

NFPA® 412

Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment

2014 Edition



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An International Codes and Standards Organization

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Standard for

Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment

2014 Edition

This edition of NFPA 412, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment*, was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting. It was issued by the Standards Council on May 28, 2013, with an effective date of June 17, 2013, and supersedes all previous editions.

This edition of NFPA 412 was approved as an American National Standard on June 17, 2013.

Origin and Development of NFPA 412

Work on this material started in 1955 when the NFPA Subcommittee on Aircraft Rescue and Fire Fighting (as then constituted) initiated a study on methods of evaluating aircraft rescue and fire-fighting vehicles. A tentative text was adopted by the Association in 1957, and a revised text was officially adopted in 1959. Revisions were made in 1960, 1964, 1965, 1969, 1973, and 1974. With the introduction of new types of foam liquid concentrates over the years for this specialized service, the text has been broadened to cover these concentrates.

In 1987, the standard was completely revised to bring it into conformance with the NFPA *Manual of Style* and to refine the test methods.

The 1993 edition of the standard established a single test method for expansion and drainage for all foams and also added information on using the conductivity meter for determining foam solution concentration. Problems with the apparatus of the single test method in the 1993 edition and with accurately determining results indicated a need to reinstate the simpler method for the 1998 edition as an alternative method. The simpler method is also in general field use.

The standard was revised for the 2003 edition with only minor editorial changes.

For the 2009 edition, the Technical Committee reaffirmed the requirements of the 2003 edition, and minor editorial changes were made.

For the 2014 edition, the Technical Committee has revised many of the requirements regarding foam and the testing and test method requirements for foam. These updated requirements allow for a broader use and application of foams along with the methods and equipment that are used to evaluate the foam. The Technical Committee also made several changes according to the *Manual of Style for NFPA Technical Committee Documents*, and updated references to NFPA and non-NFPA documents.



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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 aircraft rescue and fire-fighting services and equipment, for procedures for handling aircraft fire emergencies, and for specialized vehicles used to perform these functions at airports, with particular emphasis on saving lives and reducing injuries coincident with aircraft fires following impact or aircraft ground fires. This Committee also shall have responsibility for documents on aircraft hand fire extinguishers and accident prevention and the saving of lives in future aircraft accidents involving fire.



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Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex C.

Chapter 1 Administration

1.1 Scope. This standard establishes test procedures for evaluating the foam fire-fighting equipment installed on aircraft rescue and fire-fighting vehicles designed in accordance with NFPA 414.

1.2 Purpose. The tests specified in this standard provide procedures for the evaluation of foam fire-fighting equipment in the field to determine compliance with NFPA 414 and NFPA 403.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 403, *Standard for Aircraft Rescue and Fire-Fighting Services at Airports*, 2014 edition.

NFPA 414, *Standard for Aircraft Rescue and Fire-Fighting Vehicles*, 2012 edition.

2.3 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2010 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1 Shall. Indicates a mandatory requirement.

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

3.2.3 Standard. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the *Manual of Style for NFPA Technical Committee Documents*.

3.3 General Definitions.

3.3.1* Foam. A stable aggregation of bubbles of lower density than oil or water. [11, 2010]

3.3.1.1* Alcohol-Resistant Foam Concentrate. A concentrate used for fighting fires on water-soluble materials and other fuels destructive to regular, AFFF, or FFFP foams, as well as for fires involving hydrocarbons. [11, 2010]

3.3.1.2* Aqueous Film-Forming Foam (AFFF) Concentrate. A concentrate based on fluorinated surfactants plus foam stabilizers to produce a fluid aqueous film for suppressing hydrocarbon fuel vapors and usually diluted with water to a 1 percent, 3 percent, or 6 percent solution. [11, 2010]

3.3.1.3* Film-Forming Fluoroprotein (FFFP) Foam Concentrate. A protein-foam concentrate that uses fluorinated surfactants to produce a fluid aqueous film for suppressing hydrocarbon fuel vapors. [11, 2010]

3.3.1.4 Fluoroprotein (FP) Foam. A protein-based foam concentrate, with added fluorochemical surfactants, that forms a foam showing a measurable degree of compatibility with dry chemical extinguishing agents and an increase in tolerance to contamination by fuel.

3.3.1.5 Protein (P) Foam. A protein-based foam concentrate that is stabilized with metal salts to make a fire-resistant foam blanket.

3.3.2* Foam Concentrate. A concentrated liquid foaming agent as received from the manufacturer. [11, 2010]

