NFPA® 405

Standard for the Recurring Proficiency of Airport Fire Fighters

2015 Edition

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An International Codes and Standards Organization

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NFPA® 405

Standard for the

Recurring Proficiency of Airport Fire Fighters

2015 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 November 11, 2014, with an effective date of December 1, 2014, and supersedes all previous editions.

This edition of NFPA 405 was approved as an American National Standard on December 1, 2014.

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 have been made in order to bring the document more in line with the Federal Aviation Administration (FAA) requirements for recurrent training for airport fire fighters. To allow for increased use of this document internationally, the Committee also included requirements that the International Civil Aviation Organization (ICAO) has for airport fire fighters governed by ICAO.

One of the most significant and highly discussed changes for this edition is the change in time interval for skills evaluations, from 18 months to 12 months, which was done to line up with the time interval the FAA requires. Another significant change included in this edition is a greater focus on safety management for airport fire fighters and their important roles as team members. The committee also has 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 has modified the EMS requirements to where the AHJ is to determine what the minimum level of EMS is to be provided. Lastly, the committee has rewritten the entire chapter on recurrent live fire to address the skills and knowledge that are to be evaluated for live fire and live spill fire training. These changes have been made to align the document with what the FAA and the ICAO require airport fire fighters to be evaluated against.

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

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

Contents

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2015 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 B. 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 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 minimum exposure to 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 means of a documented management system.

1.2.3 Continuous broad-based training is fundamental to maintaining a proficient ARFF delivery system 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 Employers have a 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 reinforcment 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,* 2015 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*, First Edition, July 2013.

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,* 2014 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents,* 2014 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**, 2014]

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). Consists of full personal protective clothing, a self-contained breathing apparatus (SCBA), and a personal alert safety system (PASS) device.

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**, 2014]

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 every 12 months by a designated qualified evaluator(s) appointed by the authority having jurisdiction.

4.1.2 All evaluations shall be performed in a competent manner, 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 and course methodology
(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. 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 CRFFAA, with special emphasis to prevent runway incursions.

5.3 Maps. The ARFF personnel, given a map of the airport and vicinity, shall identify the following features:

(1) All runways, their designations and associated aircraft travel direction, and lengths and widths
(2) Access roads
(3) Taxiways and their designations
(4) Aircraft ramps/parking areas
(5) Frangible gate locations
(6) Instrument landing system (ILS) critical areas
(7) Designated aircraft isolation areas
(8) Controlled access points
(9) Predesignated staging areas
(10) Airport facilities (terminals, hangars, etc.)
(11) Water supplies
(12) Other specialized equipment for low visibility operations
(13) Any given point on a grid map or other standard maps used at the airport

5.4 Scenarios. Given a simulated incident or accident scenario, a radio, and a destination on the airport, ARFF personnel shall cautiously perform the following:

(1) Communicate with 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

5.5 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

5.6 Lighting. ARFF personnel shall identify either the color code system or location, or both, for the following:

(1) Runway centerline and edge lighting
(2) Taxiway centerline and edge lighting
(3) Runway threshold lights
(4) Runway departure end lights
(5) Obstruction lighting
(6) Visual slope indicator lights
(7) Runway guard lights
(8) Stop bars

5.7 Signage. ARFF personnel shall identify the signage system for 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 continuously demonstrate proficiency in the following behaviors pertinent to the types of aircraft regularly operating at the airport:

(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 exit door(s), emergency openings, and cargo 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, auxiliary power unit (APU)
(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) Normal and emergency shutdown procedures for aircraft engines and APU
(16) Ram Air Turbine or equivalent
(17) Hydraulic reservoirs and hydraulic accumulators
(18) Oxygen cylinders and oxygen generators
(19) Brake and wheel systems
(20) Ground ventilations, outflow valve(s)
(21) Flight data recorder and cockpit voice recorder
(22) Various onboard fire protection warning and extinguishment systems
(23) Flight interphone system
(24) Access panels
(25)*Any hazards unique to a particular aircraft

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 airport 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 as each relates to the prevention of accidents or injuries:

(1) Common fireground accidents
(2) Causes of injuries in specific incidents
(3) Correct lifting and equipment-handling techniques
(4) Falls and tripping
(5) Dangers associated with striking stationary or moving objects
(6) Hazards in the presence of aircraft
(7) Overexertion and other physiological factors
(8) Correct donning and wearing of AHJ-approved protective clothing and equipment and their limitations
(9) Correct mounting, dismounting, and riding types of apparatus
(10) Basic driving
(11) Behavioral health and wellness programs
(12) Water rescue operations
(13) Correct use of tools and equipment
(14) Working from heights associated with ARFF fire-fighting

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 Protective Clothing and Equipment. ARFF personnel shall be able to articulate the correct wearing, 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
(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
   (c) Threshold limit values
   (d) Short-term exposure limits
(2) Types of breathing apparatus assigned
(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) Routine testing and maintenance
   (e) Care and maintenance of air cylinders
   (f) Breathing apparatus control procedures
   (g) Cylinder removal and replacement
   (h) Cylinder recharging

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 cargo 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.

10.3 Criteria. ARFF personnel shall maintain a proficiency and shall demonstrate the following:

(1) Thorough knowledge of and ability to operate all primary and alternate airport emergency communication systems that connect the fire department with the following:
   (a) Control tower or flight service station
   (b) Airport administrative offices
   (c) Airlines
   (d) Fixed-base operators
   (e) Mutual aid agencies
   (f) Airport service vehicles
   (g) Airport fire service vehicles
(2) Operating knowledge of the fire department's standby power source (or alternate communications system), its testing sequence, procedure, test recording, and routine maintenance
(3) Working knowledge of the function of all emergency and backup alarm systems and their devices and the ability to reinstate all systems that have been activated
(4) Awareness of all possible ways of reporting emergencies and the steps required to ensure that complete notification occurs
(5) Thorough knowledge and application of the international phonetic alphabet and standard airport communications terminology
(6) Complete knowledge of and ability to operate all fire department, ground control, mutual aid, and airport radio frequencies using prescribed procedures, discipline, and protocol
(7) 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
(8) 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
(9) Knowledge of location of the aircraft interphone system jack located on each aircraft type using the airport
(10) Ability to locate, for purposes of emergency use, vital telephone numbers so that calls can be directed to individuals and agencies as required
(11) 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.

11.2 Tools and Equipment. ARFF personnel shall be able to describe the individual tools and equipment on each ARFF vehicle on the airport.

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

11.2.2 ARFF personnel shall also be able to describe with complete accuracy the equipment storage location on each vehicle.

11.3 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.

11.4 Operation of Equipment and Devices. ARFF personnel shall be able to demonstrate that they have the knowledge and skills to operate the following systems of assigned emergency vehicles:

(1) Communications equipment
(2) Pump operation
(3) Proportioning system
(4) Turret(s)
(5) Vehicle positioning and maneuvering
(6) Elevated devices (where provided)
(7) Skin penetrating tools (where provided)
(8) Various nozzles (types and applications)
(9) Lighting systems (for accident site)
(10) Driver enhanced vision system (DEVS)
(11) Rescue tools (forcible entry, cutting, lifting, etc.)
(12) Ladder evolutions
(13) Ventilation equipment
(14) Complementary agent system
(15) Systems for replenishment of fire-fighting agent
(16) Backup systems for the production and application of fire-fighting agent (where applicable)

11.5 ARFF Vehicle Operation. Designated ARFF personnel shall have the knowledge and skills to operate the assigned vehicle(s) in the following manner:

(1) With its agent tanks fully loaded, semiloaded, and unloaded
(2) In all climatic conditions experienced at the airport
(3) Within certain limits while negotiating high-speed tight turns and high-speed braking
(4) In an environment that has no signage
(5) In various conditions of lighting
(6) In off-road conditions
(7) 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.

12.2 Selection and Application. Given all the extinguishing agents used at the airport, ARFF personnel shall be able to describe the choice and application for the following types of fires:

(1) Aviation gasoline (AvGas)
(2) Jet fuel
(3) Interior aircraft combustibles
(4) Magnesium
(5) Electrically energized
(6) Composite materials
(7) Engine
(8) Cargo
(9) Wheel fires
(10) Avionics bay
(11) Auxiliary power unit (APU)

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

(1) Wind
(2) Rain
(3) Freezing weather
(4) Use of more than one agent (compatibility)
(5) Fuel-soaked sod and flowing fuel or pressurized fuel

12.4 Description of Environmental Effects.

12.4.1 ARFF personnel shall be able to describe how to minimize the environmental impacts of the extinguishing agents in use at their airport.

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.

13.2 Criteria. ARFF personnel shall be able to demonstrate a comprehensive 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
(6) Exterior access equipment (e.g., ladders, aircraft interior access vehicles, aerostand)
(7) Passenger and crew seat restraint system and crew seat operation
(8) Cockpit ingress/egress

Chapter 14 Rescue and Fire-Fighting Operations

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

14.2 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) Location of the accident
(6) Nature and location of cargo
(7) Wind direction and velocity
(8) Weather conditions and terrain
(9) ARFF vehicle status
(10) Time of day or night

14.3 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.

14.4 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.

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

14.6 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

14.7 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

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

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

14.9 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

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

14.11 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

14.12 Structural Apparatus. ARFF personnel shall be able to define the structural apparatus expected to respond to the airport on mutual aid assignments and how the vehicles and equipment are deployed.

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

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

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

(1) Biological hazards or hazardous materials considerations
(2) Site security
(3) Site photographs and documentation
(4) Relocation of human and fragmented remains
(5) Movement of wreckage and preservation of accident evidence

Chapter 15 Recurrent Live Fire Training

15.1* Live Spill Fire Training. The following live spill fire training shall use hydrocarbon fuel, propane, or a combination of both.

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

15.1.2 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.

15.1.3 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.

15.2 Live Fire Training.

15.2.1 The following live fire training shall use hydrocarbon fuel, propane, or a combination of both.

15.2.2 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

Chapter 16 Airport Emergency Plan

16.1* General. ARFF personnel shall understand their duties and responsibilities as defined in the airport emergency plan.

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

16.3 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, including each individual role, responsibility, and authority
(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 offensive and defensive fire-fighting operations

Chapter 17 Emergency Medical Services (EMS)

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

Chapter 18 Administration and Standards

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

18.2 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.

19.2 Competency. Because saving lives is the first priority in aircraft rescue and fire fighting, ARFF personnel shall possess the comprehensive 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) Sensible 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) Sound 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) Comprehensive 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) Sound 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) Sound 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 de-

Table A.15.1.1 Burn Area Structures as a Function of Airport ARFF Index

Airport ARFF Index	Overall Aircraft Lengths						Average Fuselage Width		PCA		Rectangular Burn Area (L/W = 4/3)		Circular Burn Area Diameter	
	Lower		Average		Upper									
	ft	m	ft	m	ft	m	ft	m	ft^2	m^2	ft	m	ft	m
1–5	60	18	75	23	90	27	10	3	5,527	513	86 × 64	26 × 20	84	26
6	90	27	108	33	126	38	10	3	7,959	739	103 × 77	31 × 23	101	31
7	126	38	143	44	160	49	10	3	10,539	979	118 × 89	36 × 27	116	35
8	160	49	180	55	200	61	20	6	14,475	1,345	139 × 104	42 × 32	136	41
9–10	200	61	225	69	—	—	20	6	18,090	1,681	155 × 116	47 × 35	152	46

partment, 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.6.3(25) 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.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.15.1 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.15.1.1 The fuel-spill burn area provides airport 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.

Table A.15.1.1 pertains to hydrocarbon-based training facilities.

The burn area structure for ARFF training facilities using a computer-controlled, propane-fired simulator must be sized as follows:

(1) For ARFF index A and B simulations, the burn area must be a circle with a diameter of least 100 feet (–1/+2 ft) ([30 m (–0.3/+0.61 m)]. A square or a rectangle that will accommodate the required aircraft mockup of an approximately equivalent area [7855 ft (2394 m)] is acceptable.
(2) For ARFF index C through E simulations, the burn area must be a circle with a diameter of least 125 feet (–1/+3 ft) [38 m (–0.3/+0.91 m)]. A square or a rectangle that will accommodate the required aircraft mockup of an approximately equivalent area [12,265 ft^2 (1140 m^2)] is acceptable.

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.

B.1.2.1 FAA Publications. Federal Aviation Administration, 800 Independence Avenue SW, Washington, DC 20591.

Aircraft Rescue and Fire-Fighting (ARFF) Training Facilities. Advisory Circular 150/5220/17.

B.2 Informational References. (Reserved)

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

Index

Sequence of Events for the Standards Development Process

As soon as the current edition is published, a Standard is open for Public Input

Step 1: Input Stage

- Input accepted from the public or other committees for consideration to develop the First Draft
- Committee holds First Draft Meeting to revise Standard (23 weeks)
  Committee(s) with Correlating Committee (10 weeks)
- Committee ballots on First Draft (12 weeks)
  Committee(s) with Correlating Committee (11 weeks)
- Correlating Committee First Draft Meeting (9 weeks)
- Correlating Committee ballots on First Draft (5 weeks)
- First Draft Report posted

Step 2: Comment Stage

- Public Comments accepted on First Draft (10 weeks)
- If Standard does not receive Public Comments and the Committee does not wish to further revise the Standard, the Standard becomes a Consent Standard and is sent directly to the Standards Council for issuance
- Committee holds Second Draft Meeting (21 weeks)
  Committee(s) with Correlating Committee (7 weeks)
- Committee ballots on Second Draft (11 weeks)
  Committee(s) with Correlating Committee (10 weeks)
- Correlating Committee First Draft Meeting (9 weeks)
- Correlating Committee ballots on First Draft (8 weeks)
- Second Draft Report posted

Step 3: Association Technical Meeting

- Notice of Intent to Make a Motion (NITMAM) accepted (5 weeks)
- NITMAMs are reviewed and valid motions are certified for presentation at the Association Technical Meeting
- Consent Standard bypasses Association Technical Meeting and proceeds directly to the Standards Council for issuance
- NFPA membership meets each June at the Association Technical Meeting and acts on Standards with "Certified Amending Motions" (certified NITMAMs)
- Committee(s) and Panel(s) vote on any successful amendments to the Technical Committee Reports made by the NFPA membership at the Association Technical Meeting

Step 4: Council Appeals and Issuance of Standard

- Notification of intent to file an appeal to the Standards Council on Association action must be filed within 20 days of the Association Technical Meeting
- Standards Council decides, based on all evidence, whether or not to issue the Standards or to take other action

Committee Membership Classifications[1,2,3,4]

The following classifications apply to Committee members and represent their principal interest in the activity of the Committee.

1. M *Manufacturer:* A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.
2. U *User:* A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.
3. IM *Installer/Maintainer:* A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.
4. L *Labor:* A labor representative or employee concerned with safety in the workplace.
5. RT *Applied Research/Testing Laboratory:* A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.
6. E *Enforcing Authority:* A representative of an agency or an organization that promulgates and/or enforces standards.
7. I *Insurance:* A representative of an insurance company, broker, agent, bureau, or inspection agency.
8. C *Consumer:* A person who is or represents the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in (2).
9. SE *Special Expert:* A person not representing (1) through (8) and who has special expertise in the scope of the standard or portion thereof.

NOTE 1: "Standard" connotes code, standard, recommended practice, or guide.

NOTE 2: A representative includes an employee.

NOTE 3: While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of member or unique interests need representation in order to foster the best possible Committee deliberations on any project. In this connection, the Standards Council may make such appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.

NOTE 4: Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.