NFPA 1003
Standard for Airport Fire Fighter Professional Qualifications

1994 Edition

National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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This edition of NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, was prepared by the Technical Committee on Fire Fighter Professional Qualifications, released by the Technical Correlating Committee on Professional Qualifications, and acted on by the National Fire Protection Association, Inc., at its Annual Meeting held May 16-18, 1994, in San Francisco, CA. It was issued by the Standards Council on July 14, 1994, with an effective date of August 5, 1994, and supersedes all previous editions.

The 1994 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 1003

In 1972, the Joint Council of National Fire Service Organizations (JCNFSO) created the National Professional Qualifications Board for the Fire Service (NPQB) to facilitate the development of nationally applicable performance standards for uniformed fire service personnel. On December 14, 1972, the Board established four technical committees to develop those standards using the National Fire Protection Association (NFPA) standards-making system. The initial committees addressed the following career areas: fire fighter, fire officer, fire service instructor, and fire inspector and investigator.

The Committee on Fire Fighter Professional Qualifications met regularly from 1976 to 1978 to produce the first edition of this document. Adopted by the Association in 1978, NFPA 1003 was the third in the series of fire fighter professional qualifications standards.

Subsequent to the adoption of the initial edition, the committee has met regularly to revise and update the standard. A revised edition was adopted and issued by the NFPA under the auspices of the NPQB in 1987.

The original concept of the professional qualification standards, as directed by the JCNFSO and the NPQB, was to develop an interrelated set of performance standards specifically for the fire service. The various levels of achievement in the standards were to build upon each other within a strictly defined career ladder. In the late 1980s, revisions of the standards recognized that the documents should stand upon their own merit in terms of job performance requirements for a given field. Accordingly, the strict career ladder concept was abandoned, except for the progression from fire fighter to fire officer. The later revisions, therefore, facilitated the use of the documents by other than the uniformed fire services.

In 1990, responsibility for the appointment of professional qualifications committees and the development of the professional qualifications standards was assumed by the NFPA.

The Correlating Committee for Professional Qualifications Standards was appointed by the NFPA Standards Council in 1990 and assumed the responsibility for coordinating the requirements of all of the professional qualifications documents.

The intent of the technical committee was to develop clear and concise job performance requirements that can be used to determine that an individual, when measured to the standard, possesses the skills and knowledge to perform as an airport fire fighter. The committee further contends that these job performance requirements can be used in any fire department in any city, town, or private organization throughout North America.

The Technical Committee would like to thank the members of the Airport Fire Fighter Task Group who provided them with valuable time and expertise in the development of this document. These individuals are Hugh Pike, Chair; Collin DeWitt; George Hall; Paul Robinson; and Wayne Sibley.

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Committee Scope: This Committee shall have primary responsibility for the management of the NFPA Professional Qualifications Project and documents related to professional qualifications for fire service, public safety, and related personnel.

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

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

Committee Scope: This Committee shall have primary responsibility for documents on professional competence required of fire fighters.

Contents

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

Information on referenced publications can be found in Chapter 4 and Appendix D.

Chapter 1 Administration

1-1 Scope. This standard identifies the minimum job performance requirements for the airport fire fighter responsible for aircraft rescue and fire fighting.

1-2 Purpose. The purpose of this standard is to specify the minimum job performance requirements for service as an airport fire fighter. It is not the intent of this standard to restrict any jurisdiction from exceeding these minimum requirements.

1-3 General.

1-3.1* For certification as an airport fire fighter, the candidate shall meet the requirements for Fire Fighter I defined in Chapter 3 of NFPA 1001, *Standard for Fire Fighter Professional Qualifications*; first responder operational level defined in Chapter 3 of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*; and the job performance requirements for airport fire fighter defined in Chapter 3 of this standard. Airport fire fighters who drive aircraft rescue and fire fighting (ARFF) vehicles shall meet the requirements of Chapter 7 of NFPA 1002, *Standard for Fire Department Vehicle Driver/Operator Professional Qualifications.*

1-3.2 Job performance requirements shall be safely completed in accordance with recognized practices and procedures. All applicable occupational safety and health requirements of the jurisdiction shall be met.

1-3.3 Job performance requirements defined by this standard shall be evaluated by individuals approved by the authority having jurisdiction. Evaluators shall be individuals who were not involved as instructors for the requirement being evaluated.

1-3.4 It is not required for the job performance requirements to be mastered in the order in which they appear. The local, state/provincial, or federal training program shall establish the instructional priority and the training program content to prepare individuals to meet the job performance requirements of this standard.

1-3.5 Job performance requirements involving exposure to products of combustion outside of the ARFF vehicle shall be performed in full protective clothing.

1-4* Definitions.

Aircraft Accident. An occurrence during the operation of an aircraft in which any person involved suffers death or serious injury or in which the aircraft receives substantial damage.

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. An incident does not result in serious injury to persons or substantial damage to aircraft.

Airport Fire Fighter. The Fire Fighter I who has demonstrated the skills and knowledge necessary to function as an integral member of an aircraft rescue and fire fighting (ARFF) team as defined in Chapter 3.

Approved. Acceptable to the authority having jurisdiction.

NOTE: 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 concerned with product evaluations that is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

NOTE: The phrase "authority having jurisdiction" 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.

Fire Department. An organization providing rescue, fire suppression, and related activities. The term "fire department" shall include any public, governmental, private, industrial, or military organization engaging in this type of activity.

Job Performance Requirement. A statement that describes a specific job task, lists the items necessary to complete the task, and defines measurable or observable outcomes and evaluation areas for the specific task.

Prerequisite Knowledge. Fundamental knowledge one must have in order to perform a specific task.

Prerequisite Skills. The essential skills one must have in order to perform a specific task.

Protective Clothing. Approved proximity protective clothing, including SCBA, providing full body protection.

Shall. Indicates a mandatory requirement.

Task. A specific job behavior or activity.

1-5 Units. In this standard, values for measurement are followed by an equivalent in SI units, but only the first stated value shall be regarded as the requirement. Equivalent values in SI units shall not be considered as the requirement, as these values are approximate.

Table 1-5 SI Conversions

Quantity	US Unit/Symbol	SI Unit/Symbol	Conversion Factor
Length	inch/in.	millimeter/mm	1 in. = 25.4 mm
	foot/ft	meter/m	1 ft = 0.305 m
Area	sq foot/ft^2	sq meter/m^2	1 ft^2 = 0.0929 m^2

Chapter 2 Entrance Requirements

2-1 Prior to entering training to meet the requirements of Chapter 3, the candidate shall:

(a) Meet the minimum educational requirements established by the authority having jurisdiction.

(b) Meet the age requirements established by the authority having jurisdiction.

(c) Meet the medical requirements of NFPA 1582, *Standard on Medical Requirements for Fire Fighters.*

2-2 Physical fitness requirements shall be developed and validated by the authority having jurisdiction. Physical fitness requirements shall be in compliance with applicable equal opportunity regulations and other legal requirements.

Chapter 3 Airport Fire Fighter

3-1 General.

3-1.1 For qualification as an airport fire fighter, the candidate shall meet each of the job performance requirements defined in this chapter. These requirements are divided into four major duties: response, fire suppression, rescue, and post-emergency operations. The primary function of the airport fire fighter shall be to execute fire suppression and rescue activities.

3-1.2 The job performance requirements of this chapter shall be accomplished in accordance with the requirements of the authority having jurisdiction and NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program.*

3-2 Response.

3-2.1 Description of Duty. Response includes the timely arrival at an incident/accident with the capability to perform fire suppression and rescue operations, or both. The duty also includes responding to hazardous conditions and performing standby operations.

3-2.2 Respond to incidents/accidents on and off the airport, given a scenario and location, a grid map, a vehicle, and a prescribed response time, so that the route selected provides the most efficient access to the site within the allotted time.

3-2.2.1 *Prerequisite Knowledge:* Airport familiarization including runway and taxiway designations, frangible gate locations, airport markings, lights, signage, instrument landing system (ILS) critical areas, designated isolation areas, vehicular traffic controls on airfield, bridge load limits, controlled access points, aircraft traffic patterns and taxi routes, fuel storage and distribution locations, airport topographic layout and drainage systems, and aircraft maintenance facilities.

3-2.2.2 *Prerequisite Skills:* Reading grid maps.

3-2.3 Communicate critical incident information regarding an incident/accident on an airport, given a description of the incident/accident and an incident management system (IMS) protocol, so that information provided is sufficient for the incident commander to develop an attack plan.

3-2.3.1 *Prerequisite Knowledge:* Incident management system, the airport emergency plan, airport and aircraft familiarization, and radio procedures.

3-2.3.2 *Prerequisite Skills:* Communications and radio operation.

3-2.4 Communicate with applicable air traffic control facilities, given a response destination on an airport and radio equipment, so that all required clearances are obtained.

3-2.4.1 *Prerequisite Knowledge:* Radio frequencies, tower light signals, fire department and airport terminology and phraseology.

3-2.4.2 *Prerequisite Skills:* Communications and radio operation.

3-2.5 Perform an airport standby operation, given a hazardous condition and the airport standby policies and procedures, so that unsafe conditions are detected and mitigated in accordance with the airport policies and procedures.

3-2.5.1* *Prerequisite Knowledge:* Airport and aircraft practices for hazardous conditions and applicable standby policies and procedures.

3-3 Fire Suppression.

3-3.1 Description of Duty. Fire suppression includes the attack, control, and extinguishment of fires involving aircraft and airport facilities and operations. The primary purpose of this duty is to protect lives and property.

3-3.1.1* *Prerequisite Knowledge:* Aircraft familiarization, including conventional and composite materials used in aircraft construction, aircraft terminology, automatic explosive devices, hazardous areas in and around aircraft, aircraft fueling systems (hydrant/vehicle), aircraft shutdown, aircraft extinguishing systems, aircraft brake systems, aircraft egress/ingress (hatches, doors, and evacuation chutes), unique fuels used on aircraft, location and operation of oxygen systems, and military aircraft systems and associated hazards. Tactics and strategy, including the approach, positioning, initial attack, and the selection, application, and management of the extinguishing agents.

3-3.2* Extinguish a 100-ft^2 (9.3-m^2) aircraft fuel fire, given a minimum of a 100-lb (45-kg) dry chemical extinguisher, so that the agent is applied with proper technique and the fire is extinguished.

3-3.2.1 *Prerequisite Knowledge:* The fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, use of protective clothing, agent selection, and agent management.

3-3.2.2 *Prerequisite Skills:* Operation of dry chemical extinguishers equipped with a hose line, including hose removal, operation, and agent application.

3-3.3* Extinguish a 400-ft^2 (37.2-m^2) aircraft fuel fire, given an ARFF vehicle hand line and appropriate agents, so that the agent is applied with proper technique and the fire is extinguished.

3-3.3.1 *Prerequisite Knowledge:* The fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, use of protective clothing, agent selection, agent management, and agent application rates and densities.

3-3.3.2 *Prerequisite Skills:* Fire stream practices and agent application techniques.

3-3.4* Extinguish a 5000-ft^2 (464.5-m^2) aircraft fuel fire, given ARFF vehicle turrets and appropriate agents, so that the agent is applied with proper technique and the fire is extinguished.

3-3.4.1 *Prerequisite Knowledge:* Operation of ARFF vehicle agent delivery systems, the fire behavior of aircraft fuels in pools, physical properties and characteristics of aircraft fuel, use of protective clothing, agent selection, agent management, and agent application rates and densities.

3-3.4.2 *Prerequisite Skills:* Effective application of fire-fighting agent using ARFF vehicle turrets.

3-3.5* Extinguish a three-dimensional aircraft fuel fire, given an ARFF vehicle hand line and appropriate agents, so that the agent is applied with proper technique and the fire is extinguished. (*See Appendix B.*)

3-3.5.1* *Prerequisite Knowledge:* The fire behavior of aircraft fuels in three-dimensional and atomized states, physical properties and characteristics of aircraft fuel, use of protective clothing, agent selection, agent management, and agent application rates and densities.

3-3.6* Attack a fire on the interior of an aircraft, given an ARFF vehicle hand line(s) and appropriate agent, so that the lines are properly advanced and positioned and the fire is extinguished. (*See Appendix B.*)

3-3.7 Control engine and auxiliary power unit (APU) fires on an aircraft, given an ARFF vehicle hand line or turrets and appropriate agent, so that the agent is applied with proper technique and the fire is controlled. (*See Appendix B.*)

3-3.8 Extinguish a tire assembly fire, given an ARFF vehicle hand line and appropriate agent, so that the agent is applied with proper technique and the fire is extinguished. (*See Appendix B.*)

3-3.8.1 *Prerequisite Knowledge:* Agent selection criteria, special safety considerations, and the characteristics of combustible metals.

3-3.9* Ventilate an aircraft through available doors and hatches, given mechanical ventilation devices, so that the smoke is removed in order to aid passenger egress and rescue. (*See Appendix B.*)

3-3.10 Replenish extinguishing agents, given an ARFF vehicle, a fixed or mobile water source, a supply of agent and necessary supply lines and fittings, so that agents are available for application by the ARFF vehicle.

3-4 Rescue.

3-4.1* Description of Duty. Rescue includes gaining access to an aircraft; assisting in the evacuation process; performing extrication, initial triage, and first aid.

3-4.2* Gain access into and out of an aircraft through normal entry points and emergency hatches, given an incident scenario, so that passenger evacuation and rescue can be accomplished. (*See Appendix B.*)

3-4.2.1 *Prerequisite Knowledge:* Aircraft familiarization, including materials used in construction, aircraft terminology, automatic explosive devices, hazardous areas in and around aircraft, aircraft egress/ingress (hatches, doors, and evacuation chutes), military aircraft systems and associated hazards; capabilities and limitations of manual and power rescue tools and specialized high reach devices.

3-4.2.2 *Prerequisite Skills:* Operation of power saws and cutting tools, hydraulic devices, pneumatic devices, and pulling devices; operation of specialized ladders and high reach devices.

3-4.3* Extricate an entrapped victim from an aircraft, given manual and powered rescue equipment, so that the victim is disentangled and prepared for removal from the aircraft. (*See Appendix B.*)

3-4.3.1 *Prerequisite Knowledge:* Capabilities and limitations of manual and power rescue tools.

3-4.3.2 *Prerequisite Skills:* Operation of power saws and cutting tools, hydraulic devices, pneumatic devices, and pulling devices.

3-4.4 Implement initial triage of the victims of an aircraft accident, given an aircraft accident scenario with multiple casualties and the triage protocol of the airport, so that each victim is evaluated and removed to a designated collection point.

3-4.4.1 *Prerequisite Knowledge:* Local triage protocol.

3-5 Post-emergency Operations.

3-5.1 Description of Duty. Post-emergency operations include salvage, overhaul, and scene preservation.

3-5.2 Preserve the scene, given an aircraft accident scenario, so that evidence is not disturbed.

3-5.3 Overhaul the scene, given an aircraft accident scenario, hand and power tools, and hand lines and salvage covers, so all fires are extinguished and the salvageability of the aircraft and its contents are maintained.

Chapter 4 Referenced Publications

4-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

4-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, 1992 edition.

NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, 1992 edition.

NFPA 1002, *Standard for Fire Department Vehicle Driver/Operator Professional Qualifications*, 1993 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 1992 edition.

NFPA 1582, *Standard on Medical Requirements for Fire Fighters*, 1992 edition.

Appendix A Explanatory Material

This Appendix is not a part of the recommendations of this NFPA document but is included for informational purposes only.

A-1-3.1 Due to the improvements in the design and construction of modern aircraft, resulting in increased structural integrity, the potential exists for significant interior fires that cannot be extinguished using external aircraft fire-fighting tactics. Extinguishing aircraft interior fires is an essential task of the airport fire fighter. This is one of the primary reasons for the FFI requirement in this document. The basic fire-fighting skills and knowledge required for Fire Fighter I in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*, are essential to the airport fire fighter.

The requirement for first responder at the operational level (in NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*) was included based on the airport fire fighter's potential for frequent exposure to a wide variety of hazardous materials. The potential exposure frequency is significantly greater than anticipated for the Fire Fighter I.

A-1-4 Definitions of action verbs used in the job performance requirements in this document are based on the first definition of the word found in *Webster's Third New International Dictionary of the English Language*.

A-3-2.5.1 Hazardous conditions include special fuels, fueling operations (grounding and bonding), welding operations, hazardous materials operations, corrosion control, fuel cell maintenance, and military operations.

A-3-3.1.1 Airport fire fighters must have knowledge of military aircraft at those airports that accept military aircraft.

This knowledge should include the following:

(a) Military cargo/passenger aircraft (C-5, C-141, C-130, C-9, C-135) are basically the same as civilian, large-frame aircraft, and there are no additional hazards other than the cargo that might be carried on the aircraft.

(b) Military tanker aircraft (KC-10, KC-135, and KC-130) are basically the same as civilian versions except for the amount and location of fuel carried.

(c) Military fighter aircraft (F-15, F-16, F-117), bomber aircraft (B-1, B-2, B-52), and attack aircraft such as the A-10 present the highest risk to airport fire fighters. These aircraft are equipped with explosive devices and ejection seats of which the airport fire fighter should be aware.

(1) *Entry.* If the emergency controls are activated, an explosive charge will blow the canopy from the aircraft.

(2) *Ejection Systems.* All fighter, bomber, and attack aircraft are equipped with ejection seats. Once access has been gained to the cockpit, caution is extremely important, as these ejection seats, when activated, are propelled out of the aircraft by an explosive charge. Airport fire fighters should not touch or activate any controls.

(3) *Extrication.* The aircrew member is secured to the seat by a series of straps, harnesses, and restraint belts. These restraints can be released by cutting if the release procedure is unknown.

(4) *Ordinance.* Fighter and attack aircraft will have forward firing ordnance located in the forward part of the fuselage or wings.

(d) *Engine Shutdown.* This usually can be done by pulling T-handles, as on a commercial jet.

A-3-3.2 Concerns with the environmental impact of traditional flammable liquid training fires have caused many facilities to convert to propane-fueled simulators. The intent of this requirement is a safe and proper extinguishment technique for pool fires involving aircraft fuels. The use of pressurized flammable gas or flammable liquid is acceptable for this simulation.

A-3-3.3 See A-3-3.2.

A-3-3.4 See A-3-3.2.

A-3-3.5 Three-dimensional or running fuel fires are those involving a fuel leak from an elevated or pressurized source. The fuel burns as it falls through the air, and the burning fuel on the ground can pool or run across the ground surface. These fuel fires are extremely difficult to extinguish. They must be recognized and action must be taken to extinguish them early in the incident or accident for successful fire-fighting operations. Typically, these fires cannot be extinguished by smothering agents such as aqueous film-forming foam, because these agents cannot seal the surface and exclude oxygen. Such fires are more successfully extinguished by shutting off the fuel flow or by using agents, such as dry chemical, that interfere with the chemical or chain reaction.

A-3-3.5.1 A three-dimensional fire is a flowing flammable liquid fire. These fires typically involve fuel that is cascading, leaking, or running from a fuel source. The fuel might or might not be under pressure. Aircraft fuels released under pressure, in an atomized state, will ignite with explosive force when exposed to an ignition source. Experience has shown that these fires are extremely difficult to extinguish with conventional foam application.

A-3-3.6 This requirement can be met by using a structural burn facility configured to simulate the interior layout and dimensions of an aircraft fuselage containing mannequins to simulate victims. The mock-up should include at least three metal seats and training dummies to simulate victims.

A-3-3.9 Training and evaluation of this task can be accomplished using actual aircraft or mock-ups and smoke-generation devices used for training.

A-3-4.1 One of the primary tasks of rescue operations is for the airport fire fighter to maintain a habitable environment around the fuselage and assist with aircraft evacuation by stabilizing slide chutes and assisting and controlling the evacuees.

A-3-4.2 Training and evaluation of this task can be accomplished using actual aircraft or mock-ups.

A-3-4.3 Training and evaluation of this task can be accomplished using actual aircraft or mock-ups.

Appendix B Aircraft Fire Suppression and Rescue Fire Training Mock-up

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

Pre-incident planning directly affects a fire department's ability to provide quality resource protection. Fire fighters must be trained, competent, and certified to execute pre-incident plans. The live fire training program focuses on a fire fighter's ability to work as a team member during realistic and challenging training events.

These basic designs for an aircraft fire./rescue training simulator challenge fire fighters and result in increased protection for airports and airlines. Simulators can be constructed with low-cost materials, usually available in maintenance yards or public works departments. Simulators can be equipped to use hydrocarbon fuels, such as Jet A, or clean-burning propane. (*See Figures B-1 through B-8.*)

Running Fuel Fire ***(see 3-3.5)***. This requirement is met by allowing a continuous, small stream of aircraft fuel flowing from the engine simulator into a catch basin. The fuel is ignited, resulting in a fire at the lead source. The fuel burns as it falls through the air and ignites the surface fire in the catch basin. (*See Figure B-2.*)

Interior Aircraft Fire ***(see 3-3.6)***. The fuselage and cabin section should be constructed of steel frames and heavy metal skin that will withstand heat and rapid cool-down. The simulator should be 30 ft to 40 ft (9 m to 12 m) in length to allow a realistic cabin fire-fighting exercise. The scenario includes burning Class A materials in the simulator to create the conditions expected with an interior aircraft fire. (*See Figures B-6 and B-7.*)

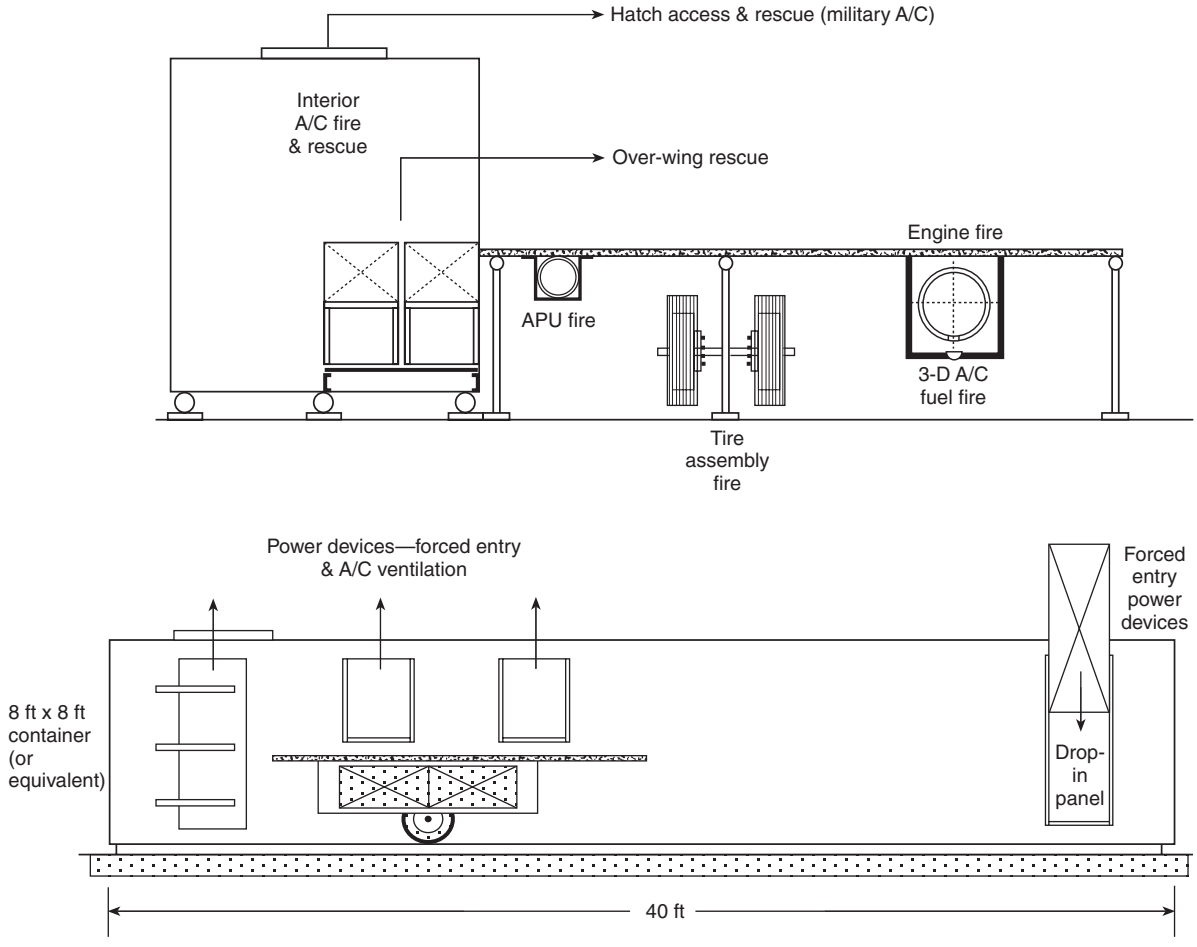

Figure B-1 Aircraft fire suppression and rescue live fire training mock-up.

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

Auxiliary Power Unit (APU) Fire ***(see 3-3.7)***. The APU fire is created by burning fuel within a 6-in. (15-cm) steel pipe suspended from the wing. This addition is a reasonable simulation of both the intake and exhaust ports. (*See Figure B-2.*)

Wheel Assembly Fire ***(see 3-3.8)***. Salvaged tire rims can be welded onto the number 2 wing support. Fuel can flow from above or through a pressurized device around the rims or spray fuel on the rims to create a typical aircraft tire assembly fire. (*See Figures B-1 and B-7.*)

Ventilation of Doors and Hatches ***(see 3-3.9)***. This design provides for both normal and emergency means of entry and egress. Normal entry is made through a hinged door, mounted forward of the wing. Emergency entrance is made through two over-wing openings and one aft door. All emergency openings are framed on the sides and bottom by angle iron. This allows for sections of corrugated metal to be dropped into place and removed after use. An additional hatch has been added to the top of the fuselage to simulate military aircraft and provide for vertical ventilation. (*See Figures B-4 and B-8.*)

Access through Normal and Emergency Hatches for Rescue ***(see 3-4.2)***. Compliance with this requirement can be met by using the same openings discussed in 3-3.9.

Passenger Extraction and Use of Rescue Equipment ***(see 3-4.3)***. Access to simulated passengers is possible by using mechanical rescue equipment to force openings in the corrugated metal panels discussed in 3-3.9. These sections can be forced or cut with pneumatic cutting devices or power saws. These metal sections can be secured with pins to allow the realistic use of other hydraulic rescue equipment. (*See Figures B-5 and B-6.*)

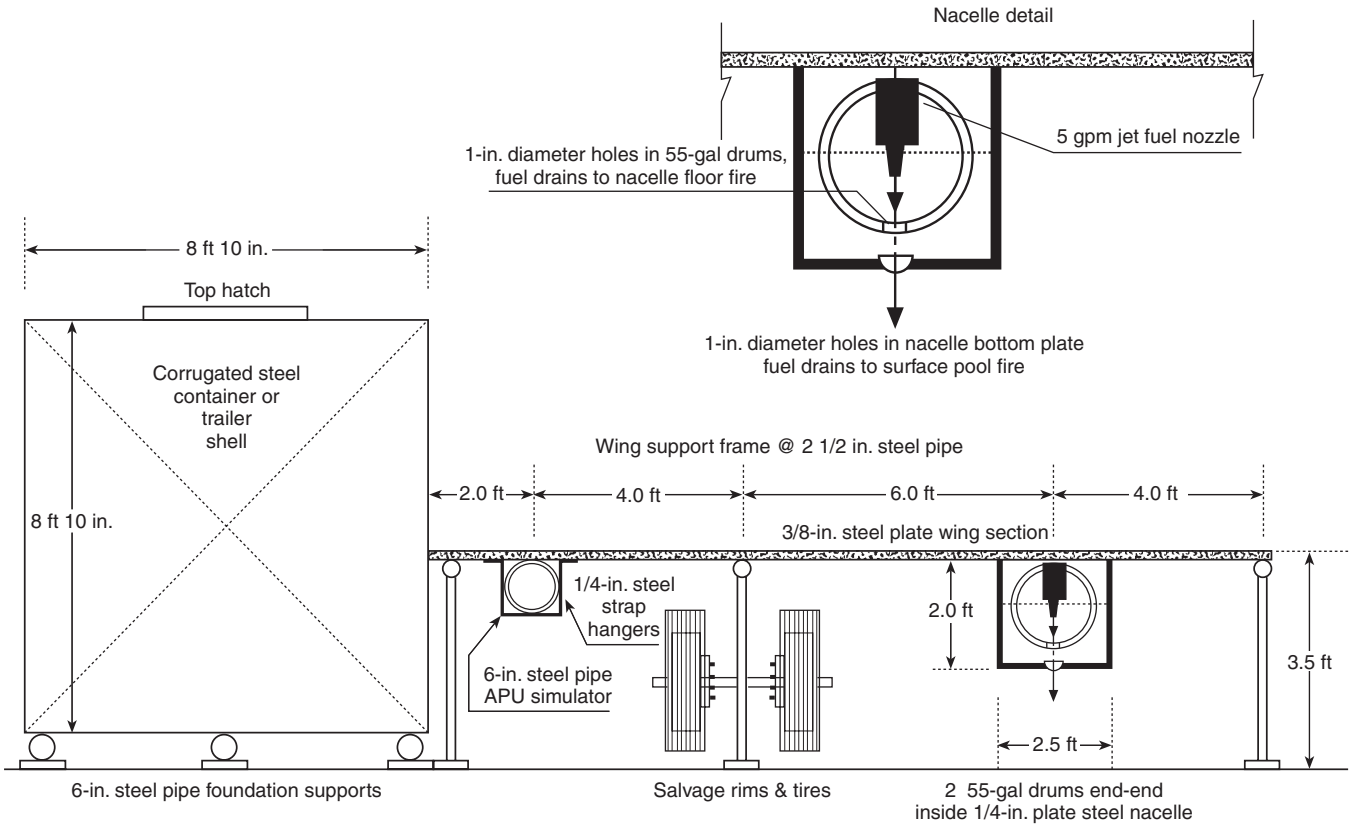

Figure B-2 Aircraft fire suppression and rescue live fire training mock-up (front view).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

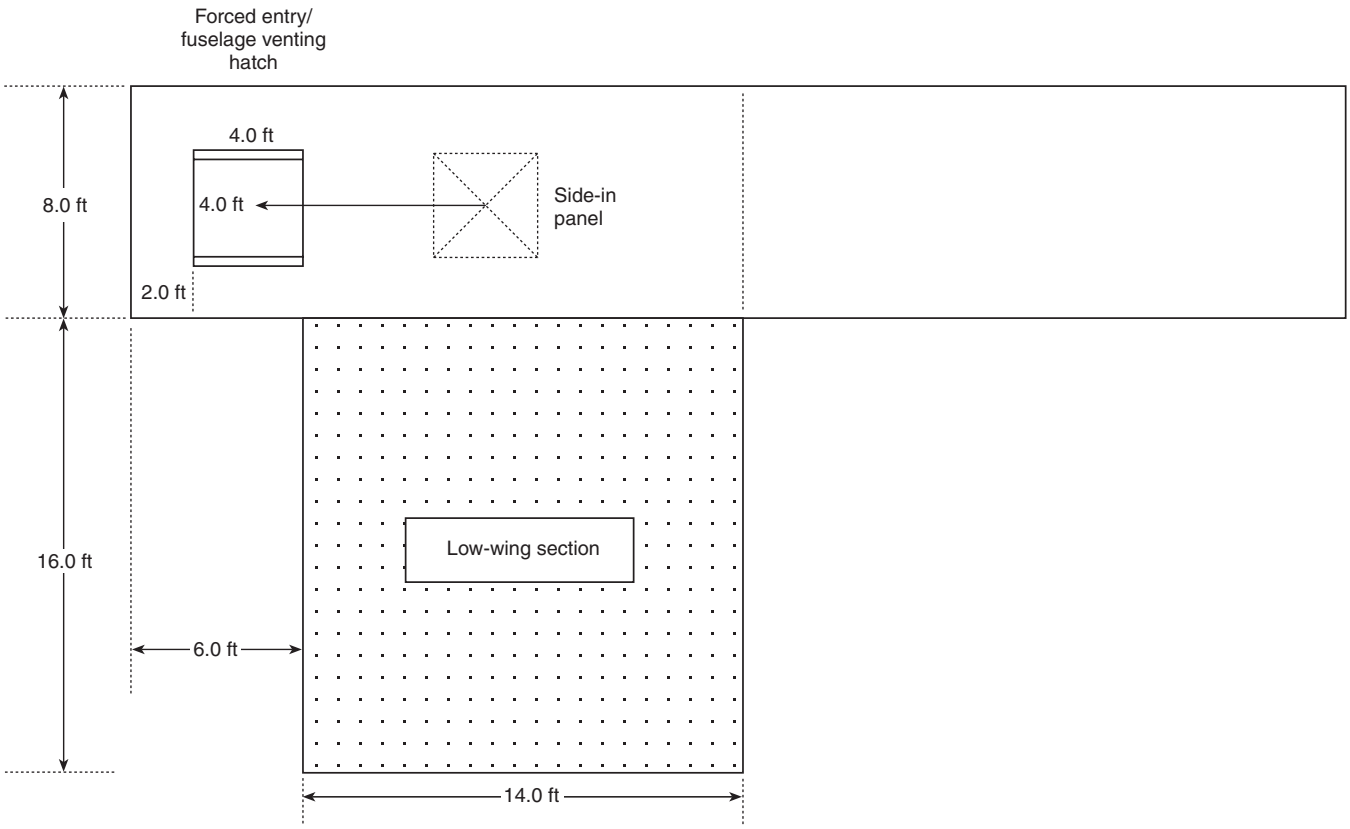

Figure B-3 Aircraft fire suppression and rescue live fire training mock-up (top view).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

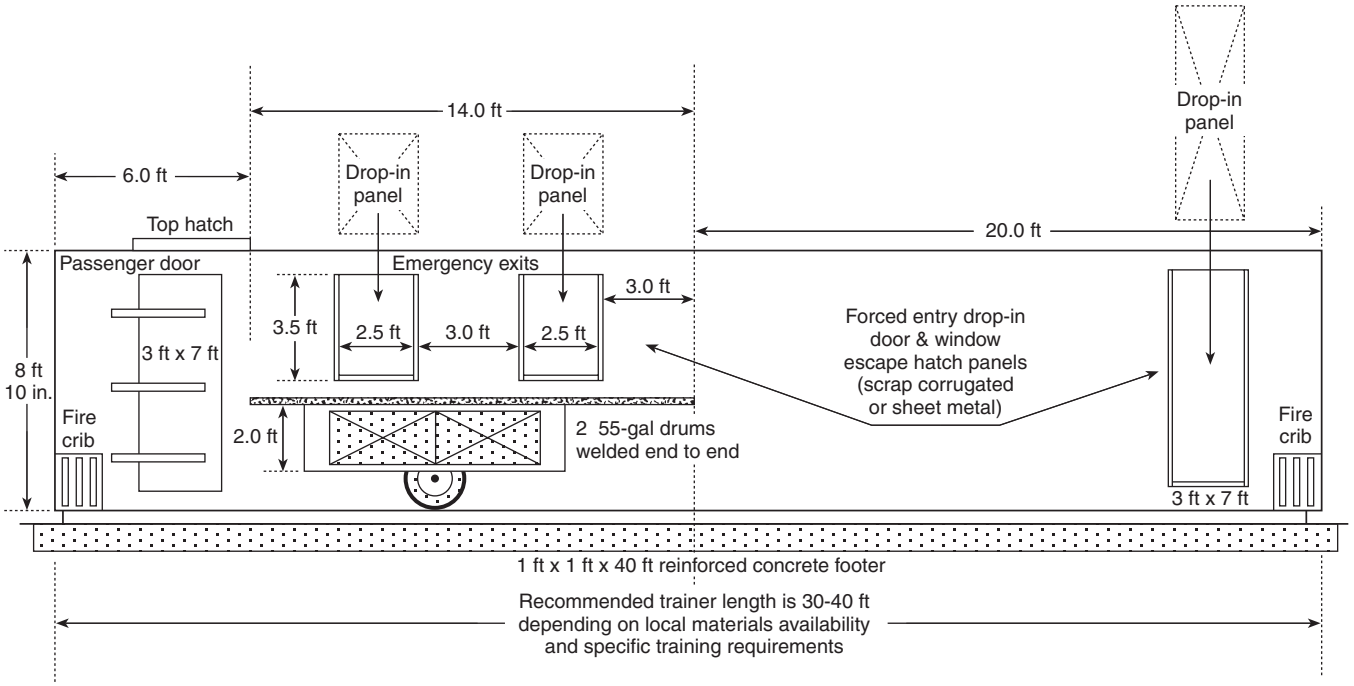

Figure B-4 Aircraft fire suppression and rescue live fire training mock-up (over-wing egress side view).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

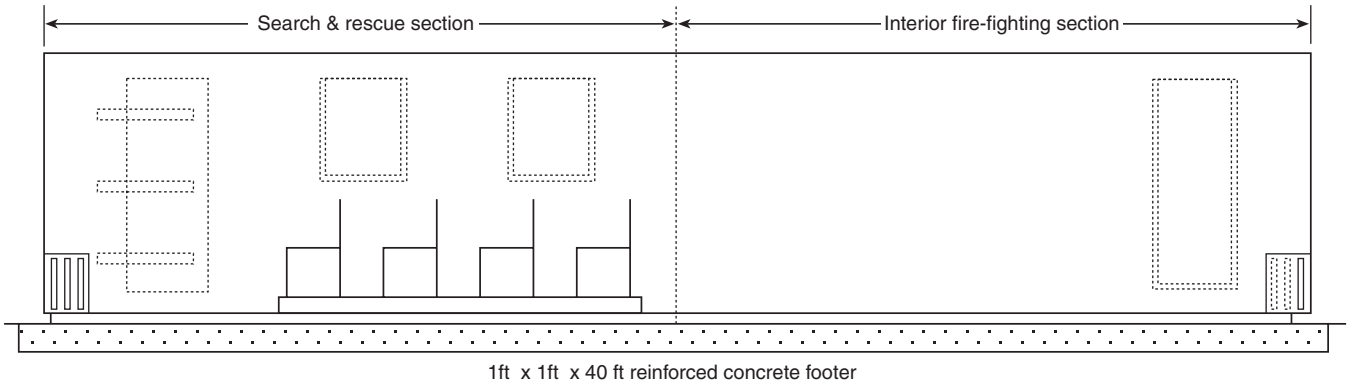

Figure B-5 Aircraft fire suppression and rescue live fire training mock-up (interior aircraft seat arrangement).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

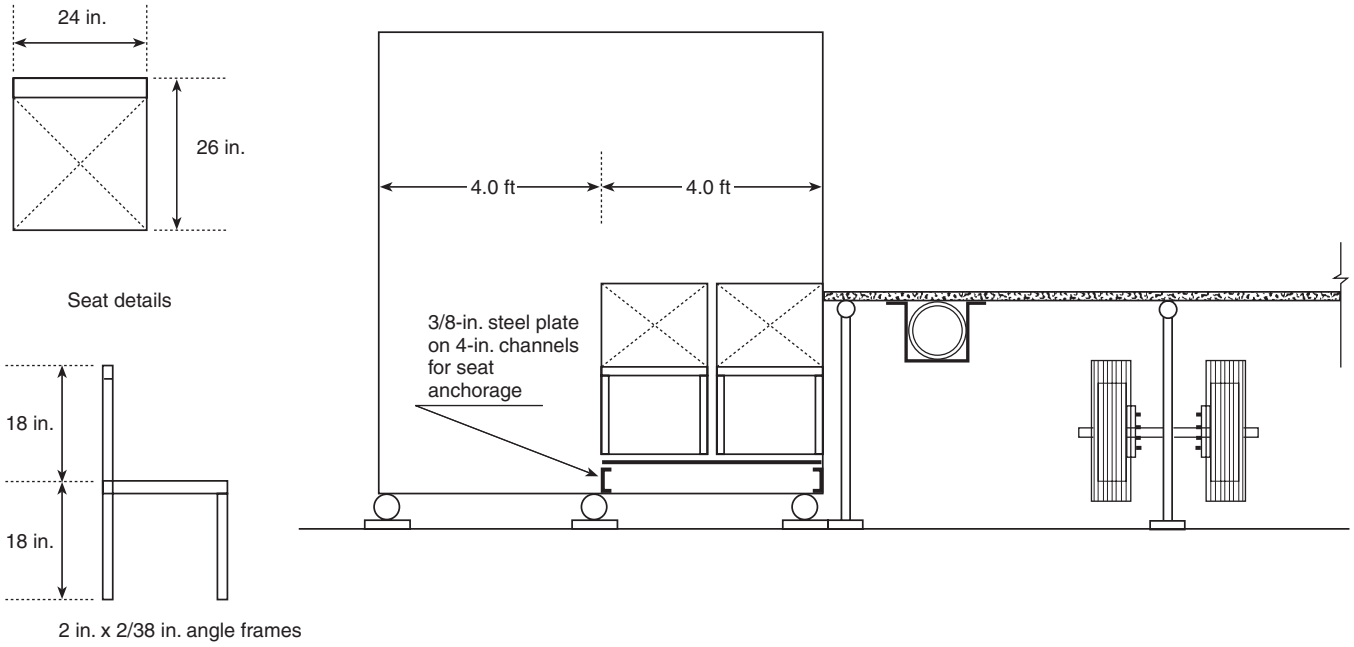

Figure B-6 Aircraft fire suppression and rescue live fire training mock-up (interior seating arrangement).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

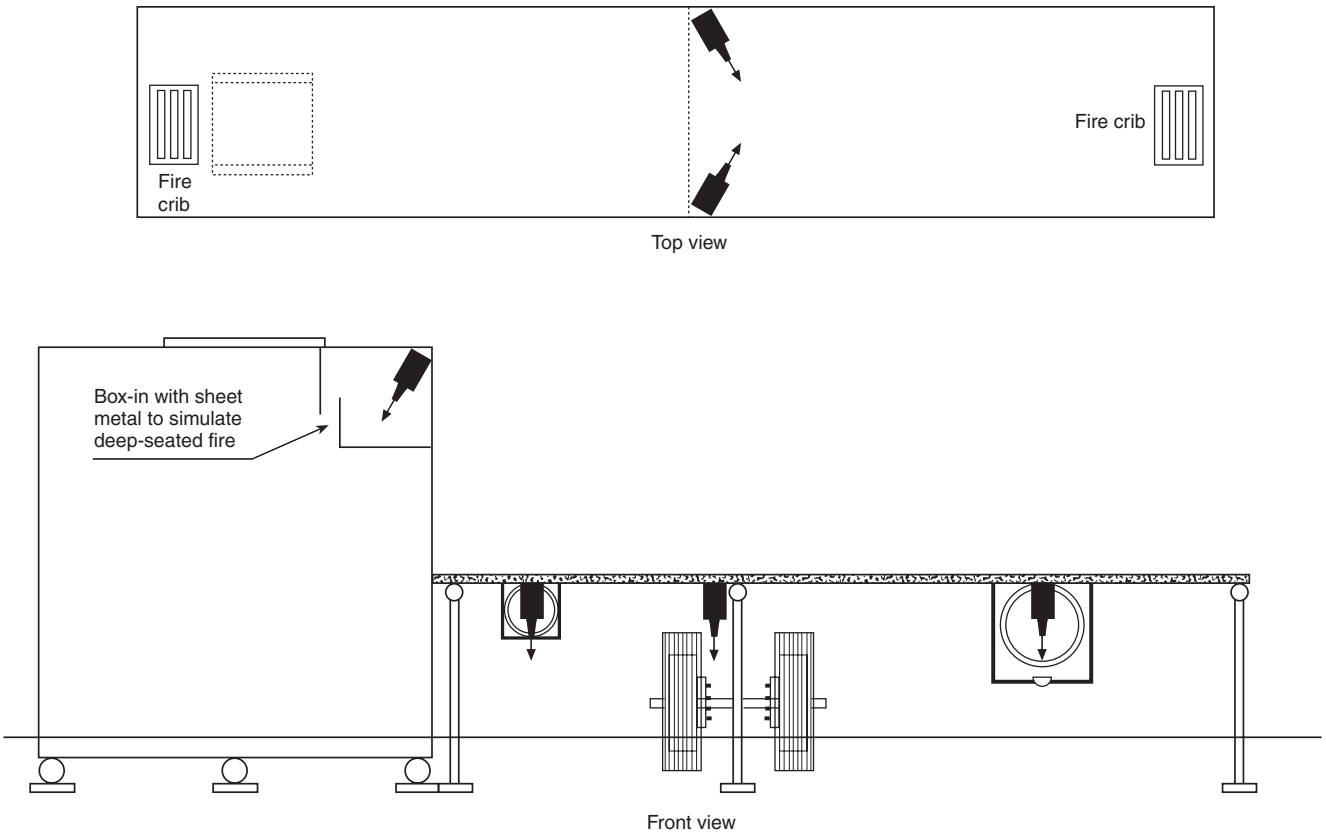

Figure B-7 Aircraft fire suppression and rescue live fire training mock-up [liquid propane or atomized jet fuel nozzle locations (no scale)].
This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

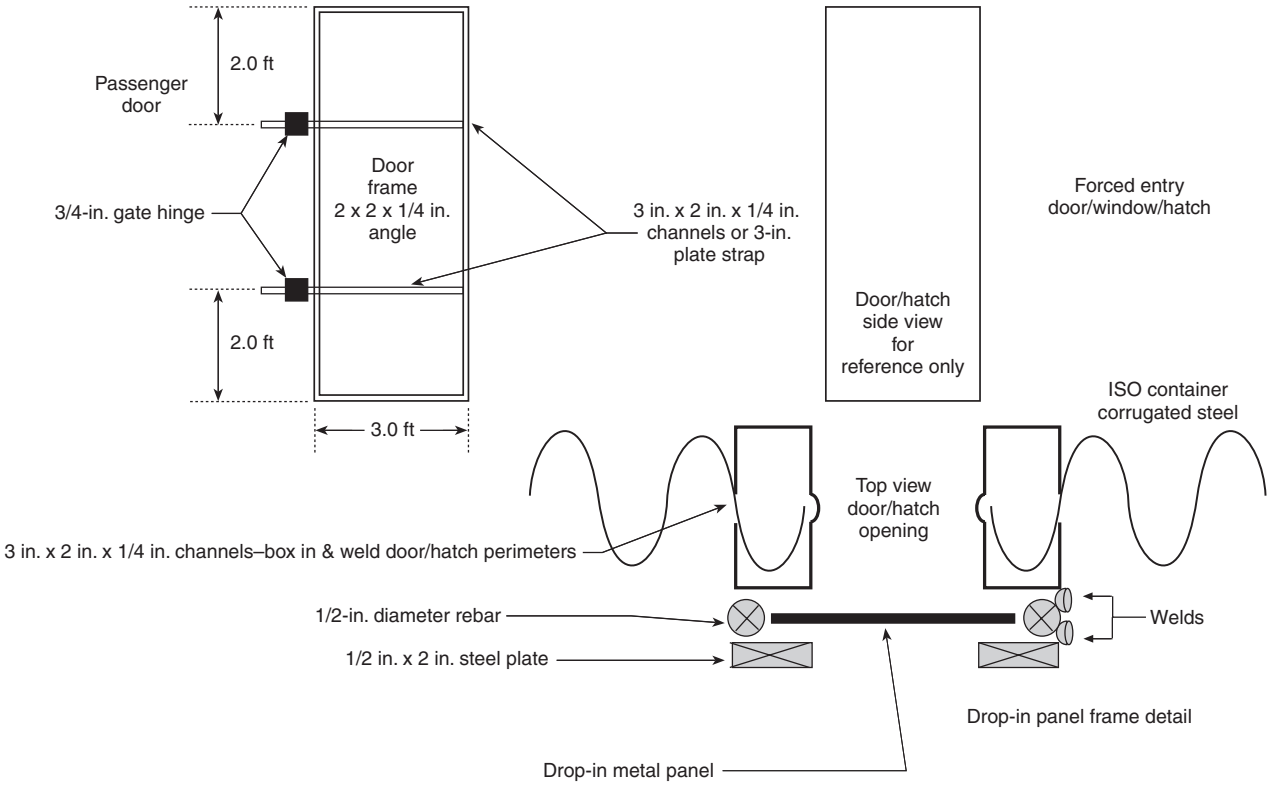

Figure B-8 Aircraft fire suppression and rescue live fire training mock-up (door and forced entry hatch details).

This mock-up was developed for the users' information by U.S. Air Force HQ AFCESA/DEF, Tyndall AFB, FL 32403.

Appendix C Using Job Performance Requirements

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

Explanation of the Standards and Concepts of JPRs

The primary benefit of establishing national professional qualification standards is to provide both public and private sectors with a framework of the job requirements for the fire service. Other benefits include enhancement of the profession, individual as well as organizational growth and development, and standardization of practices.

NFPA professional qualification standards identify the minimum job performance requirements for specific fire service positions. The standards may be used for training design and evaluation, certification, measuring and critiquing on-the-job performance, defining hiring practices, and setting organizational policies, procedures, and goals (other applications are encouraged).

Professional qualification standards for a specific job are organized by major areas of responsibility defined as duties. For example, the fire fighter's duties may include fire suppression, rescue, and water supply; and the public fire educator's duties may include education, planning and development, and administration. Duties are major functional areas of responsibility within a job.

The professional qualification standards are written as job performance requirements (JPRs). Job performance requirements describe the performance required for a specific job. JPRs are grouped according to the duties of a job. The complete list of JPRs for each duty defines what an individual must be able to do in order to successfully perform that duty. Together, the duties and their JPRs define the job parameters; that is, the professional qualification standard as a whole is a job description.

Breaking Down the Components of a Job Performance Requirement

The job performance requirement is the assembly of three critical components. These components are as follows:

(1) Task to be performed.

(2) Tools, equipment, or materials that must be provided to successfully complete the task.

(3) Evaluation parameters and/or performance outcomes.

Example

(1) (Task	(1) Ventilate a pitched roof;
2) Tools, equipment, or materials	(2) Given an ax, a pike pole, an extension ladder, and a roof ladder;
(3) Evaluation parameters and performance outcomes	(3) So that a 4-ft × 4-ft hole is created, all ventilation barriers are removed; ladders are properly positioned for ventilation; ventilation holes are correctly placed; and smoke, heat, and combustion by-products are released from the structure.

The task to be performed: The first component is a concise statement of what the person is supposed to do.

Tools, equipment, or materials that must be provided to successfully complete the task: This component ensures that all individuals completing the task are given the same minimal tools, equipment, or materials when being evaluated. By listing these items, the performer and evaluator know what must be provided in order to complete the task.

Evaluation parameters and/or performance outcomes: This component defines how well one must perform each task—for both the performer and evaluator. The JPR guides performance outcomes. This portion of the JPR promotes consistency in evaluation by reducing the variables used to gauge performance.

In addition to these three components, the JPR contains prerequisite knowledge and skills. Just as the term prerequisite suggests, these are the necessary knowledge and skills one must have prior to being able to perform the task. Prerequisite knowledge and skills are the foundation for task performance.

Once the components and prerequisites are put together, the JPR might read as follows:

Example 1:

The Fire Fighter I shall ventilate a pitched roof, given an ax, a pike pole, an extension ladder, and a roof ladder, so that a 4-ft × 4-ft hole is created, all ventilation barriers are removed, ladders are properly positioned for ventilation, and ventilation holes are correctly placed.

Prerequisite Knowledge: Pitched roof construction, safety considerations with roof ventilation, the dangers associated with improper ventilation, knowledge of ventilation tools, the effects of ventilation on fire growth, smoke movement in structures, signs of backdraft, and the knowledge of vertical and forced ventilation.

Prerequisite Skills: Remove roof covering; properly initiate roof cuts; use the pike pole to clear ventilation barriers; use ax properly for sounding, cutting, and stripping; position ladders; and climb and position self on ladder.

Example 2:

The Fire Investigator shall interpret burn patterns, given standard equipment and tools and some structural/content remains, so that each individual pattern is evaluated with respect to the burning characteristics of the material involved.

Prerequisite Knowledge: Knowledge of fire development and the interrelationship of heat release rate, form, and ignitability of materials.

Prerequisite Skill: Interpret the effects of burning characteristics on different types of materials.

Examples of Potential Uses

Certification:

JPRs can be used to establish the evaluation criteria for certification at a specific job level. When used for certification, evaluation must be based on the successful completion of JPRs.

First, the evaluator verifies the attainment of prerequisite knowledge and skills prior to JPR evaluation. This might be through documentation review or testing.

Next, the candidate is evaluated on completing the JPRs. The candidate performs the task and is *evaluated* based on the evaluation parameters and/or performance outcomes. This performance-based evaluation can be either practical (for psychomotor skills such as "ventilate a roof") or written (for cognitive skills such as "interpret burn patterns").

Using Example 1, a practical performance-based evaluation would measure the ability to "ventilate a pitched roof." The candidate passes this particular evaluation if the standard was met, i.e., a 4-ft × 4-ft hole was created; all ventilation barriers were removed; ladders were properly positioned for ventilation; ventilation holes were correctly placed; and smoke, heat, and combustion by-products were released from the structure.

For Example 2, when evaluating the task *"interpret burn patterns,"* the candidate could be given a written assessment in the form of a scenario, photographs, and drawings and then be asked to respond to specific written questions related to the JPR's evaluation parameters.

Remember, when evaluating performance, candidates must be given the tools, equipment, or materials listed in the JPR before they can be properly evaluated, e.g., an ax, a pike pole, an extension ladder, and a roof ladder.

Curriculum Development/Training Design and Evaluation

The statements contained in this document that refer to job performance were designed and written as job performance requirements. While a resemblance to instructional objectives may be present, these statements should not be used in a teaching situation until after they have been modified for instructional use.

Job performance requirements state the behaviors required to perform a specific skill(s) on the job, as opposed to a learning situation. These statements should be converted into instructional objectives with behaviors, conditions, and standards that can be measured within the teaching/learning environment. A job performance requirement that requires a fire fighter to "ventilate a pitched roof" should be converted into a measurable instructional objective for use when teaching the skill. (*See Figure C-1.*)

Using Example 1, a terminal instructional objective might read as follows:

The candidate will ventilate a pitched roof, given a simulated roof, an ax, a pike pole, an extension ladder, and a roof ladder, so that 100 percent accuracy is attained on a skills checklist. (At a minimum, the skills checklist should include each of the measurement criteria from the JPR.)

While the differences between job performance requirements and instructional objectives are subtle in appearance, the purpose of each statement differs greatly. JPRs state what is necessary to perform the job in the "real world." Instructional objectives, however, are used to identify what students must do at the end of a training session and are stated in behavioral terms that are measurable in the training environment.

By converting JPRs into instructional objectives, instructors will be able to clarify performance expectations and avoid confusion related to using statements designed for purposes other than teaching. Additionally, instructors will be able to add local/state/regional elements of performance into the standards as intended by the developers.

Prerequisite skills and knowledge should be converted into enabling objectives. These help to define the course content. The course content should include each of the prerequisite

*NOTE: Psychomotor skills are those physical skills that can be demonstrated or observed. Cognitive skills (or mental skills) cannot be observed, but rather are evaluated on how one completes the task (process oriented) or on the task outcome (product oriented).

knowledge and skills. Using Figure C-2, the enabling objectives are pitched roof construction, safety considerations with roof ventilation, remove roof covering, properly initiate roof cuts, etc. These ensure that the course content supports the terminal objective.

NOTE: It is assumed that the reader is familiar with curriculum development or training design and evaluation.

Other Uses

While the professional qualifications standards are principally used to guide the development of training and certification programs, there are a number of other potential uses for these documents. Because they are written in JPR terms, they lend themselves well to any area of the profession where a level of performance or expertise must be determined. Such areas might include:

Employee Evaluation/Performance Critiquing. The JPRs can be used as a guide by both the supervisor and the employee during an evaluation. The JPRs for a specific job define tasks that are essential to perform on the job, as well as the evaluation criteria to measure when those tasks are completed.

Establishing Hiring Criteria. Professional qualifications standards may be used in a number of ways to further the establishment of hiring criteria. The authority having jurisdiction might simply require certification at a specific job level, e.g., Fire Fighter I. The JPRs might also be used as the basis for pre-employment screening by establishing essential minimal tasks and the related evaluation criteria. An added benefit is that individuals interested in employment can work toward the minimal hiring criteria at local colleges.

Employee Development. The professional qualifications standards can be useful to both the employee and the employer in developing a plan for the individual's growth within the organization. The JPRs and the associated prerequisite skills and knowledge can be used as a guide to determine additional training and education required for the employee to master the job or profession.

Succession Planning. Succession planning or career pathing addresses the efficient placement of people into jobs in response to current needs and anticipated future needs. A career development path can be established for targeted individuals to prepare them for growth within the organization. The JPRs and prerequisite knowledge and skills could then be used to develop an educational path to aid in the individual's advancement within the organization or profession.

Establishing Organizational Policies, Procedures, and Goals. The JPRs can be incorporated into organizational policies, procedures, and goals where employee performance is addressed.