

NFPA® 405

Standard for the
Recurring Proficiency of
Airport Fire Fighters

2010 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
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NFPA® 405

Standard for the

Recurring Proficiency of Airport Fire Fighters

2010 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 October 27, 2009, with an effective date of December 5, 2009, and supersedes all previous editions.

This edition of NFPA 405 was approved as an American National Standard on December 5, 2009.

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.

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

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



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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, *Standard for Airport Fire Fighter Professional Qualifications*, 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 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 Publication. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2010 edition.

2.3 Other Publications. (Reserved)**2.3.1 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*, 2009 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2010 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2009 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. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

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, 2009]

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 150 m (500 ft) from each side of the runway centerline and whose length is 1000 m (3300 ft) 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 Proximity Personal Protective Equipment (PrPPE). A protective ensemble consisting of approved proximity protective clothing, self-contained breathing apparatus (SCBA), and personal alert safety system (PASS).

3.3.7 Size-Up. A mental process of evaluating the influencing factors at an incident prior to committing resources to a course of action. [1670, 2009]

3.3.8 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 18 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 (e.g., CAT I, CAT II, CAT III, where applicable)
- (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

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 ground control
- (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 bars (lines) and, where applicable, CAT I, CAT II, CAT III
- (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 the following:
 - (a) Location of normal entry doors, emergency exits, and evacuation slides
 - (b) Fuel tanks
 - (c) Passenger and flight crew compartments
 - (d) Oil tanks
 - (e) Hydraulic reservoirs
 - (f) Oxygen cylinders
 - (g) Batteries
 - (h) Fuselage break-in points
 - (i) Emergency engine shutdown procedures

- (j) External/internal auxiliary power unit (APU) shutdown and fire extinguishment systems (where applicable)
- (k) Parts of aircraft structure containing man-made mineral fibers (composite material)
- (6) Demonstrate the ability to correctly open and operate emergency exits
- (7) Demonstrate the ability to locate and operate various compartment and access doors
- (8) Locate, identify, and explain the procedures for the following systems and components where applicable:
 - (a) Various onboard fire protection warning and extinguishing systems
 - (b) APU shutdown controls
 - (c) Flight data recorder and cockpit voice recorder
 - (d) Brake and wheel systems
 - (e) Aircraft emergency engine shutdown controls
- (9) Identify and describe particular hazards unique to particular aircraft

Chapter 7 ARFF Personnel Safety

7.1 Scope. This chapter identifies the knowledge and skills necessary to ensure ARFF personnel safety.

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 accident prevention in the following areas:

- (1) Common types of fireground accidents
- (2) Cause of injuries in specific incidents
- (3) Correct lifting and equipment-handling techniques
- (4) How to avert falls and tripping accidents
- (5) Inherent dangers associated with striking stationary or moving objects
- (6) Hazards associated with horseplay
- (7) Injuries occurring from overexertion or other physiological factors
- (8) Correct donning and wearing of protective clothing and equipment
- (9) Correct mounting, dismounting, and riding on apparatus
- (10) Basic driving operations
- (11) Critical stress management
- (12) Water operations (where located adjacent to water)
- (13) Correct use of tools and equipment
- (14) Working from heights associated with ARFF fire fighting
- (15) Comprehensive knowledge of the health surveillance monitoring procedure

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, or 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 hard-wired 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) Back-up 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

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) Emergency exits
- (2) Stairways
- (3) Evacuation slides
- (4) Military aircraft evacuation and ejection systems and canopy ejection systems

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) Interior attack and ventilation
- (5) Ventilation
- (6) Overhaul
- (7) Fire extinguishment

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 hand lines

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 Live Fire Fighting

15.1 Scope. This chapter identifies the various types and sizes of fires associated with aircraft accidents.

15.2 Competency. ARFF personnel shall regularly demonstrate, individually and as teams, their ability to control and extinguish fires associated with aircraft accidents.

15.3 Criteria. The ARFF personnel shall meet the job performance requirements defined in 15.3.1 through 15.3.8.

15.3.1 ARFF personnel shall be able to extinguish a 23.2 m² (250 ft²) aircraft fuel spill fire, given proximity personal protective equipment (PrPPE) and at a minimum a 45 kg (100 lb) dry chemical fire extinguisher, so that the agent is applied using the proper technique and the fire is extinguished in 25 seconds.

(A) Requisite Knowledge. The fire behavior of aircraft fuels in pools and the physical properties and characteristics of aircraft fuel.

(B) Requisite Skills. Operate dry chemical extinguishers equipped with a hose line, including removing and operating hose and applying agent. [1003:5.3.1(B)]

15.3.2 ARFF personnel shall be able to extinguish an aircraft fuel spill fire, given PrPPE, an assignment, an ARFF vehicle hand line flowing a minimum of 359 L/min (95 gpm) of ARFF extinguishing agent, and a fire sized to the ARFF L/min (gpm) flow rate divided by 0.492 (0.13) [L/min/0.492 = 0.304 m² (gpm/0.13 = fire square footage)], so that the agent is applied using the proper techniques and the fire is extinguished in 45 seconds.

(A) Requisite Knowledge. The fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, and agent application rates and densities. [1003:5.3.2(A)]

(B) Requisite Skills. Operate fire streams and apply agent. [1003:5.3.2(B)]

15.3.3 ARFF personnel shall be able to extinguish an aircraft fuel spill fire, given PrPPE, an ARFF vehicle turret, and a fire sized to the ARFF flow rate of 0.492 L/min (0.13 gpm) divided by the square meters (feet) of fire area, so that the agent is applied using the proper technique and the fire is extinguished in 45 seconds.

(A)* Requisite Knowledge. Operation of ARFF vehicle agent delivery systems, the fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, and agent application rates and densities.

(B)* Requisite Skills. Apply fire-fighting agents and streams using ARFF vehicle turrets. [1003:5.3.3(B)]



15.3.4 ARFF personnel shall be able to extinguish a three-dimensional aircraft fuel fire, given PrPPE, an assignment, and ARFF vehicle hand line(s) using primary and secondary agents, so that a dual agent attack is used, the agent is applied using the proper technique, the fire is extinguished, and the fuel source is secured.

(A) Requisite Knowledge. The fire behavior of aircraft fuels in three-dimensional and atomized states, physical properties and characteristics of aircraft fuel, agent application rates and densities, and methods of controlling fuel sources.

(B) Requisite Skills. Operate fire streams and apply agents, and secure fuel sources. [1003:5.3.4(B)]

15.3.5 Interior Fire. ARFF personnel shall be able to attack a simulated fire on the interior of an aircraft while operating as a member of a team, given a team, PrPPE, an assignment, an ARFF vehicle hand line, an extinguishing agent, and a ladder or other means of accessing the aircraft, so that team integrity is maintained, the attack line is deployed for advancement, ladders or other means are used, access is gained into the fire area, effective agent application practices are used, the fire is approached, attack techniques facilitate suppression given the level of the fire, hidden fires are located and controlled, hazards are avoided or managed, and the fire is brought under control.

(A) Requisite Knowledge. Techniques for accessing the aircraft interior according to the aircraft type, methods for advancing hand lines from an ARFF vehicle, precautions to be followed when advancing hose lines to a fire, observable results that a fire stream has been applied, dangerous structural conditions created by fire, principles of exposure protection, potential long-term consequences of exposure to products of combustion, physical states of matter in which fuels are found, common types of accidents or injuries and their causes, the role of the backup team in fire attack situations, attack and control techniques, and techniques for exposing hidden fires. [1003:5.3.5(A)]

(B) Requisite Skills. Deploy ARFF hand line on an interior aircraft fire; gain access to aircraft interior; open, close, and adjust nozzle flow and patterns; apply agent using direct, indirect, and combination attacks; advance charged and uncharged hose lines up ladders and up and down interior and exterior stairways; and locate and suppress interior fires. [1003:5.3.5(B)]

15.3.6 APU Fire. ARFF personnel shall be able to attack a simulated engine or auxiliary power unit/emergency power unit (APU/EPU) fire on an aircraft while operating as a member of a team, given PrPPE, an assignment, ARFF vehicle hand line or turret, a correct agent, and agent application procedures, so that agent application procedures are followed, the fire is extinguished, and the engine or APU/EPU is shut down.

(A) Requisite Knowledge. Techniques for accessing the aircraft engines and APU/EPUs, safety procedures, methods for advancing hand line from an ARFF vehicle, methods for operating turrets, and methods for shutting down engine and APU/EPU operation. [1003:5.3.6(A)]

(B) Requisite Skills. Deploy and operate ARFF hand line, operate turrets, gain access to aircraft engine and APU/EPU, and shut down engine and APU. [1003:5.3.6(B)]

15.3.7 Wheel Fire. ARFF personnel shall be able to attack a simulated wheel assembly fire, as a member of a team, given

PrPPE, a team, an assignment, an ARFF vehicle hand line, and correct agent, so that the fire is extinguished.

(A) Requisite Knowledge. Agent selection and application procedure, special safety considerations, and the characteristics of combustible metals. [1003:5.3.7(A)]

(B) Requisite Skills. Approach the fire in accordance with safety procedures, and select and apply agent. [1003:5.3.7(B)]

15.3.8 Aircraft Ventilation. ARFF personnel shall be able to ventilate an aircraft or equivalent training mock-up through available doors and hatches while operating as a member of a team, given PrPPE, an assignment, tools, and mechanical ventilation devices, so that openings are created, all ventilation barriers are removed, and the heat and other products of combustion are released.

(A) Requisite Knowledge. Aircraft access points; principles, advantages, limitations, and effects of mechanical ventilation; the methods of heat transfer; the principles of thermal layering within an aircraft on fire; and the techniques and safety precautions for venting aircraft. [1003:5.3.8(A)]

(B) Requisite Skills. Operate doors, matches, and forcible entry tools; operate mechanical ventilation devices; and remove barriers. [1003:5.3.8(B)]

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. This chapter identifies the critical knowledge and skills that ARFF personnel shall have in order to provide basic emergency medical service (EMS) at the airport.

17.2 Competency. ARFF personnel shall have the knowledge and skills necessary to operate in an emergency environment until additional medical resources become available.

17.3 Criteria. ARFF personnel shall be able to perform the following tasks:

- (1) Define the accepted method of infection control and universal blood and body fluid precautions as prescribed for public safety workers
- (2) Demonstrate methods of decontamination, disinfection, and disposal of personal protective equipment (PPE) that has become contaminated
- (3) Explain or demonstrate the accepted procedures for single-rescuer and two-rescuer cardiopulmonary resuscitation (CPR), including adult, child, and infant procedures
- (4) Demonstrate management of an obstructed airway for a conscious and an unconscious adult, child, and infant
- (5) Demonstrate the use of a resuscitation mask in the performance of single-rescuer and two-rescuer CPR
- (6) Demonstrate a primary survey for life-threatening injuries
- (7) Identify three types of external bleeding and the characteristics of each
- (8) Demonstrate three approved methods to control external bleeding
- (9) According to severity, identify characteristics and demonstrate treatment of thermal and chemical burns
- (10) Describe and demonstrate the techniques for managing the following:
 - (a) Head injuries
 - (b) Chest injuries
 - (c) Fractures
 - (d) Spinal injuries
- (11) Describe the symptoms and demonstrate emergency treatment of the following:
 - (a) Shock
 - (b) Fainting
 - (c) Allergies
 - (d) Convulsions
 - (e) Heart attack
 - (f) Stroke
- (12) Identify the symptoms and demonstrate emergency treatment for the following:
 - (a) Ingested poisons
 - (b) Drug overdose
- (13) Identify the method of contacting the poison control center that serves the airport
- (14) Demonstrate knowledge and skill in performing the Heimlich maneuver
- (15) Demonstrate the correct method of splinting
- (16) Demonstrate precautions and procedures for childbirth and care of the newborn
- (17) Demonstrate recognition of common medical conditions (e.g., diabetes, pacemaker) that affect medical treatment
- (18) Demonstrate approved measures for handling emotionally disturbed persons
- (19) Demonstrate techniques for moving the injured
- (20) Demonstrate an understanding of the concept of medical triage
- (21) Demonstrate an understanding of the treatment of fatalities
- (22) Be familiar with the parameters of a simple triage and rapid transport system

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 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.4.2 Each authority having jurisdiction should establish an ongoing program to evaluate personnel assigned ARFF duties. All ARFF personnel should be evaluated on each objective and task that is applicable to the ARFF operations at their airports as recommended under the provisions of this standard. The pass/fail criteria for performance task-based competencies and minimum test scores on knowledge-based objectives will be established by the authority having jurisdiction based on

the operational functions required. Computer based training (CBT) might be used to complement ARFF training resources for simulation and evaluation of ARFF personnel in technical knowledge.

A.6.3 Every effort should be made to gain access to all types of aircraft that normally operate at the airport.

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.15.3.3(A) For burn area structures and agent discharge rates, see FAA Advisory Circular 150/5220/17A.

A.15.3.3(B) See A.15.3.3(A).

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 20590.
Advisory Circular 150/5220/17A, 1998.

B.2 Informational References. (Reserved)

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

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