von Zehle

(Log #1)

11C- 2 - (Entire Document): Accept
SUBMITTER: David White, Industrial Emergency Response Working Group
RECOMMENDATION: Recommend that NFPA 11C be brought into NFPA 1901 and applicable sections be put into either a separate chapter or the foam section.
SUBSTANTIATION: Almost all of NFPA 11C sections related to the vehicle are in NFPA 1901 now. The foam parts can be put into NFPA 1901's foam sections and be updated easier. The IERWG does ask that they be permitted to put a couple of industrial users on the task force. If any openings come up on NFPA 1901 they would like to be considered for the full committee.
COMMITTEE ACTION: Accept.
COMMITTEE STATEMENT: The Fire Department Apparatus Committee has integrated the requirements of NFPA 11C into NFPA 1901. See Proposal 1901-216 (Log #52) in the A99 Report on Proposals for NFPA 1901.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 22
NOT RETURNED: 5 Craven, Darley, Guyotte, Ruth, von Zehle

Note: To assist in review and comment, a draft of NFPA 1901 is available and downloadable from our Web Site. It is also available on the CD ROM. Paper copies of the draft are available from NFPA upon request by calling Customer Service at 1-800-344-3555.

PART II

(Log #CP87)

1901- 1 - (1-3): Accept
SUBMITTER: Technical Committee on Fire Department Apparatus
RECOMMENDATION: Add a new section 1-3 as follows:
 1-3 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety in place of those prescribed by this standard, provided technical documentation is submitted to the authority having jurisdiction to demonstrate equivalency and the system, method, or device is approved for the intended purpose.
 Renumber existing sections.

SUBSTANTIATION: The equivalency statement being added is standard in many NFPA codes and standards and recognizes that the authority having jurisdiction can allow the use of other materials and technologies as long as they have been demonstrated to be equivalent and the system, method, or device is approved for the intended purpose.

COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 22
NOT RETURNED: 5 Craven, Darley, Guyotte, Ruth, von Zehle

(Log #CP76)

1901- 2 - (1-3, 2-9.3 (New), A-2-9): Accept
SUBMITTER: Technical Committee on Fire Department Apparatus
RECOMMENDATION: Modify 1-3 to read as follows:
 Responsibility of Purchaser. It shall be the responsibility of the purchaser to specify the details of the apparatus; its required performance, including where operations at elevations above 2000 ft (610 m), ~~or~~ on grades greater than 6 percent, or in ambient temperature condition less than 0°F (-18°C) or greater than 110°F (43°C) are required; the maximum number of fire fighters to ride within the apparatus; specific added continuous electrical loads which exceed the minimum of this standard; and any hose, ground ladders, or equipment to be carried by the apparatus that exceed the minimum requirements of this standard.
 Add a new 2-9.3 to read: The apparatus shall meet the requirements of this standard in ambient temperature condition between 0°F (-18°C) and 110°F (43°C).
 Renumber A-2-9 as A-2-9.3
SUBSTANTIATION: The standard does not established the expected temperature operating range of the fire apparatus. Currently there are references to temperature throughout the document. By establishing this operating range, the other references can be standardized and if the apparatus is expected to operate outside that range, the purchaser is made aware of their responsibility to specify the required temperature range.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27
VOTE ON COMMITTEE ACTION:
AFFIRMATIVE: 22
NOT RETURNED: 5 Craven, Darley, Guyotte, Ruth, von Zehle

(Log #CP88)

1901- 3 - (1-4): Accept
SUBMITTER: Technical Committee on Fire Department Apparatus
RECOMMENDATION: Add a new section 1-4 to read as follows:
 1-4 Application. This standard is applicable to new fire apparatus contracted for on or after January 1, 2000, however, nothing shall prevent the use of the standard prior to January 1, 2000 if the purchaser and contractor agree. The standard is not intended to be applied retroactively.
 Renumber existing sections
SUBSTANTIATION: Fire Departments spend many months planning and writing specifications for new fire apparatus. Manufacturers need time to implement the new requirements of the standard. This allows both the fire department and the manufacturer time to study and implement the standard.
COMMITTEE ACTION: Accept.
NUMBER OF COMMITTEE MEMBERS ELIGIBLE TO VOTE: 27

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NFPA 11C
Standard for
Mobile Foam Apparatus
1995 Edition

This edition of NFPA 11C, *Standard for Mobile Foam Apparatus*, was prepared by the Technical Committee on Foam and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 22-25, 1995 in Denver, CO. It was issued by the Standards Council on July 21, 1995, with an effective date of August 11, 1995, and supersedes all previous editions.

This edition of NFPA 11C was approved as an American National Standard on August 11, 1995.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Origin and Development of NFPA 11C

The need for a standard concerning mobile foam apparatus was brought to the attention of the Technical Committee on Foam by several members affiliated with petroleum and chemical companies. The lack of a national standard had made designing, building, and purchasing a foam truck an expensive undertaking, sometimes resulting in substandard fire protection. Recognizing the need for a standard, and with the approval of the Standards Council, work on the standard was begun in 1978, and it was adopted at the 1980 Fall Meeting. The 1986 edition was a partial revision of the 1980 edition.

The 1995 edition incorporates several changes with regard to foam concentrate pumps. Editorial changes were also incorporated in an effort to make the document more user friendly.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

NOTE: Membership on a Committee shall not in and of itself constitute an endorsement of the Association or any document developed by the Committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the installation, maintenance, and use of foam systems for fire protection, including foam hose streams.

Contents

Chapter 1 Introduction	11C- 4	4-3 Proportioning System	11C- 8
1-1 Scope	11C- 4	4-4 Foam Concentrate Tank	11C- 9
1-2 Purpose	11C- 4	Chapter 5 Pressurized Premix Foam	
1-3 Units	11C- 4	Systems	11C- 9
1-4 Definitions	11C- 4	5-1 General	11C- 9
1-5 Description	11C- 5	5-2 Premix Tank	11C- 9
Chapter 2 General Requirements	11C- 5	5-3 Expellant Gas (Nitrogen) Cylinders . . .	11C- 9
2-1 General	11C- 5	5-4 Valving and Piping	11C- 9
2-2 Tanks	11C- 5	Chapter 6 Alternate Proportioning Systems for	
2-3 Nameplates and Markings	11C- 5	Mobile Fire Apparatus	11C- 9
2-4 Performance	11C- 5	6-1 General	11C- 9
2-5 Hose Connections	11C- 5	6-2 Pressure Proportioning System	11C-10
2-6 Control Valves	11C- 5	6-3 In-Line Eductor Foam Proportioning	
2-7 Drains	11C- 5	Systems	11C-10
2-8 Apparatus Operator's Position	11C- 5	Chapter 7 Acceptance Tests and	
2-9 Temperature	11C- 5	Requirements	11C-10
Chapter 3 Balanced Pressure Proportioning		7-1 General	11C-10
System	11C- 6	7-2 Foam System Tests	11C-10
3-1 General	11C- 6	7-3 Tests of Automotive Foam Apparatus Where	
3-2 Atmospheric Foam Concentrate Tank . . .	11C- 6	Equipped with a Water Pump	11C-11
3-3 Foam Concentrate Pump	11C- 6	7-4 Road Tests	11C-11
3-4 Proportioning System	11C- 7	Chapter 8 Referenced Publications	11C-11
3-5 External Concentrate Connections . . .	11C- 8	Appendix A Explanatory Material	11C-11
3-6 Gauge	11C- 8	Appendix B Referenced Publications	11C-13
3-7 Twin Suction Device	11C- 8	Index	11C-13
Chapter 4 Around-the-Pump Proportioning			
System	11C- 8		
4-1 General	11C- 8		
4-2 Water System	11C- 8		

NFPA 11C
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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 8 and Appendix B.

Chapter 1 Introduction

1-1 Scope. This standard applies to mobile foam apparatus (not hand-drawn) used for the control and extinguishment of flammable and combustible liquid fires in storage tanks, and other locations involving the risk of flammable liquid spills. It covers the special systems and equipment necessary to produce foam and the requirements of the vehicle carrying the equipment. With respect to automotive apparatus, this standard is intended to supplement NFPA 1901, *Standard for Pumper Fire Apparatus*. The specific design and application requirements of foam for special hazard protection are defined in NFPA 11, *Standard for Low-Expansion Foam*, and NFPA 11A, *Standard for Medium- and High-Expansion Foam Systems*. Requirements for airport crash rescue vehicles are covered in NFPA 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles*, and are not included in this standard.

1-2 Purpose. This standard is intended for the use and guidance of persons charged with designing, purchasing, approving, testing, inspecting, operating, or maintaining mobile foam apparatus and is based upon sound engineering principles, test data, and field experience. Nothing in this standard is intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by the standard is not lowered.

1-3 Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). The liter is not part of, but is recognized by, SI and is commonly used in international fire protection. The units are listed in Table 1-3 with conversion factors.

Table 1-3

Name of Unit	Unit Symbol	Conversion Factor	
meter	m	1 ft	= 0.3048 m
centimeter	cm	1 ft	= 30.48 cm
millimeter	mm	1 in.	= 25.40 mm
liter	L	1 gal	= 3.785 L
liter per minute	L/min	1 gpm	= 3.785 L/min
cubic decimeter	dm ³	1 gal	= 3.785 dm ³
pascal	Pa	1 psi	= 6894.757 Pa
bar	bar	1 psi	= 0.0689 bar
bar	bar	1 bar	= 105 Pa
kilopascal	kPa	1 psi	= 6.895 kPa
kilowatt	kW	1 HP	= 0.746 kW

For additional conversions and information, see ASTM E380, *Standard for Metric Practice* (see Chapter 8).

1-4 Definitions. The following definitions apply to terms used in this standard. Refer to NFPA 11, *Standard for Low-Expansion Foam*; NFPA 11A, *Standard for Medium- and High-Expansion Foam Systems*; and NFPA 1901, *Standard for Pumper Fire Apparatus*, for other definitions and further explanation.

Approved.* Acceptable to the authority having jurisdiction.

Authority Having Jurisdiction.* The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Concentration. The percent of foam concentrate contained in a foam solution. The type of foam concentrate being used determines the percentage of concentration required. A 3-percent foam concentrate is mixed in a ratio of 97 parts water to 3 parts foam concentrate to make foam solution. A 6-percent concentrate is mixed with 94 parts water to 6 parts foam concentrate.

Discharge Device. A fixed or portable device that directs the flow of foam to the fire or flammable liquid surface.

Eductor. A proportioning device that employs a venturi placed in a water line to create a reduced pressure in piping that leads from a supply of concentrate so that the concentrate is automatically mixed with water in the required proportion.

Expansion. The ratio of final foam volume to original foam solution volume before adding air.

Expellant Gas. Usually nitrogen under pressure that is used to expel a premixed foam solution from a tank through a discharge system. Carbon dioxide or dry air under pressure shall be permitted to be used.

Foam (Air Foam or Mechanical Foam). Fire fighting foam within the scope of this standard is a stable aggregation of small bubbles made by mixing air into a water solution containing a foam concentrate by means of suitably designed equipment. Foam has a lower density than oil or water and shows tenacious qualities for covering and clinging to vertical or horizontal surfaces. It flows freely over a burning liquid surface and forms a stable, air-excluding continuous blanket that seals volatile flammable vapors from access to air. It resists disruption due to wind and draft, or heat and flame attack, and is capable of resealing in case of mechanical rupture. Fire fighting foams retain these properties for relatively long periods of time.

Foam Concentrate. The liquid foaming agent as received from the manufacturer and used for mixing with the recommended amount of water and air to produce foam. This term as used in this standard includes concentrates of the following types: protein foam, fluoroprotein foam, aqueous film forming foam (AFFF), and other synthetic foams.

Foam Solution. A homogeneous mixture of water and foam concentrate in the proper proportion.

Inductor. (See Eductor.)

In-line Eductor. A venturi eductor, placed in the water supply line to the foam maker to create a reduced pressure in piping that leads from a supply of concentrate so that the concentrate is automatically mixed with water in the required proportion. It is precalibrated and it can be adjustable.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Listed.* Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

Premix Solution. A foam solution made by mixing foam concentrate and water in proper proportion and stored ready for use.

Premix Tank. A tank for the storage of premix foam solution. Premix tanks are employed on mobile foam apparatus designed to operate without an external water supply.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

1-5 Description. Mobile foam apparatus is an automotive vehicle or trailer designed to transport, produce, and apply foam to fires or to a potential fire hazard. Such apparatus comprises one or several of the following components: foam concentrate supply tanks, premix solution supply tank, foam concentrate proportioning system, water pump, portable foam discharge devices, fire hose, and foam monitors. The following chapters contain general requirements applicable to different kinds of foam systems and also specific requirements for the type of system generally used. The final chapter covers acceptance tests.

Chapter 2 General Requirements

2-1 General.

2-1.1 Clarification. The following provisions supplement or modify requirements of NFPA 1901, *Standard for Pumper Fire Apparatus*.

(a) *Chassis Carrying Capacity.* NFPA 1901, *Standard for Pumper Fire Apparatus*, is amended to include consideration of the weight of any additional equipment required by this standard, including, but not limited to, the weight of additional tanks or containers, when full.

(b) *Tank Requirement.* No stipulation in NFPA 1901, *Standard for Pumper Fire Apparatus*, shall be construed to require a mobile foam apparatus to be equipped with a water tank in addition to foam concentrate or premix solution tanks, or both.

2-1.2 Materials. The materials used in the foam system shall be compatible with the foam concentrate or premix solution to be carried on the apparatus. Components of the system that can be flushed after use can be constructed of any material that will resist corrosion from water and has the structural strength necessary for the application intended.

2-2 Tanks.

2-2.1 Mounting. Tanks shall be mounted in the mobile apparatus in such fashion that they can be removed and reinstalled without cutting, burning, or welding.

2-3 Nameplates and Markings. All required permanent nameplates and markings shall be capable of withstanding the effects of extreme weather and temperature, and shall be securely attached and installed so as to be protected against mechanical injury.

2-3.1 Instruction Plate. The manufacturer shall provide an instruction plate, affixed to the apparatus at the operator's position, stating the conditions under which the foam system will operate effectively. The instruction plate shall include a schematic diagram of the system and general operating instructions.

2-3.2 Controls. The function and operation of controls, operating devices, gauges, and drains shall be clearly identified and shall be accessible.

2-4 Performance. The foam system shall be designed to deliver foam solution within the limits established for the listed devices in the system.

2-5 Hose Connections.

2-5.1 Threads. All hose connections 1½ in. and larger shall conform to the American National Fire Hose Connection Screw Thread as specified in NFPA 1963, *Standard for Fire Hose Connections*. Adapter couplings, securely attached, shall be provided where hose connectors required by local law or custom differ from the American National Fire Hose Connection Screw Thread.

2-5.2 Caps and Plugs. All male hose connections not supplied with preconnected hose shall be provided with protective caps. All female hose connections shall be provided with plugs.

2-6 Control Valves. All control valves shall be of a type that open and close smoothly and readily under all rated pressures, shall effectively shut off the portions of the system they control, and shall be sized commensurate with the maximum flow and pressure required by the portions of the system they control.

2-7 Drains. The piping system shall be provided with sufficient drains so that all foam concentrate, foam solution, or water (after flushing) can be drained from the system.

2-8 Apparatus Operator's Position. Operating controls, gauges, and other instruments shall be grouped in one area of the apparatus designated to be the operator's position. The design of the operator's position shall be such that the operator can, without changing position, see all gauges and instruments and manipulate all controls.

2-8.1 Water Pump. If the apparatus is equipped with a water pump, the requirements of Chapter 3 of NFPA 1901, *Standard for Pumper Fire Apparatus*, shall apply in addition to the requirements of this chapter.

2-9 Temperature. Optimum foam production is obtained using water at temperatures between 40°F (4.4°C) and 100°F (37.8°C). Higher or lower water temperatures can reduce foam efficiency. Foam concentrates and premix solution are subject to freezing and shall be stored under conditions that fall within listed temperature limitations.