

NFPA[®]

405

**Standard for
the Recurring Proficiency
of Airport Fire Fighters**

2020



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NFPA® 405

Standard for the

Recurring Proficiency of Airport Fire Fighters

2020 Edition

This edition of NFPA 405, *Standard for the Recurring Proficiency of Airport Fire Fighters*, was prepared by the Technical Committee on Aircraft Rescue and Fire Fighting. It was issued by the Standards Council on April 28, 2019, with an effective date of May 18, 2019, and supersedes all previous editions.

This edition of NFPA 405 was approved as an American National Standard on May 18, 2019.

Origin and Development of NFPA 405

In 1994, the Standards Council approved the request of the Technical Committee on Aircraft Rescue and Fire Fighting to develop a new document to address the maintaining of proficiency of aircraft rescue and fire-fighting services at airports. This recommended practice evolved from the U.S. Department of Transportation, Federal Aviation Administration, Federal Aviation Regulations (FAR), Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers. In NFPA 405, the committee had expanded the training curriculum provided in Part 139.319 by providing airport authorities with more specific information with which to develop comprehensive programs in order to maintain proficiency of ARFF services at airports.

The 1999 edition was a recommended practice. The document was changed to a standard for the 2004 edition.

In the 2010 edition, the technical committee made several additions to the requirements of this document, the most significant addition being the inclusion of all the requirements of NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*. The technical committee recognized that fire fighters must meet certain minimum qualifications prior to being assigned to aircraft rescue and fire fighting (ARFF) activities and that NFPA 1003 contained such minimum requirements. While NFPA 1003 sets the initial minimum qualifications required, NFPA 405 builds on NFPA 1003 and includes the recurrent training requirements that are to be used by those assigned to ARFF activities. The technical committee also added recurrent training requirements that involve the use of proximity personal protective equipment (PrPPE). The technical committee also brought the document in line with the *Manual of Style for NFPA Technical Committee Documents*, as well as updated many of the references that are used in the document.

For the 2015 edition, many of the changes to the recurrent training requirements were made to bring the document more in line with the Federal Aviation Administration (FAA) requirements for recurrent training for airport fire fighters. To allow increased use of this document internationally, the committee also included requirements that the International Civil Aviation Organization (ICAO) had for airport fire fighters governed by ICAO.

One of the most significant and highly discussed alterations for this edition was the change in time interval for skills evaluations, from 18 months to 12 months, which was done to align with the time interval the FAA requires. Another significant change included in this edition was a greater focus on safety management for airport fire fighters and their important roles as team members. The committee also included requirements to ensure that airport fire fighters are aware of the environmental impacts of extinguishing agents. Given the potential for international use of this document, the committee modified the EMS requirements to where the AHJ determines the minimum level of EMS to be provided. Lastly, the committee rewrote the entire chapter on recurrent live fire to address the skills and knowledge to be evaluated for live fire and live spill fire training. These changes were made to align the document with what the FAA and the ICAO require airport fire fighters to be evaluated against.

The 2020 edition has incorporated substantial changes in the formatting of each chapter. Each chapter has been reorganized with specific competencies for ARFF personnel followed by criteria to gauge each competency. Specific criteria and training requirements have been updated throughout the document to account for improved technologies and industry best practices since previous editions. Training on personnel safety has been expanded to include behavioral wellness training. Finally, the requirements for live fire training were updated to include the need for ARFF personnel to be proficient in the use of extendable turrets.

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John W. McDonald, *Secretary*

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Rep. U.S. General Services Administration

Gerard G. Back, JENSEN HUGHES, MD [SE]

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

Rep. U.S. Federal Aviation Administration

Ralph B. Colet, JRI Inc., CA [M]

Howard "Ted" 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

Michael Flores, Los Angeles Fire Department, CA [U]

Patrick T. Ginnaty-Moore, UL LLC, IL [RT]

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

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

Denny J. Heitman, U.S. Department of the Air Force, IL [E]

Elizabeth A. Hendel, Phoenix Fire Department, AZ [E]

Rene Herron, Embry-Riddle Aeronautical University - Worldwide, FL [SE]

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

Ronald J. Krusleski, Houston Fire Department ARFF, TX [SE]

Rep. Aircraft Rescue & Fire Fighting Working Group, Inc.

David Scott Lanter, Blue Grass Airport, KY [C]

Rep. Airports Council International-North America

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

James Lonergan, American Pacific Corporation (AMPAC), PA [M]

Rep. Fire Equipment Manufacturers' Association

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

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

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

John E. McLoughlin, American Airlines, FL [SE]

Travis W. McNichols, Port Authority Of NY and NJ, NY [C]

Rep. American Association of Airport Executives

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

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

Paul W. Powell, Rosenbauer America, TX [M]

Rep. Fire Apparatus Manufacturers Association

Jason Shively, Oshkosh Corporation, WI [M]

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

Gary David Barthram, Heathrow Airport Fire Service, United Kingdom [U]

(Alt. to Graeme Day)

Daniel Buckingham, U.S. General Services Administration, DC [U]

(Alt. to John W. McDonald)

Dale Clarence Carnes, Sacramento County Airports, CA [E]

(Alt. to Elizabeth A. Hendel)

Robert L. Darwin, Saalex Solutions, VA [C]

(Alt. to Ross A. Davidson)

Benoit Gagnon, Canadian Forces Fire Marshal, Canada [E]

(Alt. to Martin Gravel)

Richard Gentry, Indianapolis Airport Authority, IN [E]

(Alt. to Stephen Listerman)

Al Gulamali, Lee County Port Authority, FL [C]

(Alt. to David Scott Lanter)

James E. Johannessen, UL LLC, PA [RT]

(Alt. to Patrick T. Ginnaty-Moore)

Duane F. Kann, Rosenbauer, MN [M]

(Alt. to Paul W. Powell)

Jeffrey Lassell, UPS Airlines, KY [SE]

(Alt. to Ronald J. Krusleski)

Thomas W. Littlepage, Evansville Airport Authority, IN [U]

(Alt. to John Anderson Maddox)

Kevin Matlock, U.S. Air Force, FL [E]

(Alt. to Denny J. Heitman)

Paul Joseph Nye, Allison Park, PA [L]

(Alt. to Hanh Deniston)

James Price, U.S. Department of Transportation, GA [E]

(Alt. to Marc S. Tonnacliff)

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

(Alt. to Gerard G. Back)

Steven Schwartz, Oshkosh Corporation, WI [M]

(Alt. to Jason Shively)

Oscar L. Scott, Los Angeles Fire Department, CA [U]

(Alt. to Michael Flores)

Darrell Sooter, The Boeing Company, SC [M]

(Voting Alt.)

Leroy Stephens, E-One, FL [M]

(Alt. to Ronald E. Jones)

Jonathan Torres, FAA William J. Hughes Technical Center, NJ [RT]

(Alt. to Keith W. Bagot)

Tim Vanfleet, IDEX Corp/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)

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

Jeremy Souza, NFPA Staff Liaison

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Committee Scope: This Committee shall have primary responsibility for aircraft rescue and fire-fighting (ARFF) documents used by organizations providing ARFF services for operational procedures; training; foam testing and application; specialized equipment; and planning for aircraft emergencies.

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NFPA 405

Standard for the

Recurring Proficiency of Airport Fire Fighters

2020 Edition

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

Chapter 1 Administration

1.1 Scope. This standard contains the required performance criteria by which an authority having jurisdiction over aircraft rescue and fire-fighting (ARFF) maintains proficiency and effective ARFF at airports.

1.2 Purpose. This standard is intended for the use of those charged with maintaining ARFF services at airports and establishes the basis for a recurring training program that focuses on measurable performance criteria.

1.2.1 This standard addresses the development of productive and coordinated aircraft rescue and fire control operations with a goal of reducing risk for participants and the environment.

1.2.2 Results of evaluations conducted in accordance with the requirements of this standard shall be recorded and maintained by the authority having jurisdiction.

▲ **1.2.3** Continuous broad-based training is fundamental to maintaining proficient ARFF services at airports.

1.2.4 ARFF personnel at airports shall meet the requirements of NFPA 1003 prior to assignment and thereafter shall receive necessary recurring training that will enable them to consistently meet the requirements of this standard relative to each individual's role and tasks.

1.3 Application.

1.3.1 The provisions of this standard are considered fundamental to maintaining levels of professional competence of ARFF services at airports.

1.3.2 This standard is intended to be adopted as a model for the development of a proficient in-service training program for ARFF personnel at airports.

1.3.3 The authority having jurisdiction has the responsibility to ensure that ARFF personnel receive initial training in relation to each individual's role and expected tasks to enable them to perform competently. It is recognized that recurring proficiency training assists in the maintenance of competence through practice of initial skills and reinforcement of knowledge.

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 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2019 edition.

2.3 Other Publications.

2.3.1 ICAO Publications. International Civil Aviation Organization, 999 University Street, Montréal, Quebec H3C 5H7, Canada.

Annex 19 to the Convention on International Civil Aviation, International Standards and Recommended Practices, *Safety Management*, amended first edition, July 2016.

2.3.2 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 403, *Standard for Aircraft Rescue and Fire-Fighting Services at Airports*, 2018 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2017 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.

3.3.1 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. [403, 2018]

3.3.2* 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.

3.3.3 ARFF Personnel. Personnel under the operational jurisdiction of the chief of the airport fire department assigned to aircraft rescue and fire fighting.

3.3.4 Critical Rescue and Fire-Fighting Access Area (CRFFAA). The rectangular area that surrounds a runway within which aircraft movements can be expected to occur on airports and whose width extends 500 ft (150 m) from each side of the runway centerline and whose length is 3300 ft (1000 m) beyond each runway threshold.

3.3.5 Knowledge. What the individual must know or understand in order to carry out a role and subsequent tasks to the standard required.

3.3.6 Personal Protective Equipment (PPE). Multiple elements of compliant protective clothing, and equipment that when worn together provide protection from some, but not all, risks of emergency incident operations.

3.3.7 Safety Management System. A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. [ICAO:Annex 19]

3.3.8 Size-Up. A mental process of evaluating the influencing factors at an incident prior to committing resources to a course of action. [1670, 2017]

3.3.9 Skills. Behaviors or actions that require practice in order to be performed satisfactorily. The skills or abilities can be manual, social, interpersonal, or intellectual.

Chapter 4 General Requirements

4.1 General.

4.1.1 Each evaluation of skills and knowledge required by this standard shall be conducted at regular intervals of at least once every twelve (12) consecutive calendar months by a designated qualified evaluator(s) appointed by the authority having jurisdiction.

4.1.2 All evaluations shall be performed in a manner as determined by the authority having jurisdiction, and each objective shall be met in its entirety.

4.2 Evaluation Criteria. The authority having jurisdiction shall establish the evaluation criteria for each objective or task to be evaluated in accordance with Chapter 4 through Chapter 19 to ensure competency for each person assigned ARFF duties.

4.2.1 Where actual operation is not possible, evaluation of skills and knowledge shall be carried out by simulations. Those simulated exercises shall be structured to involve the organization and achievement of specific task(s), to include team coordination, explanations, and illustrations that seek to reproduce a real-life situation.

4.2.2 Whenever any of the following terms — *rules, regulations, procedures, supplies, apparatus, and equipment* — are referred to in this standard, it shall be implied that they are the terms of the authority having jurisdiction.

4.3* Record Keeping. Records sections, including “general” individual training records, shall be maintained for each ARFF employee and shall include the following:

- (1) Name of the individual
- (2) Date of training
- (3) Subject covered, course methodology, and training materials utilized
- (4) Climatic conditions
- (5) Duration of training
- (6) Instructor comments
- (7) Performance evaluation
- (8) Name of instructor
- (9) Signature of student

Chapter 5 Airport Familiarization

5.1 Scope. This chapter identifies the knowledge and skills necessary to maintain proficiency in airport familiarization.

5.2 Competency.

N 5.2.1 ARFF personnel shall have a thorough knowledge of their airport and its immediate surrounding area under all operating conditions, which is fundamental in achieving a rapid response by ARFF personnel and equipment to the critical rescue and fire-fighting access area (CRFFAA), with special emphasis to prevent runway incursions.

N 5.2.2 The program shall train ARFF personnel during both daytime and nighttime hours and include airport-specific training.

Δ 5.3 Criteria. ARFF personnel, given a map of the airport and vicinity, shall be able to perform all of the following:

- (1) Identify all runways, taxiways, and access roads, their designations and associated aircraft travel direction, and lengths and widths
- (2) Describe the airfield lighting system (i.e., center line, edge and threshold lights, and so on)
- (3) Describe airfield pavement marking and signing systems, including standard colors used in markings and signs
- (4) Identify the limits of the runway safety areas on the airport, including engineered materials arresting systems (EMAS), as applicable
- (5) Identify the various aircraft navigational aids and associated critical areas located on the airport
- (6) Describe airport rules and regulations for operating and accessing the airport's movement and nonmovement areas, including communicating with the air traffic control tower (ATCT)
- (7) Identify key terrain features, installations, and potential hazards on the airport
- (8) Identify the probable direction of fuel travel in a simulated leak in the fuel distribution system
- (9) Identify the location of all emergency fuel shutoff(s) and describe the process by which these shutoffs stop the flow of fuel within the system
- (10) Identify hazardous materials locations stored or used on the airport
- (11) Identify aircraft ramps/parking areas and related support facilities
- (12) Identify frangible gate locations, predesignated staging areas, and controlled access points
- (13) Identify water supply locations
- (14) Identify fuel storage and distribution locations

5.4 Scenarios. Given a simulated incident or accident scenario, a radio, and a destination on the airport, ARFF personnel shall be competent in performing the following:

- (1) Communicate with the air traffic control (ATC) on appropriate frequency
- (2) Obtain all necessary clearances
- (3) Select the shortest and safest response route to arrive at the designated point within specified times required by the authority having jurisdiction
- (4) Communicate directly by radio with a flight crew regarding the aircraft emergency situation
- (5) Identify and interpret light-gun signals used by the air traffic control tower (ATCT)

5.5 Airport Markings. ARFF personnel, given a diagram of the aircraft movement area, shall identify the following airport markings:

- (1) Color of runway markings
- (2) Color of taxiway markings
- (3) Hold position markings
- (4) Displaced thresholds
- (5) Aiming point/landing zone bars
- (6) Apron ground markings
- (7) Other painted surface markings
- (8) Any additional markings applicable to the airport

Δ 5.6 Lighting. ARFF personnel shall demonstrate a knowledge of the following:

- (1) Runway centerline and edge lighting
- (2) Taxiway centerline and edge lighting

- (3) Runway threshold lights
- (4) Runway end identifier lights
- (5) Obstruction lighting
- (6) Visual slope indicator lights
- (7) Runway guard lights
- (8) Stop bars
- (9) Runway status lights
- (10) Surface Movement Guidance Control System (SMGCS)
- (11) Any additional lighting applicable to the airport

5.7 Signage. ARFF personnel shall identify the following signage systems for the airport:

- (1) Runway distance remaining signs
- (2) Directional signs
- (3) Runway signs
- (4) Taxiway signs
- (5) Any additional signage applicable to the airport

5.8 Airport Traffic. Given a map of the airport, ARFF personnel shall identify all motor vehicle traffic routes and the traffic flow system of the airport, including vehicle parking and storage areas.

Chapter 6 Aircraft Familiarization

6.1 Scope. This chapter identifies the knowledge and skills necessary to maintain proficiency in aircraft familiarization.

6.2* Competency. ARFF personnel shall have a thorough knowledge of all types of aircraft utilizing the airport.

6.3 Criteria. ARFF personnel shall possess the following knowledge:

- (1) Identify the various types and models of aircraft, including the approximate number of passengers each is designed to carry
- (2) Identify the categories of aircraft propulsion systems and their associated hazards
- (3) Identify major aircraft structural components using the correct terms and nomenclature
- (4) Describe materials used in aircraft construction and their effects on fire and rescue operations
- (5) Demonstrate the correct use of an aircraft familiarization chart by identifying and describing important aircraft components
- (6) Locate, identify, and have a working knowledge of the aircraft systems and components for aircraft typically operating at the airport
- (7) Estimated typical crew and passenger capacity
- (8) Correct location and operation of normal entry door(s), emergency exit openings, evacuation slides, and cargo compartment doors
- (9) Exits that have evacuation slides and the evacuation slide deployment that will be inhibited when accessed from the aircraft exterior
- (10) Location of aircraft propulsion and auxiliary power units (APU), including normal and emergency shutdown procedures for each
- (11) Major aircraft structural components
- (12) Type, location, and isolation of batteries found on aircraft and their associated hazards
- (13) Crew compartment locations and access
- (14) Fuel used, location of fuel tanks, fuel line locations, and capacity of fuel tanks for a given aircraft
- (15) Hydraulic reservoirs and hydraulic accumulators

- (16) Oxygen cylinders and oxygen generators
- (17) Brake and wheel systems
- (18) Ground ventilations and outflow valve(s)
- (19) Flight data recorder and cockpit voice recorder
- (20) Various onboard fire protection warning and extinguishment systems
- (21) Flight interphone system
- (22) Access panels
- (23)* Any hazards unique to a particular aircraft, such as ram air turbines (RAT) or air-driven generators (ADG)
- (24) Any hazards associated with military aircraft, such as ejection seats, armament, exotic metals, composite materials, and specialized fuels

Chapter 7 ARFF Personnel Safety and Safety Management

7.1* Scope. This chapter identifies the knowledge and skills necessary to ensure safety as it relates to ARFF personnel and safety management.

7.2 Competency. To reduce the risk associated with ARFF operations, ARFF personnel shall have in-depth knowledge of the exposure to the hazards associated with their occupation through training and testing of their knowledge and skills.

▲ 7.3 Criteria. ARFF personnel shall possess the knowledge to describe the following:

- (1) Hazards associated with aircraft rescue and firefighting
- (2) Hazards to personnel posed by aircraft and aircraft systems
- (3) Common fireground accidents
- (4) Causes of injuries in specific incidents
- (5) Correct lifting and equipment-handling techniques
- (6) Slip, trip, and fall hazards
- (7) Dangers associated with cutting or striking stationary or moving objects
- (8) Overexertion, on-scene personnel rehabilitation, and other physiological factors
- (9) Use of authority having jurisdiction issued and approved protective clothing and equipment
- (10) The limitations of protective clothing and equipment, and the proper safety precautions to take while wearing personal protective equipment (PPE) — specifically while operating power and hand tools
- (11) The purpose, components, operation, and limitations of self-contained breathing apparatus (SCBA), including the following:
 - (a) The inspection process for an SCBA
 - (b) Changing the air supply cylinder of a team member with an exhausted air supply cylinder
 - (c) The proper donning and doffing of the SCBA
 - (d) The actions to take when the following emergency situations occur:
 - i. Low-air alarm
 - ii. Exhausted air supply, regulator malfunction(s)
 - iii. Damaged or inoperable face piece
 - iv. Damaged or inoperable SCBA hose
- (12) Mounting, dismounting, and riding various types of apparatus
- (13) Basic driving skills and distractions associated with vehicle operations

- (14) Behavioral health and wellness programs
- (15) Methods of protection against other potentially infectious material
- (16) Water rescue operations
- (17) Use of tools and equipment

Chapter 8 Personal Protective Equipment

8.1 Scope. This chapter identifies the knowledge and skills necessary to identify, maintain, and utilize personal protective equipment (PPE).

8.2 Competency. ARFF personnel shall have an intimate knowledge of PPE on which their lives and those of others depend.

▲ 8.3 Criteria. ARFF personnel shall be able to articulate wearing, daily inspection, care, maintenance, and purpose of the following protective clothing and equipment:

- (1) Boots
- (2) Gloves
- (3) Turnout coat
- (4) Turnout pants
- (5) Helmet
- (6) Eye protection
- (7) SCBA
- (8) Protective hoods
- (9) Specialized clothing as required for a specific hazard
- (10) Hearing protection

8.4 Breathing Apparatus. ARFF personnel shall be able to demonstrate and articulate the various systems and their purpose relative to their assigned breathing apparatus, including the following:

- (1) Physiology of respiration, including the following:
 - (a) Respiratory system
 - (b) Need for respiratory protection
- (2) Types of breathing apparatus assigned and available for use by ARFF personnel
- (3) Breathing apparatus procedures, including the following:
 - (a) Donning and doffing procedures
 - (b) Safety precautions and emergency procedures
 - (c) Decontamination/cleaning methods and procedures
 - (d) Inspection, care, and maintenance of all SCBA components
 - (e) Breathing apparatus control procedures
 - (f) Cylinder removal and replacement
 - (g) Cylinder recharging
 - (h) Daily inspection checklist
 - (i) Emergency procedures to be taken when the following situations occur:
 - i. Cylinder low-air alarm activation
 - ii. Cylinder air supply is exhausted
 - iii. Breathing regulator malfunction
 - iv. Face piece damage
 - v. Low-pressure hose damage
 - vi. High-pressure hose damage

Chapter 9 Aircraft Cargo Hazards

9.1* Scope. This chapter identifies the knowledge, skills, and procedures necessary to identify and mitigate cargo hazards during emergencies.

9.2 Competency. ARFF personnel shall demonstrate familiarity with the level of personal protection required for dealing with specific incidents.

9.3 Criteria. ARFF personnel shall demonstrate the following:

- (1) Comprehensive knowledge of the airport's dangerous goods response plan
- (2) Use of reference materials to identify dangerous goods and determine the applicable action to manage the incident
- (3) Procedures for the identification, risk assessment, isolation, rescue, and evacuation requirements for a given dangerous goods incident
- (4) Correct utilization of PPE and monitoring devices as they relate to the airport's dangerous goods response plan

9.4 Decontamination. ARFF personnel shall, for a given dangerous goods incident, identify the decontamination procedures required for personnel, equipment, and the incident site.

Chapter 10 Emergency Communications Systems

10.1 Scope. This chapter identifies the knowledge and skills necessary to identify and operate airport communications systems accessible for fire department use.

10.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills pertaining to the use and required maintenance of communications systems used by the airport fire department.

Δ 10.3 Criteria. ARFF personnel shall be able to maintain and demonstrate a proficiency in the following:

- (1) Knowledge of and ability to operate all radio systems and frequencies using prescribed procedures, discipline, and protocol to communicate with the following entities/agencies as applicable:
 - (a) Control tower or Common Traffic Advisory Frequency (CTAF)
 - (b) Airport administrative offices
 - (c) Airlines
 - (d) Fixed-base operators
 - (e) Mutual aid agencies
 - (f) Airport service vehicles
 - (g) Airport fire service vehicles
- (2) Emergency notification and reporting procedures
- (3) Knowledge of phonetic alphabet and standard airport communications terminology
- (4) Knowledge of and ability to operate all fire department, ground control, mutual aid, and airport radio frequencies using prescribed procedures, discipline, and protocol
- (5) Ability to initiate and operate all communications features contained in the fire department alarm room, its emergency vehicles, and any vehicle dedicated for use as a communications or command unit
- (6) Ability to communicate with flight deck personnel by means of an aircraft's interphone system, by control tower

relay, by direct radio contact, and by use of standard international ground-to-aircraft hand signals

- (7) Knowledge of location of the aircraft interphone system jack located on each aircraft type using the airport
- (8) Ability to locate, for purposes of emergency use, vital telephone numbers so that calls can be directed to individuals and agencies as required
- (9) Working knowledge of alternate means of communications; the location and use of special equipment such as cellular and hardwired field phones, power megaphones, and flashlights for hand signaling; and the ability to interpret light signals from the control tower

Chapter 11 ARFF Vehicles and Equipment

11.1 Scope. This chapter identifies the knowledge and skills to be demonstrated by designated ARFF personnel who are required to operate ARFF vehicles and special equipment under all operating conditions.

N 11.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills pertaining to the use of required ARFF vehicles and equipment used by the airport fire department.

N 11.3 Criteria. ARFF personnel shall be able to describe the equipment and its location on each ARFF vehicle at the airport.

11.4 Tools and Equipment.

Δ 11.4.1 ARFF personnel shall be able to describe the individual tools and equipment on each ARFF vehicle on the airport.

11.4.2 The description shall include the equipment's designed use, required maintenance, storage procedures, and a demonstration of its use.

11.5 Vehicle Inspection and Maintenance. ARFF personnel shall be able to demonstrate their knowledge and skills relative to routine inspection and maintenance of vehicles in accordance with fire department policy and manufacturers' specifications and maintenance manuals.

Δ 11.6 Operation of Equipment and Devices. ARFF personnel shall be able to demonstrate the knowledge and skills to operate the following systems when assigned to an emergency vehicle:

- (1) Communications equipment
- (2) Pump operation
- (3) Proportioning system
- (4) Turret(s)
- (5) Vehicle-mounted elevated devices, where provided, such as extendable turret (ET) systems
- (6) Skin-penetrating tools, where provided
- (7) Various nozzles — types and applications
- (8) Lighting systems — for accident site
- (9) Vision enhancement systems utilized during low visibility
- (10) Rescue tools
- (11) Ladders
- (12) Ventilation equipment
- (13) Complementary agent system, inspection, operation, and reservicing
- (14) Systems for reservicing of fire-fighting agent
- (15) Backup systems for the production and application of fire-fighting agent, where applicable

- (16) Seat-mounted SCBA — where provided — mounting, donning, and doffing

11.7 ARFF Vehicle Operation. Designated ARFF personnel shall have the knowledge and skills to operate the assigned vehicle(s) under the following conditions:

- (1) While responding to an incident/accident
- (2) While operating and maneuvering at an emergency scene
- (3) With its agent tanks fully loaded, semiloaded, and unloaded
- (4) In all climatic conditions experienced at the airport
- (5) Within certain limits while negotiating high-speed tight turns and high-speed braking
- (6) In an environment that has no signage
- (7) In various conditions of lighting
- (8) In off-road conditions
- (9) While discharging fire-fighting agent on the move or at a static position through the turret(s) and under truck nozzles, as applicable

Chapter 12 Extinguishing Agents

12.1 Scope. This chapter identifies the knowledge and skills required for ARFF personnel relative to the correct selection and application of extinguishing agents to be used on fires involving aircraft.

N 12.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills pertaining to the selection and use of extinguishing agents used by the airport fire department.

N 12.3 Criteria. Given all the extinguishing agents used at the airport, ARFF personnel shall be able to describe the choice and application of extinguishing agents.

Δ 12.4 Selection and Application. ARFF personnel shall be able to describe the choice and application of extinguishing agents for the following types of fires:

- (1) Aviation fuels
- (2) Interior aircraft combustibles
- (3) Combustible metals
- (4) Energized electrical equipment
- (5) Composite materials
- (6) Engine
- (7) Cargo
- (8) Wheel
- (9) Avionics bay
- (10) Auxiliary power unit (APU)
- (11) Different battery types

12.5 Descriptions of Effects. Given all the extinguishing agents used at the airport, ARFF personnel shall be able to describe the positive and negative effects of agent application when the following conditions exist:

- (1) Wind
- (2) Rain
- (3) Freezing weather
- (4) Extreme heat
- (5) Use of more than one agent (i.e., compatibility)
- (6) Fuel-soaked surfaces
- (7) Flowing fuel
- (8) Pressurized fuel
- (9) Confined spaces
- (10) Uneven terrain

12.6 Description of Environmental Effects.

12.6.1 ARFF personnel shall know where to find the safety data sheets (SDS) for all extinguishing agents in use at their airport and shall be able to describe the required procedures to minimize the impact of these agents on the environment.

Chapter 13 Emergency Aircraft Evacuation Assistance

13.1 Scope. This chapter identifies the comprehensive knowledge and skills necessary in emergency aircraft evacuation procedures for all types of aircraft using the airport.

N 13.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills pertaining to emergency aircraft evacuation systems and devices.

Δ 13.3 Criteria. ARFF personnel shall be able to demonstrate knowledge of the following emergency evacuation systems and devices:

- (1) Aircraft emergency exits
- (2) Aircraft evacuation slides
- (3) Military aircraft evacuation and ejection systems and canopy ejection systems, where applicable
- (4) Aircraft interior access vehicle
- (5) Cut-in/forcible entry areas to specifically include the hazards associated with cutting, forcing, prying, or piercing the skin of an aircraft
- (6) Exterior access equipment
- (7)* Passenger and crew seat restraint systems
- (8) Crew seat operation
- (9) Cockpit ingress/egress
- (10) Aircraft ballistic air bags
- (11) Ballistic parachute systems

Chapter 14 Rescue and Fire-Fighting Operations

14.1* Scope. This chapter identifies the knowledge and skills necessary during an emergency involving aircraft.

N 14.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills pertaining to the rescue and fire-fighting operations at airports.

14.3 Criteria. ARFF personnel shall be able to describe how each of the following items affects an emergency response:

- (1) Nature of the emergency
- (2) Type of aircraft
- (3) Number of passengers and crew
- (4) Amount of fuel on board
- (5) Expected runway and airport traffic patterns for aircraft
- (6) Location of the incident/accident and response time
- (7) Type and location of cargo
- (8) Wind direction and velocity
- (9) Weather conditions and terrain
- (10) ARFF vehicle status
- (11) Time of day or night

14.4 Emergency Alerts. ARFF personnel shall be able to identify the types of emergency alerts that occur on the airport and the actions of the fire department required for each type.

14.5 Vehicle Routes. Given multiple locations on and off the airport, ARFF personnel shall be able to describe the response

routes, alternate routes, and problems or hazards that they present.

14.6 Size-Up Procedures. Given any accident situation, ARFF personnel shall describe how the correct “size-up” (risk assessment) procedures are carried out.

14.7 Factors Affecting Fire Attack. Given a fire situation, ARFF personnel shall describe how the following factors affect the fire attack:

- (1) Wind
- (2) Terrain
- (3) Wreckage
- (4) Survivors
- (5) Hazardous areas

14.8 Response Considerations. ARFF personnel shall be able to define the following factors in regard to an aircraft fire and their relationships as exposures:

- (1) Survivors
- (2) Other aircraft
- (3) Structures
- (4) Unaffected parts of the involved aircraft

14.9 Tactical Considerations. ARFF personnel shall be able to define and prioritize the following tactical fire suppression considerations:

- (1) Rescue
- (2) Exposure protection
- (3) Fire confinement
- (4) Ventilation
- (5) Interior attack
- (6) Fire extinguishment
- (7) Overhaul
- (8) Environmental impact

14.10 ARFF Vehicle Positioning. Given a scenario, ARFF personnel shall explain the positioning of ARFF vehicles to assist in a given strategy with respect to the following factors:

- (1) Ground slope
- (2) Wind direction
- (3) Movement of other vehicles
- (4) Applicable use of turrets and handlines

14.11 Agent Application. ARFF personnel shall be able to describe those factors that affect extinguishing agent application pertinent to water or agent conservation.

14.12 Ventilation Considerations. ARFF personnel shall be able to identify the following ventilation factors as they relate to an aircraft fire:

- (1) Backdraft considerations
- (2) Flashover considerations
- (3) Ventilation locations
- (4) Methods of ventilation

14.13 Structural Apparatus. ARFF personnel shall be able to define the role of structural apparatus that respond to aircraft emergencies.

14.14 Extinguishing Agent Resupply. ARFF personnel shall be able to explain extinguishing agent resupply procedures established by the airport fire department.

14.15 Fire Department Supply and Resupply. ARFF personnel shall be able to identify fire department supply and resupply sources on and adjacent to the airport.

14.16 Other Aircraft Accident Considerations. ARFF personnel shall be able to explain other aircraft accident operation policy procedures established by their fire department as they relate to the following:

- (1) Biological hazards or hazardous materials considerations
- (2) Site security
- (3) Evidence preservation with emphasis on site photographs and documentation
- (4) Relocation of human and fragmented remains
- (5) Movement of wreckage and preservation of accident evidence to include the marking or diagramming of wreckage moved from its original post-accident location
- (6) Mass casualty, including the following:
 - (a) Casualty collection point
 - (b) Treatment area
 - (c) Transportation
 - (d) Routing

Chapter 15 Recurrent Live Fire Training

N 15.1 Scope. This chapter identifies the knowledge and skills to be demonstrated by designated ARFF personnel required for live fire recurrent training.

N 15.2 Competency. ARFF personnel shall demonstrate the knowledge and operational skills necessary to extinguish a live aircraft fire.

N 15.3 Criteria. Given extinguishing agents, ARFF personnel shall choose the appropriate extinguishing agent to extinguish a live aircraft fire.

Δ 15.4* Live Spill Fire Training. The live spill fire training in 15.4.1 through 15.4.3 shall use hydrocarbon fuel, propane, or a combination of both.

15.4.1* When conducting live spill fire training, ARFF personnel shall utilize the minimum burn area based on the airport category.

15.4.2 ARFF personnel shall extinguish an aircraft fuel spill fire utilizing the appropriately sized burn area, given PPE, an assignment, and an ARFF vehicle handline flowing an appropriate extinguishing agent, so that the agent is applied using the proper techniques and the fire is completely extinguished.

15.4.3 ARFF personnel shall extinguish an aircraft fuel spill fire utilizing the appropriately sized burn area, given PPE, an assignment, and an ARFF vehicle turret flowing an appropriate extinguishing agent, so that the agent is applied using the proper techniques and the fire is completely extinguished.

15.5* Live Fire Training.

Δ 15.5.1 The live fire training in 15.5.2 shall use hydrocarbon fuel, propane, or a combination of both.

15.5.2 ARFF personnel shall be able to extinguish a live fire, given appropriate PPE and a handline flowing the appropriate extinguishing agent using the proper technique, and demonstrate the ability to completely extinguish a fire in at least three of the following six aircraft emergencies:

- (1) Interior fire
- (2) Auxiliary power unit (APU) fire
- (3) Engine fire
- (4) Wheel well/brake fire

- (5) Electronics and electrical (E and E) compartment fire
- (6) Three-dimensional aircraft running fuel fire
- (7) Aircraft incident/accident debris fire

N 15.6 Extendable Turret (ET) Live Fire Training. ARFF personnel given appropriate PPE, a vehicle-mounted extendable turret with piercing nozzle (if and when applicable), piped waterway and/or high-pressure chemical agent line flowing the appropriate extinguishing agent, shall be able to extinguish a fire using the proper techniques and demonstrate the ability to completely extinguish a fire in at least three of the following six aircraft emergencies:

- (1) Interior fire
- (2) Auxiliary power unit (APU) fire
- (3) Engine fire
- (4) Wheel wheel/brake fire
- (5) Baggage or cargo hold fire
- (6) Three-dimensional aircraft running fuel fire

Chapter 16 Airport Emergency Plan

N 16.1* Scope. ARFF personnel shall understand their duties and responsibilities as defined in the airport emergency plan (AEP).

N 16.2 Competency. ARFF personnel shall be able to identify and describe each type of emergency listed in the plan, including alert procedures, that requires a response from the fire department.

N 16.3 Criteria. Given the AEP, ARFF personnel shall demonstrate the proper knowledge to respond to accidents and incidents in the airport in accordance with the AEP.

16.4 Incident Command. For each emergency involving the fire department, ARFF personnel shall provide descriptions or identify the following:

- (1) Describe the chain of command and command authority at incidents both on and off the airport
- (2) Identify the personnel associated with each responsibility in the incident management system
- (3) Describe the procedures for the change of command during any phase of the emergency
- (4) Identify and describe other agencies involved in the unified command system, including the role, responsibility, and authority of each individual agency
- (5) Describe, in general, various ARFF personnel duties and responsibilities under the plan
- (6) Describe the incident management structure in use at the airport and how this interfaces with external mutual aid organizations
- (7) Describe differences in offensive and defensive in ARFF operations

Chapter 17 Emergency Medical Services (EMS)

Δ 17.1 Scope. ARFF personnel shall maintain EMS training based on the requirements of the authority having jurisdiction.

N 17.2 Competency. ARFF personnel shall be certified by the appropriate authority for the level of training attained.

N 17.3 Criteria. ARFF personnel shall maintain proficiency through certification and recurrent requirements.

Chapter 18 Administration and Standards

18.1 Scope. This chapter identifies general administrative requirements and responsibilities.

N 18.2 Competency. ARFF personnel shall be familiar with basic administrative requirements and responsibilities.

18.3 Criteria. ARFF personnel shall demonstrate a comprehensive knowledge of the following:

- (1) Airport and fire department standard operating procedures
- (2) Local instructions, bylaws, and regulations
- (3) Individual responsibilities as they relate to the maintenance and operational effectiveness of ARFF
- (4) Record-keeping requirements, including personnel records related to professional competency
- (5) Organizational structure
- (6) Occupational health and safety regulations
- (7) Emergency planning, including personnel roles and responsibilities structured within the plan

Chapter 19 Water Rescue Operations

19.1* Scope. This chapter identifies the knowledge and skills required by ARFF personnel in maintaining levels of competency required in water rescue operations.

Δ 19.2 Competency. Because saving lives is the first priority in aircraft rescue and fire fighting, ARFF personnel shall possess knowledge of water safety and shall be highly skilled in water rescue operations for all airports with the need for potential water rescue operations.

19.3 Criteria. ARFF personnel shall be able to demonstrate the following:

- (1) **Boat** handling, including maneuvering in confined water, high-speed maneuvering, steering a compass course and taking rough bearings, berthing and unberthing, coming to and weighing anchor, and making fast to and leaving a buoy
- (2) **An** understanding of chartwork, including the meaning of common chart symbols; the use of tidal diamonds; position-fixing course correction allowing for currents and leeway; and dangers to navigation, including rules and regulations for collision prevention
- (3) **Local** knowledge of signals and regulations, local marks, buoyage lights, leading lights and marks, dangers to navigation, minimum and maximum depths over banks, obstructions, currents, and abnormal tidal conditions; general knowledge of the times and heights of tides and landing places in differing weather conditions, together with compass courses in and out of local harbors
- (4) Recovery of an injured or incapacitated person from the water
- (5) Towing astern and alongside, righting capsized dinghies, working with helicopters, pacing alongside under way, and recognizing search patterns and techniques
- (6) **An** understanding of distress signals, including the regulations for preventing collision
- (7) Signs of approaching bad weather
- (8) Effects of craft stability, freeboard, and trim, together with the loading and discharging of occupants

- (9) An understanding of the care and maintenance of rescue craft, including engines, hull, and electrical system, together with day-to-day routine inspections
- (10) Day-to-day inspections of life-saving equipment and devices, together with associated protective clothing

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.2 Aircraft Incident. An incident does not result in serious injury to persons or substantial damage to aircraft.

A.4.3 Acceptable training records include paper or electronic training records.

A.6.2 It is specifically recommended that in addition to scheduled commercial aircraft, personnel should consider becoming familiar with general aviation and business class aircraft that could make an emergency landing at your airport.

A.6.3(23) Some examples are military aircraft with armament, canopy jettison systems, ejection seats, general aviation aircraft with ballistic chutes, and wildland fire-fighting aircraft.

A.7.1 The concept of safety management system (SMS) is becoming a worldwide aviation industry standard. It is recognized by the Joint Planning and Development Office (JPDO), International Civil Aviation Organization (ICAO), European Aviation Safety Agency (EASA), Civil Aviation Authority (CAA), and product and service providers as the next step in the evolution of safety in aviation. Safety management systems are also

becoming the standard for the management of safety beyond aviation.

A.9.1 The term *mitigate* as it is used in this context means to lessen in severity, that is, emergency response personnel are expected to perform duties, as they relate to aircraft cargo hazards, only to the extent to which they are trained, equipped, and qualified. Utilizing an outside response or professional firm to perform activities beyond the capabilities of the on-airport response might be necessary.

A.13.3(7) Aircraft seatbelt airbags and other protective airbags continue to be an emerging safety technology. Not unlike automotive airbags, these safety devices are a self-contained, self-powered system and can be typically found under each equipped passenger seat. They are typically comprised of an electronics module, battery, high-pressure compressed gas cylinder, and firing system with a high-velocity squib and inflator. Upon detection of a sudden deceleration event by the electronics module, the squib is fired into the compressed gas cylinder, which inflates the airbag(s). Seat belts that contain an airbag can be visually identified as being thicker than normal seat belts.

ARFF personnel are reminded to use extreme caution when dealing with any airbag system — especially those that are undeployed, particularly if the seat is damaged or partially separated from the airframe.

The authority having jurisdiction is encouraged to engage airlines and aircraft manufacturers for specific safety information related to these systems.

A.14.1 Rescue and fire-fighting operations involve a multitude of tasks, many of which occur simultaneously. All of these tasks need to be considered in “sizing up” an emergency.

A.15.4 Federal, state, or local restrictions might prohibit or restrict the use of hydrocarbon-based fires for training. In these circumstances, the authority having jurisdiction could substitute a live fire trainer utilizing either propane or a combination system of propane and hydrocarbon fuels.

A.15.4.1 The fuel-spill burn area provides ARFF personnel with a realistic scenario to practice responding to, gaining control of, and extinguishing a ground-based, aviation fuel-spill fire typical of ramp service mishaps and aircraft accidents. Government authorities such as the FAA or ICAO can provide minimum sizes and requirements for burn areas.

A.15.5 ARFF personnel should be able to demonstrate proficiency in the use of all extinguishing agents required to meet the airport index. It is recognized that most airports operate under constraints that do not allow all ARFF personnel to discharge all primary and complementary agents annually. The authority having jurisdiction should consider a live fire training process for firefighter proficiency with locally available extinguishing agents.

A.16.1 ARFF personnel are key members of a team organized to deal with airport emergencies.

A.19.1 Personnel who can be called upon to effect rescue from an aircraft that has crashed and/or ditched in water have to have a sound understanding of seamanship and water safety if the rescue of the aircraft’s occupants is to succeed.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. (Reserved)

B.1.2 Other Publications. (Reserved)

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B.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

NFPA 402, *Guide for Aircraft Rescue and Fire-Fighting Operations*, 2019 edition.

NFPA 424, *Guide for Airport/Community Emergency Planning*, 2018 edition.

B.3 References for Extracts in Informational Sections. (Reserved)

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