

NFPA® 403

Standard for Aircraft Rescue and Fire-Fighting Services at Airports

2018



IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

NOTICE AND DISCLAIMER OF LIABILITY CONCERNING THE USE OF NFPA STANDARDS

NFPA® codes, standards, recommended practices, and guides (“NFPA Standards”), of which the document contained herein is one, are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in NFPA Standards.

The NFPA disclaims liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on NFPA Standards. The NFPA also makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

In issuing and making NFPA Standards available, the NFPA is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the NFPA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

The NFPA has no power, nor does it undertake, to police or enforce compliance with the contents of NFPA Standards. Nor does the NFPA list, certify, test, or inspect products, designs, or installations for compliance with this document. Any certification or other statement of compliance with the requirements of this document shall not be attributable to the NFPA and is solely the responsibility of the certifier or maker of the statement.

REVISION SYMBOLS IDENTIFYING CHANGES FROM THE PREVIOUS EDITION

Text revisions are shaded. A **Δ** before a section number indicates that words within that section were deleted and a **Δ** to the left of a table or figure number indicates a revision to an existing table or figure. When a chapter was heavily revised, the entire chapter is marked throughout with the **Δ** symbol. Where one or more sections were deleted, a **•** is placed between the remaining sections. Chapters, annexes, sections, figures, and tables that are new are indicated with an **N**.

Note that these indicators are a guide. Rearrangement of sections may not be captured in the markup, but users can view complete revision details in the First and Second Draft Reports located in the archived revision information section of each code at www.nfpa.org/docinfo. Any subsequent changes from the NFPA Technical Meeting, Tentative Interim Amendments, and Errata are also located there.

REMINDER: UPDATING OF NFPA STANDARDS

Users of NFPA codes, standards, recommended practices, and guides (“NFPA Standards”) should be aware that NFPA Standards may be amended from time to time through the issuance of a Tentative Interim Amendment (TIA) or corrected by Errata. An official NFPA Standard at any point in time consists of the current edition of the document together with any TIAs and Errata then in effect.

To determine whether an NFPA Standard has been amended through the issuance of Tentative Interim Amendments or corrected by Errata, go to www.nfpa.org/docinfo to choose from the list of NFPA Standards or use the search feature to select the NFPA Standard number (e.g., NFPA 13). The document information page provides up-to-date document-specific information as well as postings of all existing TIAs and Errata. It also includes the option to register for an “Alert” feature to receive an automatic email notification when new updates and other information are posted regarding the document.

IMPORTANT NOTICES AND DISCLAIMERS CONCERNING NFPA® STANDARDS

ADDITIONAL NOTICES AND DISCLAIMERS

Updating of NFPA Standards

Users of NFPA codes, standards, recommended practices, and guides (“NFPA Standards”) should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of Tentative Interim Amendments or corrected by Errata. An official NFPA Standard at any point in time consists of the current edition of the document together with any Tentative Interim Amendments and any Errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of Tentative Interim Amendments or corrected through the issuance of Errata, consult appropriate NFPA publications such as the National Fire Codes® Subscription Service, visit the NFPA website at www.nfpa.org, or contact the NFPA at the address listed below.

Interpretations of NFPA Standards

A statement, written or oral, that is not processed in accordance with Section 6 of the Regulations Governing the Development of NFPA Standards shall not be considered the official position of NFPA or any of its Committees and shall not be considered to be, nor be relied upon as, a Formal Interpretation.

Patents

The NFPA does not take any position with respect to the validity of any patent rights referenced in, related to, or asserted in connection with an NFPA Standard. The users of NFPA Standards bear the sole responsibility for determining the validity of any such patent rights, as well as the risk of infringement of such rights, and the NFPA disclaims liability for the infringement of any patent resulting from the use of or reliance on NFPA Standards.

NFPA adheres to the policy of the American National Standards Institute (ANSI) regarding the inclusion of patents in American National Standards (“the ANSI Patent Policy”), and hereby gives the following notice pursuant to that policy:

NOTICE: The user’s attention is called to the possibility that compliance with an NFPA Standard may require use of an invention covered by patent rights. NFPA takes no position as to the validity of any such patent rights or as to whether such patent rights constitute or include essential patent claims under the ANSI Patent Policy. If, in connection with the ANSI Patent Policy, a patent holder has filed a statement of willingness to grant licenses under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, copies of such filed statements can be obtained, on request, from NFPA. For further information, contact the NFPA at the address listed below.

Law and Regulations

Users of NFPA Standards should consult applicable federal, state, and local laws and regulations. NFPA does not, by the publication of its codes, standards, recommended practices, and guides, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

NFPA Standards are copyrighted. They are made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of safe practices and methods. By making these documents available for use and adoption by public authorities and private users, the NFPA does not waive any rights in copyright to these documents.

Use of NFPA Standards for regulatory purposes should be accomplished through adoption by reference. The term “adoption by reference” means the citing of title, edition, and publishing information only. Any deletions, additions, and changes desired by the adopting authority should be noted separately in the adopting instrument. In order to assist NFPA in following the uses made of its documents, adopting authorities are requested to notify the NFPA (Attention: Secretary, Standards Council) in writing of such use. For technical assistance and questions concerning adoption of NFPA Standards, contact NFPA at the address below.

For Further Information

All questions or other communications relating to NFPA Standards and all requests for information on NFPA procedures governing its codes and standards development process, including information on the procedures for requesting Formal Interpretations, for proposing Tentative Interim Amendments, and for proposing revisions to NFPA standards during regular revision cycles, should be sent to NFPA headquarters, addressed to the attention of the Secretary, Standards Council, NFPA, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101; email: stds_admin@nfpa.org.

For more information about NFPA, visit the NFPA website at www.nfpa.org. All NFPA codes and standards can be viewed at no cost at www.nfpa.org/docinfo.

Copyright © 2017 National Fire Protection Association®. All Rights Reserved.

NFPA® 403

Standard for

Aircraft Rescue and Fire-Fighting Services at Airports

2018 Edition

This edition of NFPA 403, *Standard for Aircraft Rescue and Fire-Fighting Services at Airports*, was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This edition of NFPA 403 was approved as an American National Standard on August 21, 2017.

Origin and Development of NFPA 403

Committee work leading to the development of a recommended practice by the Association commenced in 1947 following a request from the Civil Aeronautics Board (USA) for information on what constituted “adequate” ground fire-fighting equipment and personnel for airports served by air carrier aircraft.

NFPA Committee work continued during 1948, and in 1949 the Association adopted a tentative text at its Annual Meeting held in San Francisco. In 1952, a revised text was submitted for adoption by the Association, and unanimously accepted. Since its original adoption, this text has been revised periodically, with editions issued in 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1965, 1966, 1967, 1970, 1971, 1972, 1973, 1974, 1975, and 1978.

The 1988 edition comprised a complete revision to the text of the document to make it a standard and to segregate mandatory requirements from advisory material. Prior to the 1988 edition, all editions were recommended practices. The standard was revised again in 1993.

The 1998 edition was a partial revision.

The major change to the 2003 edition was the addition of staffing requirements.

The 2009 edition modified some definitions. Additional cleanup of the document was made by moving nonmandatory language to Annex A. The FAA Airport Category column in Table 4.3.1 was updated.

For the 2014 edition, the committee made several changes to various requirements and sections within the document. The committee updated the definitions pertaining to foam and extracted several definitions from other NFPA standards for document and project consistency. Most of the updates and changes in the 2014 edition revolved around response times and response capabilities for ARFF departments. The committee invested a significant amount of time looking at existing science and data along with currently accepted practices and adjusted the response time requirements accordingly. Along with adjusting response times and capabilities, the committee also developed requirements that would allow for a risk analysis to be conducted by the AHJ in order to determine what would best meet the needs and demands of each ARFF department, recognizing the fact that each department and airport are different and have different needs. The committee also made adjustments to the minimum number of ARFF vehicles required based on airport category. Annex B, which is related to agent qualities, was also revised.

For the 2018 edition, the committee updated the reference sections of the document as well as updated and included new definitions in the document. Some of the newly included definitions are pertaining to special events, specifically air shows occurring at airports. There are now definitions for the three categories pertaining to the aircraft showline. This had been included because the committee has added a new chapter pertaining to special events and airport-based air shows. The committee also made changes to the requirements pertaining foam with the intent of limiting variation due to potential confusion and increased complication in testing. The committee also re-evaluated the staffing levels within the document, and in doing so they added new text to ensure that the levels can be modified based on the AHJ completing a task and resource analysis based on the airport's individual needs and demands. The committee also added clarification to the distinction between the terms *arriving* and *responding*, with the intent to reduce and eliminate confusion. The committee also included response times relating to passenger boarding areas of the airport, such as jet bridges.

Technical Committee on Aircraft Rescue and Fire Fighting

Robert C. Mathis, *Chair*
The Boeing Company, WA [M]

John W. McDonald, *Secretary*
U.S. General Services Administration, MD [U]
Rep. U.S. General Services Administration

Keith W. Bagot, U.S. Federal Aviation Administration, NJ [RT]
Rep. U.S. Federal Aviation Administration

Ralph Colet, JRI Inc., CA [M]

Bradford Colton, American Pacific Corporation, NV [M]
Rep. Fire Equipment Manufacturers' Association

Howard Costa, Massport Fire Rescue, MA [U]

Ross A. Davidson, U.S. Department of the Navy, CA [E]
Rep. U.S. Department of the Navy

Graeme Day, LHR Airports Limited, United Kingdom [U]

Hanh Deniston, Metropolitan Washington Airports Authority, VA [L]
Rep. International Association of Fire Fighters

Martin Gravel, Department of National Defence, Canada, Canada [E]

Neil Gray, United Kingdom Civil Aviation Authority, United Kingdom [E]

Michael A. Greenup, Los Angeles Fire Department, CA [U]

Ronald E. Jones, E-One, Inc., FL [M]

D. Scott Lanter, Blue Grass Airport, KY [C]
Rep. Airports Council International-North America

Stephen Listerman, Cincinnati/Northern Kentucky International Airport Fire Department, OH [E]

John Anderson Maddox, Lakeland Fire Department, FL [U]

Douglas C. Mangels, Denver Fire Department, CO [SE]
Rep. Aircraft Rescue & Fire Fighting Working Group, Inc.

Graydon L. Matheson, King County Sheriff's Office-ARFF Division, WA [U]

Kevin J. Petit, Akron Brass Company, OH [M]

Pam L. Phillips, Port Authority of New York & New Jersey, NJ [C]
Rep. American Association of Airport Executives

Danny M. Pierce, ARFF Solutions, CA [SE]

James E. Podolske, Jr., U.S. Department of the Air Force, FL [E]

Paul W. Powell, Rosenbauer America, TX [M]
Rep. Fire Apparatus Manufacturers Association

Joseph L. Scheffey, JENSEN HUGHES, MD [SE]

Jason Shively, Oshkosh Corporation, WI [M]

Jeremy Souza, Rhode Island Airport Corporation, RI [U]

Marc S. Tonnacliff, U.S. Federal Aviation Administration, DC [E]
Rep. U.S. Federal Aviation Administration

Christopher A. Toten, U.S. Marine Corps, TX [E]

Alternates

Gerard G. Back, JENSEN HUGHES, MD [SE]
(Alt. to Joseph L. Scheffey)

Daniel Buckingham, U.S. General Services Administration, DC [U]
(Alt. to John W. McDonald)

Ralph B. Colet, JRI Inc., CA [M]
(Alt. to Ralph Colet)

Robert L. Darwin, Engility Corporation, VA [C]
(Alt. to Ross A. Davidson)

Richard Gentry, Indianapolis Airport Authority, IN [E]
(Alt. to Stephen Listerman)

Fred B. Goodnight, Amerex Corporation, AL [M]
(Alt. to Bradford Colton)

William D. Gordon, BWI Fire Rescue Department, MD [L]
(Alt. to Hanh Deniston)

Al Gulamali, Lee County Port Authority, FL [C]
(Alt. to D. Scott Lanter)

Denny J. Heitman, U.S. Department of the Air Force, IL [E]
(Alt. to James E. Podolske, Jr.)

Elizabeth A. Hendel, Phoenix Fire Department, AZ [E]
(Voting Alt.)

Duane F. Kann, Rosenbauer, MN [M]
(Alt. to Paul W. Powell)

Ronald J. Krusleski, Houston Fire Department ARFF, TX [SE]
(Alt. to Douglas C. Mangels)

Dana Larsen, Los Angeles City Fire Department, CA [U]
(Alt. to Michael A. Greenup)

Thomas W. Littlepage, Evansville Airport Authority, IN [U]
(Alt. to John Anderson Maddox)

William K. Major, Buffalo Niagara International Airport Fire Department, NY [L]

James Price, U.S. Department of Transportation, GA [E]
(Alt. to Marc S. Tonnacliff)

Steven Schwartz, Oshkosh Corporation, WI [M]
(Alt. to Jason Shively)

Darrell Sooter, The Boeing Company, SC [M]
(Alt. to Robert C. Mathis)

Leroy Stephens, E-One, FL [M]
(Alt. to Ronald E. Jones)

Jonathan Torres, SRA International, A CSRA Company, NJ [RT]
(Alt. to Keith W. Bagot)

Justin M. Towles, American Association of Airport Executives, VA [C]
(Alt. to Pam L. Phillips)

Tim Vanfleet, Akron Brass Company, OH [M]
(Alt. to Kevin J. Petit)

Nonvoting

Francois Villard, Fire Safety Security Crisis Management Training,
Switzerland [SE]

L. M. Krasner, Medfield, MA [SE]
(Member Emeritus)

Ken Holland, NFPA Staff Liaison

Thomas J. Lett, Albuquerque Fire & Safety Associates, NM [SE]
(Member Emeritus)

This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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.

Contents

Chapter 1 Administration	403– 6	6.2 Tools and Equipment.	403– 12
1.1 Scope.	403– 6	Chapter 7 Airport Emergency Communications	403– 12
1.2 Purpose.	403– 6	7.1 Communications and Alarms.	403– 12
1.3 Equivalency.	403– 6	Chapter 8 ARFF Personnel, Protective Clothing, and Equipment	403– 12
Chapter 2 Referenced Publications	403– 6	8.1 Personnel.	403– 12
2.1 General.	403– 6	8.2 Protective Clothing.	403– 13
2.2 NFPA Publications.	403– 6	Chapter 9 Airport Fire Station Location and Response Capability	403– 13
2.3 Other Publications.	403– 6	9.1 Siting and Response.	403– 13
2.4 References for Extracts in Mandatory Sections.	403– 6	Chapter 10 Special Events	403– 13
Chapter 3 Definitions	403– 7	10.1 Airport-Based Air Shows.	403– 13
3.1 General.	403– 7	Annex A Explanatory Material	403– 14
3.2 NFPA Official Definitions.	403– 7	Annex B Basis of Agent Quantities	403– 20
3.3 General Definitions.	403– 7	Annex C Operational Communications System	403– 26
Chapter 4 Organization of Aircraft Rescue and Fire-Fighting (ARFF) Services	403– 8	Annex D Task and Resource Analysis Model	403– 27
4.1 Administrative Responsibilities.	403– 8	Annex E Training Program	403– 31
4.2 Emergency Preparedness.	403– 8	Annex F Informational References	403– 32
4.3 Categorizing Airports for ARFF Services.	403– 8	Index	403– 35
Chapter 5 Extinguishing Agents	403– 9		
5.1 Primary Agents.	403– 9		
5.2 Complementary Agents.	403– 9		
5.3 Quantity of Agents.	403– 9		
5.4 Compatibility of Agents.	403– 9		
5.5 Combustible Metal Agents.	403– 9		
5.6 Agent Discharge Capabilities.	403– 9		
Chapter 6 Aircraft Rescue and Fire-Fighting (ARFF) Vehicles	403– 12		
6.1 Rescue and Fire-Fighting Vehicles.	403– 12		

NFPA 403**Standard for****Aircraft Rescue and Fire-Fighting Services at Airports**

2018 Edition

IMPORTANT NOTE: This NFPA document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notices and Disclaimers Concerning NFPA Standards.” They can also be viewed at www.nfpa.org/disclaimers or obtained on request from NFPA.

UPDATES, ALERTS, AND FUTURE EDITIONS: New editions of NFPA codes, standards, recommended practices, and guides (i.e., NFPA Standards) are released on scheduled revision cycles. This edition may be superseded by a later one, or it may be amended outside of its scheduled revision cycle through the issuance of Tentative Interim Amendments (TIAs). An official NFPA Standard at any point in time consists of the current edition of the document, together with all TIAs and Errata in effect. To verify that this document is the current edition or to determine if it has been amended by TIAs or Errata, please consult the National Fire Codes® Subscription Service or the “List of NFPA Codes & Standards” at www.nfpa.org/docinfo. In addition to TIAs and Errata, the document information pages also include the option to sign up for alerts for individual documents and to be involved in the development of the next edition.

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

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 F. 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 F.

Chapter 1 Administration

1.1 Scope. This standard contains the minimum requirements for aircraft rescue and fire-fighting (ARFF) services at airports. Requirements for other airport fire protection services are not covered in this document.

1.2 Purpose.

1.2.1 This standard is prepared for the use and guidance of those charged with providing and maintaining aircraft rescue and fire-fighting services at airports.

1.2.2 The principal objective of a rescue and fire-fighting service is to save lives.

1.2.2.1 The preparation for dealing with an aircraft accident/incident occurring at, or in the immediate vicinity of, an

airport is of primary importance because it is within this location that the greatest opportunity to save lives exists.

1.2.2.2 The need for extinguishing a fire can occur either immediately following an aircraft accident/incident, or at any time during rescue operations, and must be assumed at all times.

1.2.3 The most important factors bearing on effective rescue in a survivable aircraft accident are the training received, the effectiveness of the equipment, and the speed with which personnel and equipment designated for rescue and fire-fighting purposes can be put to use.

1.3 Equivalency.

1.3.1 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 over those prescribed by this standard.

1.3.2 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.3.3 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

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 10, *Standard for Portable Fire Extinguishers*, 2017 edition.

NFPA 405, *Standard for the Recurring Proficiency of Airport Fire Fighters*, 2015 edition.

NFPA 412, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment*, 2014 edition.

NFPA 414, *Standard for Aircraft Rescue and Fire-Fighting Vehicles*, 2017 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2015 edition.

2.3 Other Publications.

2.3.1 Military Specifications. Department of Defense Single Stock Point, Document Automation and Production Service, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 1911-5094.

U.S. Military Specification MIL-F-24835, *Fire Extinguishing Agent, Aqueous Film-Forming Foam (AFFF), Liquid Concentrate, for Fresh and Sea Water*.

2.3.2 Other Publications.

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

ICAO Doc 9137, *Airport Services Manual*, Part 8, Level B.

2.4 References for Extracts in Mandatory Sections.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 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* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Shall. Indicates a mandatory requirement.

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

3.2.5 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that 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 NFPA Manuals of Style. When used in a generic sense, such as in the phrase "standards development process" or "standards development activities," the term "standards" includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

N 3.3.1* Aerobic Box. The Federal Aviation Administration (FAA) defines the aerobic box as the airspace at an air show where participating aircraft are authorized to perform aerobic maneuvers appropriate to their category (CAT).

N 3.3.2 Air Boss. The individual who has the primary responsibility for air show operations on the active taxiways, runways, and the surrounding air show demonstration area.

N 3.3.3 Air Show Waiver. An official document issued by the FAA that authorizes certain operations of aircraft to deviate from a regulation but under conditions that ensure an equivalent level of safety.

3.3.4 Air Traffic Control. A service established to provide air and ground traffic control for airports.

3.3.5 Aircraft Accident. An occurrence associated with the operation of an aircraft that takes place between the time any person boards the aircraft with the intention of flight and until all such persons have disembarked and in which any person suffers death or serious injury or in which the aircraft receives substantial damage.

3.3.6* Aircraft Fire Fighting. The control or extinguishment of fire adjacent to or involving an aircraft following ground accidents or incidents.

3.3.7* Aircraft Incident. An occurrence, other than an accident, associated with the operation of an aircraft, that affects or could affect continued safe operation if not corrected.

3.3.8* Aircraft Rescue. Action taken to save or set free persons involved in an aircraft accident/incident by safeguarding the integrity of the aircraft fuselage from an external/internal fire, to support self-evacuation, and to undertake the removal of injured and trapped persons.

N 3.3.9 Aircraft Showline Categories.

N 3.3.9.1 Category I Showline. A Category I showline must be not less than 1500 ft from the primary spectator area (minimum showline distances are measured from the crowd line to the center of the aircraft closest to any spectator area). Reciprocating engine-powered aircraft with a speed of 245 knots indicated air speed (KIAS) or higher in straight and level flight at 75 percent power at standard temperature and pressure (15°C at sea level) shall not perform aerobic maneuvers closer than the Category I showline. Turbine engine-powered aircraft with a speed of 245 KIAS or higher in straight and level flight at 85 percent power at standard temperature and pressure shall not perform aerobatics closer than the Category I showline.

N 3.3.9.2 Category II Showline. A Category II showline must be not less than 1000 ft from the primary spectator area. Reciprocating engine-powered aircraft with a speed of more than 156 KIAS and less than 245 KIAS in straight and level flight at 75 percent power at standard temperature and pressure shall not perform aerobic maneuvers closer than the Category II showline. Turbine engine-powered aircraft with a speed higher than 156 KIAS and less than 245 KIAS in straight and level flight at 85 percent power at standard temperature and pressure shall not perform aerobatics closer than the Category II showline.

N 3.3.9.3 Category III Showline. A Category III showline must be not less than 500 ft from the primary spectator area. Reciprocating engine-powered aircraft with a speed of 156 KIAS or less in straight and level flight at 75 percent power at standard temperature and pressure shall not perform aerobic maneuvers closer than the Category III showline. Turbine engine-powered aircraft with a speed higher than 156 KIAS or less in straight and level flight at 85 percent power at standard temperature and pressure shall not perform aerobatics closer than the Category III showline.

3.3.10 Airport Fire Chief. The individual normally having operational control over the airport's rescue and fire-fighting personnel and equipment, or a designated appointee.

3.3.11 Airport Fire Department Personnel. Personnel under the operational jurisdiction of the chief of the airport fire department assigned to aircraft rescue and fire fighting.

3.3.12 Airport Manager. The individual having managerial responsibility for the operation and safety of an airport. The manager can have administrative control over aircraft rescue and fire-fighting services but normally does not exercise authority over operational fire and rescue matters.

3.3.13 Area Classifications.

3.3.13.1 Critical Rescue and Fire-Fighting Access Area (CRFFAA). The rectangular area surrounding any runway within which most aircraft accidents can be expected to occur on airports. (See Figure A.3.3.13.3.)

3.3.13.2 Movement Area. That part of an airport to be used for the takeoff, landing, and taxiing of aircraft, and the apron(s).

3.3.13.3* Rapid Response Area (RRA). A rectangle that includes the runway and the surrounding area extending to a width of 500 ft (150 m) outward from each side of the runway centerline and to a length of 1650 ft (500 m) beyond each runway end, but not beyond the airport property line. (See Figure A.3.3.13.3.)

3.3.14 ARFF Personnel. Personnel actively engaged in the pursuit of rescue and fire fighting at the scene of an airport incident.

3.3.15 Fixed Base Operator (FBO). An enterprise based on an airport that provides storage, maintenance, or service for aircraft operators.

3.3.16 Flight Service Station (FSS). An air traffic facility that briefs pilots, processes and monitors flight plans, and provides in-flight advisories.

3.3.17 Foam. An aggregation of small bubbles used to form an air-excluding, vapor-suppressing blanket over the surface of a flammable liquid fuel.

3.3.17.1* Aqueous Film-Forming Foam Concentrate (AFFF). 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, 2016]

3.3.17.2* Film-Forming Fluoroprotein Foam Concentrate (FFFP). A protein-foam concentrate that uses fluorinated surfactants to produce a fluid aqueous film for suppressing hydrocarbon fuel vapors. [11, 2016]

3.3.17.3 Fluorine-Free Synthetic Foam (FFSF). Foam concentrate based on a mixture of hydrocarbon surface active agents that are fluorine free.

3.3.17.4* Fluoroprotein Foam Concentrate (FP). A concentrate very similar to protein-foam concentrate but with a synthetic fluorinated surfactant additive. [11, 2016]

3.3.17.5* Protein Foam Concentrate (P). Concentrate consisting primarily of products from a protein hydrolysate, plus stabilizing additives and inhibitors to protect against freezing, to prevent corrosion of equipment and containers, to resist bacterial decomposition, to control viscosity, and to otherwise ensure readiness for use under emergency conditions. [11, 2016]

3.3.18* Foam Concentrate. A concentrated liquid foaming agent as received from the manufacturer. [11, 2016]

3.3.19 Fuselage. The main body of an aircraft.

3.3.20 International Civil Aviation Organization (ICAO). An international body charged with matters dealing with the development, coordination, and preservation of international civil aviation.

3.3.21 Mutual Aid. A written intergovernmental agreement between agencies, jurisdictions, or both, that they assist one another on request by furnishing personnel, equipment, expertise, or a combination in a specified manner.

3.3.22 Response Time. The total period of time measured from the time of an alarm until the first ARFF vehicle arrives at the scene of an aircraft accident/incident and is in position to apply agent.

3.3.23 Table-Top Training. A workshop style of training involving a realistic emergency scenario and requiring problem-solving participation by personnel responsible for management and support at emergencies.

Chapter 4 Organization of Aircraft Rescue and Fire-Fighting (ARFF) Services

4.1 Administrative Responsibilities.

4.1.1 The airport management shall be responsible for the provisions of ARFF services on the airport.

4.1.2 Mutual aid shall be prearranged between such services on airports and any off-airport fire or rescue agencies serving the environs of the airport.

4.2* Emergency Preparedness. The airport shall develop a risk management plan for fire emergency scene strategy.

4.2.1 Airports shall prepare and maintain in current status an airport/community emergency plan.

4.2.1.1 The plan shall assign specific duties and responsibilities and include all airport and community resources necessary to cope with a major aircraft emergency and other potential emergencies requiring ARFF resources.

4.2.2* Airport/community emergency plans shall be tested at least every 3 years in the form of a full-scale exercise.

4.2.2.1 In addition, tabletop training shall be conducted at least annually.

4.2.3 Airport management and resource agencies shall participate in annual tabletop training exercises that encompass their duties and responsibilities depicted in the emergency plan.

4.3 Categorizing Airports for ARFF Services.

4.3.1 The authority having jurisdiction shall determine the level of protection based on the largest aircraft scheduled into the airport. Airports shall be categorized for ARFF services in accordance with Table 4.3.1. (See Annex B.)

4.3.2* The airport category for a given aircraft shall be based on the overall length of the aircraft or the fuselage width.

4.3.2.1 If, after selecting the category appropriate to the aircraft's overall length, the aircraft's fuselage width is greater than the maximum width given in Table 4.3.1, then the category for that aircraft shall be the next one higher.

Table 4.3.1 Airport Category by Overall Length and Width of Aircraft

Airport Category U.S.			Overall Length of Aircraft up to but Not Including		Maximum Exterior Width up to but Not Including	
NFPA	FAA	ICAO	ft	m	ft	m
1	A*	1	30	9	6.6	2
2	A*	2	39	12	6.6	2
3	A*	3	59	18	9.8	3
4	A	4	78	24	13.0	4
5	A	5	90	28	13.0	4
6	B	6	126	39	16.4	5
7	C	7	160	49	16.4	5
8	D	8	200	61	23.0	7
9	E	9	250	76	23.0	7
10	E	10	295	90	25.0	8

Notes:

(1) Airport categories are used in the calculations to eliminate the need for calculating specific quantities of extinguishing agents for each type of aircraft.

(2) Although only water is normally necessary for interior handline attack, logistically and tactically it should be discharged as foam and is therefore included in the quantities of water necessary for foam production in Table 5.3.1(a) and Table 5.3.1(b).

*It is FAA Category A if the airport has scheduled service with aircraft that have more than nine passenger seats.

Chapter 5 Extinguishing Agents

5.1 Primary Agents.

5.1.1* One or more of the following types of primary agents shall be used for aircraft fire fighting involving hydrocarbon fuels:

- (1) Aqueous film-forming foams (AFFF)
- (2) Fluoroprotein foam (FP) or film-forming fluoroprotein foam (FFFP)
- (3) Protein foam (P)
- (4) Fluorine-free synthetic foam

5.1.2* All foam concentrates shall be listed.

5.1.2.1 Any primary agent used at the minimum quantities and discharge rates in Table 5.3.1(a) and Table 5.3.1(b) shall meet the applicable fire extinguishment and burnback performance requirements of the performance tests specified.

5.2 Complementary Agents. All ARFF vehicles responding shall carry either one or both of the following categories of complementary agents:

- (1)* Potassium-based dry chemical
- (2)* Halogenated agent

5.3 Quantity of Agents.

5.3.1 The minimum amounts of water for foam production and the minimum amounts of complementary agents necessary shall be as specified in Table 5.3.1(a) or Table 5.3.1(b), based on the system of categorizing airports listed in Table 4.3.1.

5.3.2 Sufficient foam concentrate shall be provided on each vehicle to proportion, at the prescribed percentage of foam concentrate to water, into double the quantity of water specified in Table 5.3.1(a) or Table 5.3.1(b) at the maximum tolerance specified in NFPA 412.

5.3.3* Each airport shall conduct and document a needs analysis to determine a minimum 100 percent water resupply capability within the critical rescue and fire-fighting access area and shall ensure that local arrangements fulfill that capability.

5.4* Compatibility of Agents. Chemical compatibility shall be ensured between foam and complementary agents where used simultaneously or consecutively.

5.5* Combustible Metal Agents.

5.5.1 Extinguishing agents for combustible metal fires shall be provided in portable fire extinguishers that are rated for Class D fires in accordance with 5.2.4 of NFPA 10.

5.5.2 At least one nominal 20 lb (9.1 kg) extinguisher shall be carried on each vehicle specified in Table 6.1.1.

5.6 Agent Discharge Capabilities.

5.6.1 The discharge capabilities of extinguishing agents shall not be less than the rates specified in Table 5.3.1(a) or Table 5.3.1(b) of this standard and Table 4.1.1(c) and Table 4.1.1(d) of NFPA 414.

5.6.2 Other than at Category 1 and Category 2 airports, where the handline nozzles can be used, the discharge rates for foam shall be met using only the ARFF vehicle turret(s).

Table 5.3.1(a) Extinguishing Agents, Discharge, and Response Capability in U.S. Customary Units

Airport Category	Response Phases	Response Capability (sec)	MIL-F-24835 and ICAO C		ICAO B		ICAO A		Complementary Agents ^a	
			Required Water (U.S. gal)	Discharge Capability (gpm)	Required Water (U.S. gal)	Discharge Capability (gpm)	Required Water (U.S. gal)	Discharge Capability (gpm)	Quantity (lb)	Discharge (lb/sec)
1	Q1 ^b	180 ^b	120	120	160	160	180	180	100	5
	Q2 ^c		0		0		0			
	Q3 ^d		0		0		0			
TOTAL			120		160		180			
2	Q1 ^b	180 ^b	157	157	213	213	236	236	200	5
	Q2 ^c	210 ^c	43		57		64			
	Q3 ^d		0		0		0			
TOTAL			200		270		300			
3	Q1 ^b	180 ^b	285	285	392	392	438	438	300	5
	Q2 ^c	210 ^c	85		118		132			
	Q3 ^d	240 ^{d,e}	300	60	300	60	300	60		
TOTAL			670		810		870			
4	Q1 ^b	180 ^b	468	468	646	646	715	715	300	5
	Q2 ^c	210 ^c	272		374		415			
	Q3 ^d	240 ^{d,e}	600	60	600	60	600	60		
TOTAL			1,340		1,620		1,730			
5	Q1 ^b	180 ^b	863	863	1,194	1,194	1,331	1,331	450	5
	Q2 ^c	210 ^c	647		896		999			
	Q3 ^d	240 ^{d,e}	1,250	125	1,250	125	1,250	125		
TOTAL			2,760		3,340		3,580			
6	Q1 ^b	180 ^b	1,245	1,245	1,725	1,725	1,920	1,920	450	5
	Q2 ^c	210 ^c	1,245		1,725		1,920			
	Q3 ^d	240 ^{d,e}	1,250	125	1,250	125	1,250	125		
TOTAL			3,740		4,700		5,090			
7	Q1 ^b	180 ^b	1,585	1,585	2,192	2,192	2,437	2,437	450	5
	Q2 ^c	210 ^c	2,045		2,828		3,143			
	Q3 ^d	240 ^{d,e}	1,250	125	1,250	125	1,250	125		
TOTAL			4,880		6,270		6,830			
8	Q1 ^b	180 ^b	2,095	2,095	2,901	2,901	3,222	3,222	900	10
	Q2 ^c	210 ^c	3,185		4,409		4,898			
	Q3 ^d	240 ^{d,e}	2,500	250	2,500	250	2,500	250		
TOTAL			7,780		9,810		10,620			
9	Q1 ^b	180 ^b	2,619	2,619	3,626	3,626	4,030	4,030	900	10
	Q2 ^c	210 ^c	4,451		6,164		6,850			
	Q3 ^{d,f}	240 ^{d,e}	2,500	250	2,500	250	2,500	250		
TOTAL			9,570		12,290		13,380			
10	Q1 ^b	180 ^b	3,195	3,195	4,424	4,424	4,915	4,915	900	10
	Q2 ^c	210 ^c	6,069		8,405		9,338			
	Q3 ^d	240 ^{d,e}	5,000	500	5,000	500	5,000	500		
TOTAL			14,260		17,830		19,250			

^aThe minimum quantity is based on ISO qualified potassium bicarbonate. Powder can be substituted by a listed agent exceeding the performance of potassium bicarbonate.

^bQuantity of water for foam production for initial control of the pool fire.

^cQuantity of water for foam production to continue control or fully extinguish the pool fire.

^dWater available for interior fire fighting.

^eThe 240-second requirement begins after arrival of the first ARFF apparatus.

^fFor multiple passenger deck aircraft within this category, the Q3 discharge capability should be increased to 375 gpm (1420 L/min) and required water increased to 3750 gal (14,195 L).