NFPA 418

Standard for Heliports

2001 Edition

NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

IMPORTANT NOTICE ABOUT THIS DOCUMENT

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

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

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

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

See inside back cover for additional important notices and information.

NOTICES

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

Users of this document should be aware that this document may be amended from time to time through the issuance of Tentative Interim Amendments, and that an official NFPA document at any point in time consists of the current edition of the document together with any Tentative Interim Amendments then in effect. In order to determine whether this document is the current edition and whether it has been amended through the issuance of Tentative Interim Amendments, consult appropriate NFPA publications such as the *National Fire Codes*® Subscription Service, visit the NFPA website at www.nfpa.org, or contact the NFPA at the address listed above.

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

The NFPA does not take any position with respect to the validity of any patent rights asserted in connection with any items which are mentioned in or are the subject of this document, and the NFPA disclaims liability for the infringement of any patent resulting from the use of or reliance on this document. Users of this document are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Users of this document should consult applicable federal, state, and local laws and regulations. NFPA does not, by the publication of this document, intend to urge action that is not in compliance with applicable laws, and this document may not be construed as doing so.

8/00

Licensing Policy

NFPA 418

Standard for

Heliports

2001 Edition

This edition of NFPA 418, *Standard for Heliports*, was prepared by the Technical Committee on Helicopter Facilities and acted on by the National Fire Protection Association, Inc., at its November Meeting held November 12–15, 2000, in Orlando, FL. It was issued by the Standards Council on January 13, 2001, with an effective date of February 9, 2001, and supersedes all previous editions.

This edition of NFPA 418 was approved as an American National Standard on February 9, 2001.

Origin and Development of NFPA 418

The development of NFPA 418 began in 1965 after the NFPA Sectional Committee on Aircraft Hangars and Airport Facilities was asked to provide guidance on the construction and protection of elevated heliports. Earlier work had been done by the NFPA Sectional Committee on Aircraft Rescue and Fire Fighting with regard to fire protection in the event of accidents during flight operations, and the NFPA Sectional Committee on Aircraft Fuel Servicing developed the safeguards needed for the prevention of fire accidents during fueling operations at such locations.

In 1967, a Tentative Standard on Elevated Heliport Construction and Protection was approved at the NFPA Annual Meeting. The 1968 text was a revision of the tentative standard (including a change in title). The 1973 edition was a complete revision of the 1968 edition. Further amendments were made in 1979. The title of the 1990 edition of this standard was changed from *Standard on Rooftop Heliport Construction and Protection* to *Standard for Heliports*. The 1990 edition added chapters for land-based facilities and offshore heliports.

The standard was revised for 1995. Criteria for rooftop helicopter hangars were added for the 2001 edition.

Technical Committee on Helicopter Facilities

Steve C. Dryden, *Chair*
Marsh USA, Inc., MO [I]

Michael E. Aaron, The RJA Group, Inc., IL [SE]
Lee Ambers, Vertical Aeronautics Int'l, CA [SE]
Joseph A. Behnke, Ansul Inc./Tyco, WI [M]
William E. Davis, Heliport Systems Inc., NJ [M]
Dana P. DeWoody, Shell Corp. Aviation, TX [U]
Rep. Helicopter Safety Advisory Conference
Frank P. Lambert, Cigna Corp., PA [I]
Rep. American Insurance Services Group
John J. McGowan, The Port Authority of NY & NJ, NJ [E]
Rep. Airports Council Int'l, Inc. — North America
Jack Poole, Poole Fire Protection Eng., Inc., KS [SE]
William C. Sanderson, Helicopter Assn. Int'l, VA [U]
Donald J. Slater, Jr., Allendale Insurance Co., WA [I]
Dudley Smith, University Hospital, OH [U]
Rep. Association of Air Medical Services
Raymond A. Syms, Raymond A. Syms & Assoc., NJ [SE]
Bernard Valois, Transport Canada, Canada [E]

Alternates

Guy Heneault, Transport Canada, Canada [E]
(Alt. to B. Valois)
Dawn Mancuso, Assn. of Air Medical Services (AAMC), VA [U]
(Alt. to D. Smith)
Ronald J. Megasko, Marsh USA, Inc., PA [I]
(Alt. to S.C. Dryden)
Lanny D. Rider, The Port Authority of NY & NJ, NJ [E]
(Alt. to J. J. McGowan)

Nonvoting

Paul O. Huston, Paul Huston & Assoc., AL [SE]

Mark T. Conroy, NFPA Staff Liaison

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

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

Committee Scope: This Committee shall have primary responsibility for documents on the fire protection criteria for the design and construction of elevated and ground level heliports, helistops, and helipads; fire protection requirements for heliports, helistops, and helipads; and requirements for rescue and fire-fighting operations at heliports, helistops, and helipads.

Contents

NFPA 418

Standard for

Heliports

2001 Edition

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

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraph(s) has been deleted, the deletion is indicated by a bullet between the paragraphs that remain.

Information on referenced publications can be found in Chapter 8 and Appendix B.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard specifies the minimum requirements for fire protection for heliports and rooftop hangars. This standard does not apply to ground level helicopter hangars. All hangars not covered by this standard shall comply with NFPA 409, *Standard on Aircraft Hangars*.

1.1.2 Temporary landing sites and emergency evacuation facilities are outside the scope of this standard.

1.2* Purpose. The purpose of this standard is to establish minimum fire safety requirements for operation at heliports for the protection of persons, aircraft, and other property.

1.3 Definitions.

1.3.1* Approved. Acceptable to the authority having jurisdiction.

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

1.3.3* Critical Area. The area calculated to be one-half the overall length of the helicopter multiplied by three times the width of the widest portion of the fuselage.

1.3.4 Emergency Evacuation Facility. A designated and clear area at rooftop or ground level intended exclusively for emergency/rescue operations by helicopters.

1.3.5* Foam Fire-Extinguishing System. A low-expansion foam fire-extinguishing system designed and installed in accordance with NFPA 11, *Standard for Low-Expansion Foam*.

1.3.6 Helicopter Storage and Servicing Area. That part of a rooftop hangar normally used for the storage and servicing of one or more helicopters, not including any adjacent or contiguous areas or structures, such as shops, storage areas, and offices.

1.3.7 Helipad Support Structure. A structure used for helipad and/or helicopter maintenance or storage that is not classified as a rooftop hangar.

1.3.8* Heliport. An identifiable area located on land, on water, or on a structure, that also includes any existing buildings or facilities thereon, used or intended to be used for landing and takeoff of helicopters.

1.3.8.1 Offshore Landing Heliport. A heliport located on fixed or mobile structures and vessels in a marine environment that do not have means of entry and egress connected directly to shore.

1.3.9* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.3.10 Overall Length. The length of the helicopter from the main rotor fully extended to the tail rotor fully extended.

1.3.11* Practical Critical Fire Area. The area, for foam discharge purposes, calculated as one-half the fuselage length multiplied by three times the fuselage width.

1.3.12 Rooftop Hangar. A structure on top of a building where helicopters are housed, stored, or maintained.

1.3.13 Rooftop Landing Pad. The entire load-bearing surface intended for the touchdown and lift off (TLOF) of helicopters.

1.3.14 Shall. Indicates a mandatory requirement.

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

1.3.16 Temporary Landing Site. A site intended to be used for a period of less than 30 consecutive days, and for no more than 10 operations per day.

Chapter 2 General Requirements — Land-Based Facilities

2.1* Plans. Plans for construction and protection of heliports shall be approved by the authority having jurisdiction.

2.2 Tank Locations.

2.2.1 Storage, handling, and use of flammable and combustible liquids shall be in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

2.2.2 Oxygen and other medical gases shall be stored and used in accordance with 4.3.1.1.2(a)(5) and 9.3.1.11.2(b) to 9.3.1.11.2(c) of NFPA 99, *Standard for Health Care Facilities*.

2.2.3 Aboveground flammable liquid storage tanks, compressed gas storage tanks, and liquefied gas storage tanks shall be laterally located at least 50 ft (15.2 m) from the edge of the final approach and takeoff (FATO) area as defined in FAA A/C 150/5390-2A, *Heliport Design Advisory Circular*.

2.3 Fire-Fighting Access.

2.3.1 The heliport shall have at least one access point for fire-fighting/rescue personnel. Where practical, a second access point shall be available and located as remotely as possible from the other.

2.3.2 Fences shall not prevent rapid access by fire-fighting/rescue personnel.

2.4 Landing Pad Pitch. The heliport shall be pitched or sloped so that drainage flows away from access points and passenger holding areas.

2.5 No Smoking. No smoking shall be permitted within 50 ft (15.2 m) of the landing pad edge. No smoking signs shall be erected at access/egress points to the heliport.

2.6 Fueling System. Fueling systems shall be designed in accordance with NFPA 407, *Standard for Aircraft Fuel Servicing.*

2.6.1 Fixed fueling dispensing equipment shall be located outside of rooftop hangars. Fueling equipment shall not hinder or obstruct access to exits or fire-fighting equipment.

2.6.2 Fuel pump manifolds shall be located 25 ft (7.6 m) from rooftop hangars and fixed fire protection equipment.

Chapter 3 Rooftop Landing Facilities — Additional Protection

3.1 Structural Support. Main structural support members that could be exposed to a fuel spill shall be made fire resistant using listed materials and methods to provide a fire-resistance rating of not less than 2 hours.

3.2 Landing Pad Pitch. The rooftop landing pad shall be pitched to provide drainage at a slope of 0.5 percent to 2 percent. The pitch of the pad shall be designed to protect, at a minimum, the primary egress path, passenger holding area, rooftop hangar, and fire protection activation systems.

Flow shall not penetrate alternate egress points, stairways, ramps, hatches, and other openings not designed for drainage.

3.3 Landing Pad Construction Materials. The rooftop landing pad surface shall be constructed of noncombustible, nonporous materials that are approved. The contiguous building roof covering within 50 ft (15.2 m) of the landing pad edge shall have a Class A rating.

3.4* Means of Egress. At least two approved means of egress from the rooftop landing pad edge shall be provided and shall be remotely located from each other to the extent practical.

3.4.1 For heliports occupied by 50 or more people, two approved means of egress from the roof shall be provided and shall be remotely located from each other to the extent practical, but shall not be located less than 30 ft (9.1 m) from each other. For heliports occupied by fewer than 50 people, one approved means of egress from the roof shall be provided.

3.4.2 Means of egress from the rooftop landing pad and roof shall not obstruct flight operations.

3.5 Fire-Fighting Access. The helicopter rooftop landing pad shall have at least two access points for fire-fighting purposes. Access for fire-fighting personnel through the landing pad egress shall be permitted.

3.6 Fire Protection. A foam fire-extinguishing system shall be designed and installed to protect the rooftop landing pad.

Exception No. 1: A foam fire-extinguishing system shall not be required for heliports located on parking garages, unoccupied buildings, or other similar unoccupied structures.

Exception No. 2: For H-1 heliports, two portable foam extinguishers, each having a rating of 20-A:160-B, shall be permitted to be used to satisfy this requirement.

3.6.1* The foam discharge rate shall be as shown in Table 3.6.1.

Table 3.6.1 Foam Discharge Rates

Foam	Discharge Rate	
	gpm/ft²	(L/min)/m²
AFFF	0.10	4.1
Fluoroprotein	0.16	6.5
Protein	0.20	8.1

3.6.2 The area of application of foam discharge for fixed discharge outlet systems shall be the entire rooftop landing pad. The duration shall be 5 minutes.

3.6.3* The area of application of foam discharge for hose line systems shall be the practical critical fire area for the category of the helicopter landing facility, as shown in Table 3.6.3. The duration shall be 2 minutes.

Table 3.6.3 Practical Critical Fire Areas

Category	Helicopter Overall Length[1]	Practical Critical Fire Area	
		ft²	m²
H-1	Up to but not including 50 ft (15.2 m)	375	34.8
H-2	From 50 ft (15.2 m) up to but not including 80 ft (24.4 m)	840	78.0
H-3	From 80 ft (24.4 m) up to but not including 120 ft (36.6 m)	1440	133.8

[1]Helicopter length, including the tail boom and the rotors.

3.6.4 The water supply for the foam system shall be from a reliable source, approved by the authority having jurisdiction.

3.6.4.1 Fire pumps, if used, shall be installed in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*

3.6.4.2 Standpipes and hose stations, if used, shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems.*

3.6.4.3 Where freezing is possible, adequate freeze protection shall be provided.

3.6.5 The foam components shall be installed in a readily accessible area of the heliport and shall not penetrate the approach takeoff surface, transitional surfaces, and safety area as defined in FAA A/C 150/5390-2A, *Heliport Design Advisory Circular.*

3.6.6 At facilities where there is more than one rooftop landing pad, the supply of foam available shall be sufficient to cover an incident on at least one of the pads.

3.6.7 Where fixed foam systems utilizing fixed deck nozzles or oscillating foam turrets, or both, are installed, system components shall be listed or approved.

3.7 Standpipes. If a building with a rooftop heliport is supplied with a standpipe system, a Class II standpipe shall be extended to the roof level on which the rooftop heliport is located. Such standpipe systems shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems.*

3.8 Fire Alarm. Where buildings are provided with a fire alarm system, a manual pull station shall be provided for each designated means of egress from the roof. (*See 3.4.1.*)

Chapter 4 Rooftop Hangars

4.1 Construction.

4.1.1 Building construction of the rooftop hangar shall be as a minimum Type II (111) construction in accordance with NFPA 220, *Standard on Types of Building Construction,* except the floor rating, which shall be a minimum 2-hour fire resistance.

4.1.2 Other helicopter support operations within the rooftop hangar, such as offices, medical supplies, gas storage, fire protection equipment, and so forth, shall be separated by walls and ceilings having a minimum fire resistance rating of 1 hour with openings protected by listed fire doors or shutters having a minimum fire resistance rating of 45 minutes.

4.1.3 Partitions and ceilings separating rooftop hangars from other building occupancies shall have a minimum fire resistance rating of 2 hours, and doors shall have a minimum fire resistance rating of $1^1/_2$ hours.

4.1.4 Means of egress shall be in accordance with NFPA *101®, Life Safety Code®.*

4.1.4.1 Egress doors for personnel that do not require the opening of doors accommodating aircraft shall be provided in each partitioned space.

4.1.4.2 Intervals between doors shall not exceed 150 ft (45 m) on all exterior walls or 100 ft (30 m) along interior walls.

4.1.4.3 Egress/access points to and from the roof shall be clearly marked.

4.2 Rooftop Hangar Floor Drainage.

4.2.1 Floor drainage systems shall be provided to restrict the spread of fuel in order to reduce the fire and explosion hazards from fuel spillage.

4.2.2 Drainage systems shall use metallic pipe, drained to a safe location. Such systems shall be designed with suitable traps or be provided with adequate ventilation to prevent vapor mixtures from forming within the underground drainage system.

4.2.3 Drainage systems in helicopter storage and servicing areas shall be designed and constructed so that they have sufficient capacity to prevent buildup of flammable liquids and water over the drain inlet when fire protection systems and hose streams are discharging at the design rate.

4.2.4 The pitch of the rooftop hangar floor shall be a minimum of one-half of one percent. The floor pitch provided shall be calculated taking into consideration the towing requirements, helicopter weight, maintenance, and so forth.

4.2.5 Curbs, ramps, or drains shall be provided at all openings from helicopter storage and servicing areas, or the slope of the floor shall be such as to prevent the flow of liquids through the openings.

4.2.6 Pits for service facilities, such as for compressed air and electrical outlets, shall drain into the floor drainage system.

4.2.7 Grates and drain covers shall be of sufficient strength to support the point loading of the heaviest type of helicopter or equipment that the rooftop hangar serves. Grates and covers shall be removable to facilitate cleaning and flushing.

4.3 Suspended or Elevated Heaters. In helicopter storage and servicing areas, listed electric, gas, or oil heaters shall be permitted and shall be installed at least 10 ft (3 m) away from the helicopter engines.

4.4 Lighting and Electrical Systems.

4.4.1 Artificial lighting shall be restricted to electrical lighting.

4.4.2 Installations of electrical equipment shall be in compliance with the provisions for aircraft hangars contained in Article 513 of NFPA 70, *National Electrical Code®.*

4.5 Lightning Protection. Where provided, lightning protection shall be installed in accordance with NFPA 780, *Standard for the Installation of Lightning Protection Systems.*

4.6 Protection of Helicopter Rooftop Hangars.

4.6.1 Helicopter storage and servicing areas shall be protected by an AFFF foam water sprinkler system designed, installed, and tested in accordance with NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.* Foam concentrate shall meet the requirements of UL 162, *Standard for Foam Equipment and Liquid Concentrates.*

4.6.2 All other areas of the rooftop hangar shall be protected by water sprinkler systems designed, installed, and tested in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

4.7 Portable Fire Extinguishers for Rooftop Hangars.

4.7.1 Portable fire extinguishers for rooftop hangars shall be provided in accordance with NFPA 10, *Standard for Portable Fire Extinguishers.*

4.7.2 In helicopter storage and service areas, the distribution of fire extinguishers shall be in accordance with the extra hazard classification of NFPA 10.

Chapter 5 Water Supply

5.1* Calculation of Water Supply for Foam Systems. Where foam systems are provided for the rooftop landing pad area and rooftop hangar, the water supply shall be calculated based on the demand for the largest system.

Chapter 6 Offshore Heliports

6.1* Plans. Plans for construction and protection of heliports located on fixed and mobile offshore installations shall be approved by the authority having jurisdiction.

6.2 Fire-Fighting Access. The heliport shall have at least one access point for fire-fighting/rescue personnel. Where practical, a second access point shall be available and shall be located as remotely as possible from the other.

6.3 Landing Pad Pitch. Heliports shall be designed to prevent the standing collection of liquids and to prevent liquids from spreading to or spilling on accommodation spaces or working spaces.

Chapter 7 Portable Fire Extinguishers

7.1 Quantity and Rating. At least one portable fire extinguisher as specified in Table 7.1 shall be provided for each takeoff and landing area, parking area, and fuel storage area.

Exception: This requirement shall not apply to unattended ground level heliports.

Table 7.1 Minimum Ratings of Portable Fire Extinguishers for Heliport Categories

Category	Helicopter Overall Length[1]	Minimum Rating
H-1	Up to but not including 50 ft (15.2 m)	4-A:80-B
H-2	From 50 ft (15.2 m) up to but not including 80 ft (24.4 m)	10-A:120-B
H-3	From 80 ft (24.4 m) up to but not including 120 ft (36.6 m)	30-A:240-B

[1]Helicopter length, including the tail boom and the rotors.

7.2 Servicing. Portable fire extinguishers shall comply with NFPA 10, *Standard for Portable Fire Extinguishers*, Chapters 1, 4, 5, and 6.

Chapter 8 Referenced Publications

8.1 The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix B.

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

NFPA 10, *Standard for Portable Fire Extinguishers*, 1998 edition.

NFPA 11, *Standard for Low-Expansion Foam*, 1998 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1999 edition.

NFPA 14, *Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems*, 2000 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 1999 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 1999 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2000 edition.

NFPA 70, *National Electrical Code®*, 1999 edition.

NFPA 99, *Standard for Health Care Facilities*, 1999 edition.

NFPA *101®*, *Life Safety Code®*, 2000 edition.

NFPA 220, *Standard on Types of Building Construction*, 1999 edition.

NFPA 407, *Standard for Aircraft Fuel Servicing*, 1996 edition.

NFPA 409, *Standard on Aircraft Hangars*, 1995 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 1997 edition.

8.1.2 Other Publication.

8.1.2.1 FAA Publication. Federal Aviation Administration, Department of Transportation, Distribution Unit, M-494.3, Washington, DC 20590.

FAA A/C 150/5390-2A, *Heliport Design Advisory Circular*, January 20, 1994.

8.1.2.2 UL Publication. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062.

UL 162, *Standard for Foam Equipment and Liquid Concentrates*, 1994.

Appendix A Explanatory Material

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

A.1.2 Heliport Emergency Planning and Training for Safety Personnel.

(a) If safety personnel are provided at a heliport, the heliport operator should provide initial and recurrent training aimed at providing the safety personnel with the knowledge and skills necessary to deal effectively with an emergency at a heliport.

(b) The training should deal with, at least, the following subjects:

(1) Operation of the heliport
(2) Safety procedures around helicopters during ground operations
(3) Communication systems at the heliport
(4) Heliport emergency plan; heliport emergency planning is the process of preparing a heliport to cope with an emergency that takes place at the heliport or in its vicinity. The following are examples of heliport emergencies: aircraft emergencies, such as crashes on or off the heliport; medical emergencies; dangerous goods occurrences; fires; and natural disasters.

The purpose of heliport emergency planning is to minimize the impact of an emergency by saving lives and maintaining aircraft operations.

The heliport emergency plan sets out the procedures for coordinating the response of heliport agencies or services (e.g., air traffic services unit, fire-fighting services, heliport administration, medical and ambulance services, aircraft operators, security services, and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military, and harbour patrol or Coast Guard) that could be of assistance in responding to the emergency.

a. A heliport emergency response plan should be established at a heliport.
b. The plan should identify agencies which, in the opinion of the heliport operator, could be of assistance in responding to an emergency at the heliport or in its vicinity.
c. The plan should specify the procedures to be followed for at least the following emergencies:
   1. Aircraft crash or other accident within the heliport perimeter
   2. Aircraft crash outside the heliport perimeter
   3. Trauma injury to personnel
   4. Medical emergencies
d. Where an approach/departure path at a heliport is located over water, the plan should identify which agency is responsible for coordinating rescue in the event of an aircraft ditching and indicate how to contact that agency.
e. The plan should include, at a minimum, the following information:
   1. Types of emergencies planned for
   2. How to initiate the plan for each emergency specified
   3. Names of agencies on and off the heliport to contact for each type of emergency, with telephone numbers or other contact information
   4. The role of each agency responding to each type of emergency
   5. A list of pertinent and available on-heliport services with telephone numbers or other contact information
   6. Copies of any agreements with other agencies for mutual aid and the provision of emergency services
   7. A grid map of the heliport and its immediate vicinity
f. A heliport operator should consult all agencies identified in the plan about their role in the plan.
g. The plan should be reviewed and the information in it updated yearly by the heliport operator.
h. A test of the emergency response plan should be carried out at least once every 3 years at a heliport that provides a scheduled service for the transport of passengers.

(5) The use of any of the following equipment, if that equipment is provided at the heliport:
   a. Portable extinguishers
   b. Fire hoses, nozzles, and other similar appliances
   c. Extinguishing agents

(c) At a rooftop heliport, at least one person who has received the training referred to in this section should be available during aircraft operations.

A.1.3.1 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.1.3.2 Authority Having Jurisdiction. 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.

A.1.3.3 Critical Area. See A.3.6.1 for additional information.

A.1.3.5 Foam Fire-Extinguishing System. It can be a fixed discharge outlet system utilizing fixed storage and piping connected to fixed outlets or monitor nozzles and manually activated by pushing a button on a console or a pull station. It also can be a hose line system connected to fixed storage.

A.1.3.8 Heliport. The term *heliport* applies to all sites used or intended to be used for the landing and takeoff of helicopters.

A.1.3.9 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.1.3.11 Practical Critical Fire Area. See also A.3.6.1.

A.2.1 FAA A/C 150/5390-2A, *Heliport Design Advisory Circular*, contains design and construction information on heliports. This advisory circular provides for adequate clearance between operating aircraft and buildings or structures located at the heliport. The FAA advisory circular should be consulted to ensure that adequate safe practice and facilities are maintained.

A.3.4 For further information on exit principles, see NFPA *101®*, *Life Safety Code®*.

A.3.6.1 Where personnel trained in the operations of the equipment are in attendance, a hose line system is preferred.

The calculations used to develop the minimum extinguishing agent quantities and discharge rates presented in Table A.3.6.1(a) and Table A.3.6.1(b) for rooftop heliports include the following factors:

(a) *Aircraft Size.* This factor reflects the potential level of risk (e.g., passenger load), the potential fire load (e.g., fuel capacity), and the dimensions (i.e., fuselage length and width), that allow the identification of a meaningful operational objective [i.e., the area to be rendered fire-free (controlled or extinguished)].

(b) *Relative Effectiveness of Agent Selected.* This factor is represented by the specific application rate identified for each of the common generic foam concentrate types.

(c) *Time Required to Achieve Control.* Large-scale fire tests, empirical data, and field experience indicate that 1 minute is both a reasonable and a necessary operational objective.

(d) *Time Required to Maintain Controlled Area Fire-Free.* This factor is an operational objective that provides a safety factor for the initial fire attack while waiting for the arrival of backup support.

Table A.3.6.1(a) Method to Determine Helicopter Critical Fire Area and Required Minimum Amount of Water for a Hose Line (AFFF) System

NFPA/ICAO Heliport Category (ft)				½ × O.L. of Largest Helicopter[1] (ft)		Fuselage Width Tripled[2] (ft)		Practical Critical Fire Area (ft^2)		Application Rate (gpm/ft^2)		Q_1 Water to Control within 1 Min (gal)		Q_2 Reserve to Extinguish (%)		Q Total Water to Extinguish (gal)
H-1	0	<	50	25	×	15	=	375	×	0.10	=	37.5	+	100	=	75
H-2	50	<	80	40	×	21	=	840	×	0.10	=	84	+	100	=	168
H-3	80	<	120	60	×	24	=	1440	×	0.10	=	144	+	100	=	288

[1]O.L. = Overall length, measured from tip of main rotor fully extended to tip of tail rotor fully extended.
[2]Fuselage width = Actual fuselage width (does not include landing gear) measured from outside of cabin.

Table A.3.6.1(b) Method to Determine Helicopter Critical Fire Area and Required Minimum Amount of Water for a Hose Line (AFFF) System

NFPA/ICAO Heliport Category (m)				½ × O.L. of Largest Helicopter[1] (m)		Fuselage Width Tripled[2] (m)		Practical Critical Fire Area (m^2)		Application Rate [(L/min)/m^2]		Q_1 Water to Control within 1 Min (L)		Q_2 Reserve to Extinguish (%)		Q Total Water to Extinguish (L)
H-1	0	<	15.2	7.6	×	4.6	=	34.8	×	4.1	=	141.9	+	100	=	283.8
H-2	15.2	<	24.4	12.2	×	6.4	=	78.0	×	4.1	=	317.9	+	100	=	635.8
H-3	24.4	<	36.6	18.3	×	7.3	=	133.8	×	4.1	=	545.0	+	100	=	1090

[1]O.L. = Overall length, measured from tip of main rotor fully extended to tip of tail rotor fully extended.
[2]Fuselage width = Actual fuselage width (does not include landing gear) measured from outside of cabin.

The calculation method is supported by research and experimental work done mainly at the United States FAA Technical Center. It was developed by the Rescue and Fire-fighting Panel II (RFFP II), a group of international experts in the field, convened by the International Civil Aviation Organization, Montreal Canada, circa 1970.

The RFFP II initially focused on the concept of the theoretical critical fire area, which was identified in the FAA's large-scale fire tests as "... the area adjacent to the fuselage extending outward in all directions to a limit beyond which a large fuel fire would not melt an aluminum fuselage, regardless of the fire exposure time." For this concept to be useful, specific information about the size of the area was needed. Again, using the FAA Technical Center's work as a basis, the RFFP II defined the theoretical critical fire area (*TCA*) as "the area adjacent to an aircraft in which fire must be controlled."

The definition of *TCA* implies control of the fire within a specific area. In order to achieve this, dimensions need to be determined. The following formulas were developed from that earlier work. Using these formulas, the size of the area of interest can be calculated. For example,

If L is less than 65 ft,

$$TCA = L \times (40 \text{ ft} + W) \quad \text{(A.1)}$$

or

$$TCA = L \times (12 \text{ m} + W) \quad \text{(A.2)}$$

If L is greater than 65 ft,

$$TCA = L \times (100 \text{ ft} + W) \quad \text{(A.3)}$$

or

$$TCA = L \times (30 \text{ m} + W) \quad \text{(A.4)}$$

where:

L = average aircraft length
TCA = theoretical critical fire area
W = average width of aircraft served at the airport of interest

Conceptually, the *TCA* serves as a means for assessing the magnitude of the potential fire hazard of the aircraft accident environment. It *does not represent* the average, maximum, or minimum spill fire size associated with a particular aircraft. However, it does represent a starting point for determining realistic fire-extinguishing agent requirements. The formulas allow for the calculation of the *TCA* area for different sizes of aircraft. They are widely accepted throughout the aircraft fire service community and are applied as described in the following paragraphs.

A 1970 study concluded that in survivable aircraft crashes a practical fire area should be considered that was smaller than the theoretical area. Detailed criteria for the practical fire area and the related quantities of extinguishing agents were formulated during the second meeting of the RFFP II. In developing its material, the panel included a study of the quantities of agents used on actual fires. In 99 out of 106 such fires, the

quantities of agents used were less than those recommended by the theoretical critical fire area calculations.

As a result, RFFP II developed material recommending that the practical area be approximately two-thirds the theoretical area [*see Figure A.3.6.1(a)*]. This principle has been adopted by the ICAO, the NFPA, and the U.S. FAA in the development of tables that show extinguishing agent volumes for their respective standards and recommended practices. The practical critical fire area (*PCA*) for fixed-wing aircraft is commonly expressed as follows:

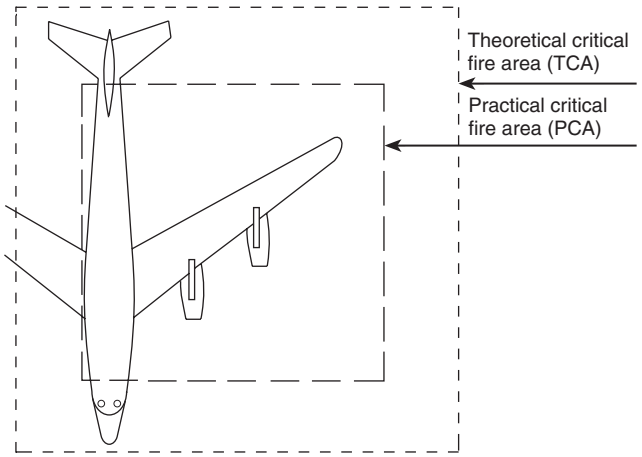
$$PCA = (0.67)\ (TCA) \tag{A.5}$$

where:

PCA = practical critical fire area

TCA = theoretical critical fire area

FIGURE A.3.6.1(a) Practical critical fire area relative to theoretical critical fire area.



In adapting the fixed-wing fire protection methodology to helicopters, the committee considered the following additional factors that make the fire protection problem of helicopters (rotary-wing aircraft) unique.

(a) *Occupied Space.* Relative to its fixed-wing counterpart, a smaller portion of the overall aircraft length is occupied.

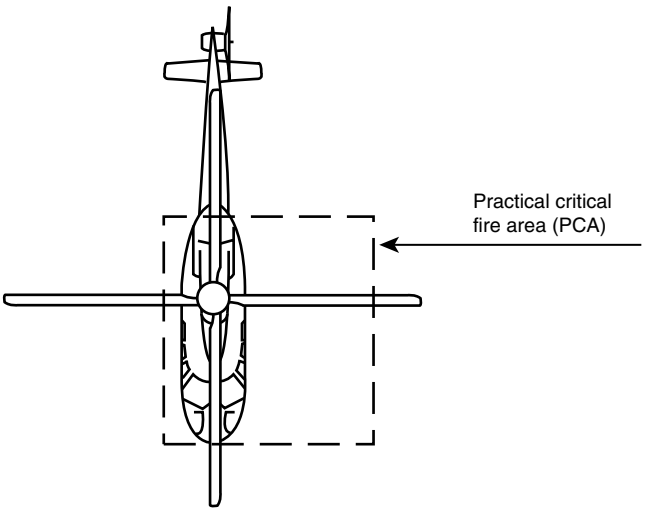
(b) *Fuel Quantities and Location.* Fuel tanks are not located in the "wings" or rotor blades, and relatively small quantities of fuel are involved.

(c) *Impact Energy.* Relative to the fixed-wing counterpart, a helicopter accident generally occurs at slow ground speeds.

(d) *Expected Aircraft Size.* In general, heliports are designed for the largest helicopter expected to utilize the facility, not the median size for the category. (*See Table 3.6.3.*)

After considering the factors involved in the fixed-wing methodology and those factors that are unique to helicopters, the committee arrived at a theoretical critical area for helicopters that includes a longitudinal dimension of one-half the overall length of the helicopter and a width equal to three times the fuselage width. In addition, in the absence of any data that suggested a more appropriate alternative, the practical critical fire area has been determined to be 100 percent of the theoretical critical area. [*See Figure A.3.6.1(b).*]

FIGURE A.3.6.1(b) Practical critical fire area for helicopters.



Another established principle is the distinction between control and extinguishment of a fire. Test data and a wide range of field experience indicate that the quantities of foam agent needed to control and extinguish an aircraft fire should be determined separately. This principle is expressed in the following calculation method, which will provide the minimum agent volume for effective fire service operations.

$$Q = Q_1 + Q_2 \tag{A.6}$$

where:

Q = minimum agent volume for effective fire service operations

Q_1 = volume of agent needed for 1-minute control of *PCA*

Q_2 = volume of agent needed for continued control or complete extinguishment of fire related to *PCA*, or both

The relationship between Q_1 and Q_2 as they were developed by the committee that studied the fixed-wing fire protection problem is as follows:

$$Q_1 = (\text{application rate}) \times (\text{practical critical area}) \tag{A.7}$$

or

$$Q_1 = (AR)(PCA) \tag{A.8}$$

Where the application rate (*AR*) is the unit volume of agent applied to a unit area of fire in a unit time (the exact units such as gpm/ft^2 or lpm/m^2 depend on the units convention being used).

$$Q_2 = f(Q_1) \tag{A.9}$$

And, it has been determined that, for all categories of heliports, $f = 1$.

Therefore:

$$Q = 2[(AR)(PCA)] \quad \text{(A.10)}$$

A sample calculation of the total water quantity, Q, needed where aqueous film-forming foam concentrate is to be used at each of the three categories of heliport is provided in Tables A.3.6.1(a) and (b). A similar set of water quantities can be calculated for any other foam concentrate for which an accepted application rate is known. The value for the AFFF application rate in column 5 of Tables A.3.6.1(a) and (b) is substituted and the indicated calculations are performed to obtain the value of Q for the specific foam concentrate to be used.

To fully appreciate the significance and simplicity of this methodology as a means of determining levels of fire protection, it should be clearly understood that Q_1 is only that minimum quantity of fire-fighting agent required for 1-minute fire control (90 percent extinguishment) of the anticipated practical critical fire area. Therefore, any fire and rescue service cannot be expected to perform an effective rescue effort where equipped with less than the quantity of primary extinguishing agent specified by the volume of Q_1 for the specific airport/heliport category. Furthermore, a fire suppression/rescue mission that is initiated using the required minimum application rate and is continued at that rate, while effectively extinguishing fire or securing unburned fuel within the practical area, ceases operations at the end of 1 minute. In other words, the agent specified by the volume Q_1 is depleted. There is no agent available for mop-up activities, foam blanket repair, or standby protection for continued rescue or salvage activities. Therefore, while the control volume Q_1 provides an operational significance that is critical to the rescue operation, it is, at the same time, limited.

It should be clear, therefore, that in order to extend an effective fire suppression and rescue operation beyond the initial 1-minute fire control period, an additional volume of foam agent, Q_2, needs to be available. This volume of agent is used to repair foam blanket damage that might be caused by evacuees and rescue workers walking through the foamed areas or by hot surfaces created by the initial fire. Furthermore, Q_2 is needed to extinguish all fire in the practical critical fire area and those fires outside the practical critical area that initially are determined to pose no threat to life. Agent quantity in accordance with Q_2 also provides standby protection before total extinguishment during interior aircraft search operations and for the removal of immobile survivors after fire control. It also is used for securing the fire area during initial aircraft salvage operations immediately after total fire extinguishment. Therefore, an aircraft fire service equipped with only the 1-minute fire control volume represented by Q_1 is expected to assume a significant level of risk. That risk cannot be considered a "calculated risk" unless the manager selecting the reduced agent volume knows the nature of the fire area and the potential hazard involved.

A.3.6.3 The area of application and the duration where using a hose line system is reduced because foam is applied efficiently and directly on the fire by trained personnel.

A.5.1 The water supply is not intended to be based on simultaneous operation of both systems.

A.6.1 The design of heliports located on fixed or mobile offshore installations generally is based on landing sites of steel construction. However, in no way should this be construed as a recommendation of steel over other suitable building material.

Appendix B Referenced Publications

B.1 The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not considered part of the requirements of this standard unless also listed in Chapter 8. The edition indicated here for each reference is the current edition as of the date of the NFPA issuance of this standard.

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

NFPA *101®*, *Life Safety Code®*, 2000 edition.

B.1.2 Other Publications.

B.1.2.1 FAA Publication. Federal Aviation Administration, Department of Transportation, Distribution Unit, M-494.3, Washington, DC 20590.

FAA A/C 150/5390-2A, *Heliport Design Advisory Circular*, January 20, 1994.

B.1.2.2 ICAO Publication. International Civil Aviation Organization, Montreal, Canada.

Rescue and Firefighting Panel II (RFFP II). Research and experimental work, circa 1970.

Index