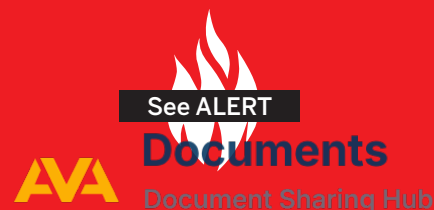


NFPA[®] 407

Standard for Aircraft Fuel Servicing

2017



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NFPA® 407

Standard for

Aircraft Fuel Servicing

2017 Edition

This edition of NFPA 407, *Standard for Aircraft Fuel Servicing*, was prepared by the Technical Committee on Aircraft Fuel Servicing. It was issued by the Standards Council on May 13, 2016, with an effective date of June 2, 2016, and supersedes all previous editions.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See “Codes & Standards” at www.nfpa.org for more information.

This edition of NFPA 407 was approved as an American National Standard on June 2, 2016.

Origin and Development of NFPA 407

Active work by NFPA leading toward the development of this standard began in 1951. Since then, the technical committee responsible has made every effort to keep the text up-to-date, and subsequent editions were published almost every year from 1955 to 1975. The 21st edition was issued in 1980, and the technical committee completed a partial revision in 1984.

The 1990 edition was a complete rewrite that reorganized the design and operational requirements into separate chapters. The requirements for grounding were deleted, and the requirements for bonding were clarified.

The 1996 edition was a partial revision. Requirements for self-service fueling and rapid refueling of helicopters were added.

The 2001 edition included new requirements for nondriven hydrant carts.

The 2007 edition was a partial revision.

The 2012 edition added new requirements for vehicles with diesel particulate filters.

The 2017 edition is a complete reorganization of the material, designed to make the document easier to use. The new format includes a general chapter that applies to all types of aircraft fueling facilities and four specific chapters that apply to aviation fueling facilities, airport fueling vehicles, rooftop heliports, and self-service aircraft fueling. Each of those four chapters is split into a design section and an operation section, and each uses consistent numbering to locate similar topics. This edition incorporates many technical revisions, aimed at clarifying existing requirements, addressing gaps, and updating old or obsolete material. Requirements for rapid refueling of fixed-wing aircraft also have been added.

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Committee Scope: This Committee shall have primary responsibility for documents on fire safe procedures, equipment, and installations for aircraft fuel servicing.

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NFPA 407

Standard for

Aircraft Fuel Servicing

2017 Edition

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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 Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex C. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration

1.1 Scope. This standard applies to the fuel servicing of all types of aircraft using liquid petroleum fuel.

1.1.1 This standard does not apply to any of the following:

- (1) In-flight fueling
- (2) Fuel servicing of flying boats or amphibious aircraft on water
- (3) Draining or filling of aircraft fuel tanks incidental to aircraft fuel system maintenance operations or manufacturing

1.1.2* This document is not intended to be used as the sole standard for design, construction, operation, and maintenance of fuel storage and transfer facilities, as it does not address requirements for environmental protection, fuel quality, or other issues not directly related to fire safety.

1.2* Purpose.

1.2.1 The purpose of this standard is to establish reasonable minimum fire safety requirements for procedures, equipment, and installations for the protection of persons, aircraft, and other property during ground fuel servicing of aircraft using liquid petroleum fuels. These requirements are based upon sound engineering principles, test data, and field experience.

1.2.2 The fire hazard properties of aviation fuels vary; however, for the purpose of this standard, the same fire safety precautions are specified for all types.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.3.1 Unless otherwise specified, the design and installation provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard.

1.3.2 Unless otherwise specified, operations and maintenance activities shall meet the current standard.

1.3.3 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.3.4 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, rating, and safety over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

1.5 Units. Where the value for a measurement as specified in this standard is followed by an equivalent value in other units, the first value shall be regarded as the requirement. The equivalent value could be approximate.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2017 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2015 edition.

NFPA 70®, *National Electrical Code®*, 2017 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids*, 2017 edition.

NFPA 410, *Standard on Aircraft Maintenance*, 2015 edition.

NFPA 415, *Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways*, 2016 edition.

NFPA 418, *Standard for Heliports*, 2016 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2017 edition.

2.3 Other Publications.

2.3.1 ASME Publications. ASME Technical Publishing Office, Two Park Avenue, New York NY 10016-5990.

ASME B31.3, *Process Piping*, 2014.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D380, *Standard Test Methods for Rubber Hose*, 1994, reapproved 2012.

2.3.3 AWS Publications. American Welding Society, 8669 NW 36 Street, # 130, Miami, FL 33166-6672.

AWS A5.10, *Welding Consumables — Wire Electrodes, Wires, and Rods for Welding of Aluminum and Aluminum Alloys — Classification*, 2012.

2.3.4 EI Publications. Energy Institute, 61 New Cavendish Street, London W1G 7AR, United Kingdom.

EI 1529, *Aviation Fueling Hose and Hose Assemblies*, 7th edition, 2014.

EI 1540, *Design, Construction, Commissioning, Maintenance and Testing of Aviation Fuelling Facilities*, 5th Edition, 2014.

EI 1542, *Identification Markings for Dedicated Aviation Fuel Manufacturing and Distribution Facilities, Airport Storage, and Mobile Fueling Equipment*, 2012.

2.3.5 FAA Publications. Federal Aviation Administration, U.S. Department of Transportation, Distribution Unit, M-494.3, Washington, DC 20590.

FAA AC-150/5300, *Airport Design*, Rev. 13A, 2012.

2.3.6 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

ANSI/UL 913, *Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III Division 1, Hazardous (Classified) Locations*, 8th edition, 2013.

2.3.7 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20402.

Title 49, Code of Federal Regulations, Part 172.504, “General Placarding Requirements.”

Title 49, Code of Federal Regulations, Part 178.345, “General Design and Construction Requirements Applicable to Specification DOT 406.”

2.3.8 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, 2015 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids*, 2017 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* 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.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Aircraft. A vehicle designed for flight that is powered by liquid petroleum fuel.

3.3.2 Aircraft Fuel Servicing. See 3.3.28.1.

3.3.3 Aircraft Fuel Servicing Hydrant Vehicle (Hydrant Vehicle). See 3.3.36.1.

3.3.4 Aircraft Fuel Servicing Ramp or Apron. An area or position at an airport used for the fuel servicing of aircraft.

3.3.5 Aircraft Fuel Servicing Tank Vehicle (Fueller). See 3.3.36.2.

3.3.6 Aircraft Fueling Vehicle. See 3.3.36.3.

3.3.7 Airport Fueling System. An arrangement of aviation fuel storage tanks, pumps, piping, and associated equipment, such as filters, water separators, hydrants and station, or aircraft fuel servicing vehicles, installed at an airport and designed to service aircraft at fixed positions.

3.3.8* Aviation Fuel. Any petroleum fuel for use in aircraft engines.

3.3.9 Bulkhead. A liquidtight transverse closure between compartments of a cargo tank.

3.3.10 Burst Pressure. See 3.3.25.1.

3.3.11* Cargo Tank. A container used for carrying fuels and mounted permanently or otherwise secured on a tank vehicle.

3.3.12 Cathodic Protection. A method of controlling or impressing an electrical current to prevent corrosion of metal components of airport fueling systems that are in contact with the ground.

3.3.13 Deadman Control. A device that requires a positive continuing action of a person to allow the flow of fuel.

3.3.14 Electric Hand Lamp. A portable lamp other than a flashlight.

3.3.15 Emergency Fuel Shutoff. A function performed to stop the flow of fuel in an emergency.

3.3.16* Fuel Servicing Station. A unit that includes all necessary equipment to enable the transfer of fuel into or from an aircraft or fueller.

3.3.17 Fueller. See 3.3.36.2.

3.3.18 Fueling Point. The location on an aircraft where fuel enters the aircraft from an external source.

3.3.19 Head. A liquidtight transverse closure at the end of a cargo tank.

3.3.20 Hydrant Cart. A non-driven vehicle used to deliver fuel from a hydrant to an aircraft.

3.3.21 Hydrant Valve. An outlet of an airport fueling system that includes a deadman-controlled valve and adapter assembly to which a coupler on a hose or other flexible conduit on an aircraft fuel servicing vehicle can be connected.

3.3.22 Hydrant Vehicle. See 3.3.36.4.

3.3.23 Misfueling. The accidental fueling of an aircraft or refueling vehicle tank with an incorrect grade of product.

3.3.24 Overshoot. The fuel that passes through a valve after the deadman control is released or another flow control device is activated.

3.3.25 Pressure.

3.3.25.1 Burst Pressure. The pressure at which a component fails due to stresses induced as a result of the pressure.

3.3.25.2 Test Pressure. The pressure to which a system or a component of a system is subjected to verify the integrity of the system or component.

3.3.25.3 Working Pressure. The maximum allowable pressure, including momentary surge pressure, to which a system, hose, or other component can be safely subjected while in service.

3.3.26 Pressure Fuel Servicing. See 3.3.28.3.

3.3.27 Self-Service Fueling. The dispensing of aviation fuels into aircraft fuel tanks by persons other than the facility owner/operator.

3.3.28 Servicing.

3.3.28.1 Aircraft Fuel Servicing. The transfer of fuel into or from an aircraft.

3.3.28.2 Overwing Fuel Servicing. A system used to fuel an aircraft through an opening in the aircraft fuel tank using a hose with a hand-held nozzle.

3.3.28.3 Pressure Fuel Servicing. A system used to fuel an aircraft by closed coupled connection under pressure.

3.3.29 Tank Baffle. A nonliquidtight transverse partition in a cargo tank.

3.3.30 Tank Compartment. A liquidtight division in a cargo tank.

3.3.31 Tank Full Trailer. A vehicle that is not self-propelled and that has a cargo tank for the transportation of aviation fuel mounted thereon or built as an integral part thereof. It is so constructed that its weight and load rest on its own wheels.

3.3.32 Tank Semitrailer. A vehicle that is not self-propelled and that has a cargo tank for the transportation of aviation fuel mounted thereon or built as an integral part thereof. It is so constructed that when drawn by a tractor by means of a fifth wheel connection, some of its load and weight rests upon the towing vehicle.

3.3.33 Tank Truck. Any single self-propelled motor vehicle equipped with a cargo tank mounted thereon and used for the transportation of flammable and combustible liquids or asphalt. [385, 2017]

3.3.34 Tank Vehicle. See 3.3.36.5.

3.3.35 Test Pressure. See 3.3.25.2.

3.3.36 Vehicle.

3.3.36.1 Aircraft Fuel Servicing Hydrant Vehicle (Hydrant Vehicle). A vehicle equipped with facilities to transfer fuel between a fuel hydrant and an aircraft.

3.3.36.2 Aircraft Fuel Servicing Tank Vehicle (Fueller). A vehicle having a cargo tank (tank truck, tank full trailer, tank semitrailer) designed for or used in the transportation and transfer of fuel into or from an aircraft.

3.3.36.3 Aircraft Fueling Vehicle. A fuel servicing hydrant vehicle, hydrant cart, or an aircraft fuel servicing tank vehicle.

3.3.36.4 Hydrant Vehicle. See 3.3.36.1.

3.3.36.5 Tank Vehicle. Any tank truck, tank full trailer, or tractor and tank semitrailer combination.

3.3.37 Vent Point. The location on the exterior of an aircraft where fuel vapors are released from the aircraft's fuel system.

3.3.38 Working Pressure. See 3.3.25.3.

Chapter 4 General Requirements

4.1 Design and Construction.

4.1.1 General Requirements.

4.1.1.1 The requirements of Chapter 4 shall apply to all aviation fueling facilities, aircraft fueling vehicles, rooftop heliport fueling facilities, and self-service aviation fueling facilities.

4.1.1.2 Aviation fueling facilities shall also comply with the requirements of Chapter 5.

4.1.1.3 Aircraft fueling vehicles and carts shall also comply with the requirements of Chapter 6.

4.1.1.4 Rooftop heliport fueling facilities shall also comply with the requirements of Chapter 5 and Chapter 7.

4.1.1.5 Self-service aviation fueling facilities shall also comply with the requirements of Chapter 5 and Chapter 8.

4.1.2 Fuel Storage Tanks. (Reserved)

4.1.3 Fuel Dispensing Systems.

4.1.3.1 Any valve that controls the flow of fuel into or from an aircraft fuel servicing vehicle or cart, or into or from an aircraft shall have a deadman control(s).

4.1.3.2 The deadman flow control in the nozzle shall be permitted for overwing fueling.

4.1.3.3 Notches or latches in the handle of an overwing nozzle that could allow the valve to be locked open shall be prohibited.

4.1.3.4 Nozzles for underwing fueling shall be designed to be attached securely to the aircraft adapter before the nozzle can be opened.

4.1.3.5 Disengaging the nozzle from the aircraft adapter shall not be possible until the nozzle is fully closed.

4.1.3.6 Fuel servicing pump mechanisms shall be designed and arranged so that failure or seizure does not cause rupture of the pump housing, of a tank, or of any component containing fuel.

4.1.3.7 Fuel pressure shall be controlled within the stress limits of the hose and plumbing by means of either an in-line pressure controller or, a system pressure relief valve, or other suitable means.

4.1.3.8 The working pressure of any system component shall equal or exceed any pressure to which it could be subjected.

4.1.4* Fueling Hose.

4.1.4.1 Performance Requirements. Hose and couplings shall comply with the requirements of EI 1529.

4.1.4.2 Fueling Hose Apparatus. Nozzle receptacles and hose storage shall be arranged to avoid kinks and maintain the hose bend radius within the requirements of EI 1529 and EI 1540.

4.1.4.3 Additional Requirements.

4.1.4.3.1 Each coupled length of hose shall be tested at the same minimum proof pressure rating for that grade of hose as defined in EI 1529.

4.1.4.3.2 A test certificate shall be provided for each coupled length of hose and shall state the following:

- (1) Manufacturer's name of hose
- (2) Manufacturer's name of couplings
- (3) Hose type
- (4) Hose grade
- (5) Size and length of hose
- (6) Serial number or reference number of hose
- (7) Quarter and year of manufacture of hose
- (8) Model number of couplings
- (9) Sizes of coupling ferrules
- (10) Hydrostatic test pressures
- (11) Coupled length serial number
- (12) Identification of individual responsible for coupling the hose
- (13) Name and address of company responsible for coupling the hose
- (14) Date of certification

4.1.4.3.3 The coupling tests as specified in EI 1529 shall be performed for each hose grade, type, and manufacturer.

4.1.4.3.4 Each coupling of a coupled length of hose shall be permanently marked with a serial number corresponding to its hydrostatic test certificate.

4.1.4.3.5 The hose at the end of each coupling ferrule shall be permanently marked prior to hydrostatic testing to serve as a reference to determine whether a coupling has slipped during testing or while in service.

4.1.4.3.6* Lengths of hose shall not be spliced together.

4.1.4.3.7 Hydrostatic Testing. Hydrostatic testing shall be in accordance with ASTM D380.

4.1.4.3.7.1 Following a hydrostatic test, all the water shall be drained and the hose shall be dried internally.

4.1.4.3.7.2 Following a hydrostatic test, the open ends of the hose, including the threads of the couplings, shall be suitably covered to protect the threads and to prevent contamination.

4.1.4.3.7.3 A hose that is recoupled for any reason shall be hydrostatically tested and recertified to the same criteria as a newly coupled hose.

4.1.4.3.8 Hose shall be connected to rigid piping or coupled to a hose reel in a manner that prevents kinks or undue bending action or mechanical stress on the hose or hose couplings.

4.1.5 Electrostatic Hazards and Bonding.

4.1.5.1 A provision for bonding shall be incorporated in the design of fuel servicing vehicles or carts and airport fueling systems to prevent differences in electrostatic potential.

4.1.5.2 The maximum resistance between the bonding cable clip and the fueling system framework shall not exceed 25 ohms.

4.1.5.3 Bonding cables shall be constructed of conductive, durable, and flexible material.

4.1.5.4 Bonding connections shall be electrically and mechanically firm.

4.1.5.5 Jacks, plugs, clamps, and connecting points shall be clean, unpainted metal to provide a positive electrical connection.

4.1.5.6 EI 1529 Type C hose (semiconductive) shall be used to prevent electrostatic discharges but shall not be used to accomplish required bonding.

4.1.5.7 EI 1529 Type A hose that does not have a semiconductive cover shall not be used.

4.1.5.8 EI 1529 Type F hose (hard wall) and EI 1529 Type CT hose (cold temperature) shall be permitted because they have semiconductive covers.

4.1.5.9* The design of airport fueling systems shall incorporate the provision of a 30-second relaxation period following the filter separator, monitors, or other filtration devices discharging into tanks.

4.1.5.9.1 The relaxation period required by 4.1.5.9 shall not apply to the actual refueling of an aircraft.

4.1.5.9.2 The relaxation period required by 4.1.5.9 shall not apply to fuels with static dissipater additives.

4.1.6 Electrical Systems. (Reserved)

4.1.7 Control of Fuel Flow. (Reserved)

4.1.8 Filters and Ancillary Equipment.

4.1.8.1 Filter vessels used in aviation fuel service shall have a functional automatic air vent (AAV) or automatic air eliminator (AAE).

4.1.8.2 The AAV or AAE shall discharge to a closed system.

4.1.9 Emergency Fuel Shutoff Systems. (Reserved)

4.1.10 Fire Extinguishers.

4.1.10.1* During fueling operations, fire extinguishers shall be available on aircraft servicing ramps or aprons, in accordance with NFPA 410.

4.1.10.2 All fire extinguishers shall conform to the requirements of NFPA 10.

4.1.10.3* ABC multipurpose dry chemical fire extinguishers (ammonium phosphate) shall not be placed on aircraft fueling vehicles, airport fuel servicing ramps or aprons, or at airport fuel facilities that are located within 150 m (500 ft) of aircraft operating areas.

4.1.11 Marking and Labeling.

4.1.11.1 Each emergency fuel shutoff station location shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high.

4.1.11.2 The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate.

4.1.11.3 Any action necessary to gain access to the shutoff device (e.g., BREAK GLASS) shall be shown clearly.

4.1.11.4 Lettering shall be of a color contrasting sharply with the placard background for visibility.

4.1.11.5 Placards shall be weather resistant.

4.1.12 Aircraft Fueling Ramps.

4.1.12.1 Aircraft Radar Equipment.

4.1.12.1.1 Surveillance radar equipment in aircraft shall not be operated within 90 m (300 ft) of any fueling, servicing, or other operation in which flammable liquids, vapors, or mist could be present.

4.1.12.1.2 Weather-mapping radar equipment in aircraft shall not be operated while the aircraft in which it is mounted is undergoing fuel servicing.

4.1.12.2* Ground Radar Equipment.

4.1.12.2.1 Antennas of airport flight traffic surveillance radar equipment shall be located so that the beam will not be directed toward any fuel storage or loading racks within 90 m (300 ft).

4.1.12.2.2 Aircraft fuel servicing shall not be conducted within the 90 m (300 ft) distance established by 4.1.12.2.1.

4.1.12.2.3 Antennas of airport ground traffic surveillance radar equipment shall be located so that the beam will not be directed toward any fuel storage or loading racks within 30 m (100 ft).

4.1.12.2.4 Aircraft fuel servicing or any other operations involving flammable liquids or vapors shall not be conducted within 30 m (100 ft) of antennas of airport ground traffic surveillance radar equipment.

4.1.12.3 Emergency Fire Equipment Accessibility. Accessibility to aircraft by emergency fire equipment shall be considered in establishing aircraft fuel servicing positions.

4.1.12.4 Ramp and Apron Drainage. Aircraft servicing ramps or aprons shall be sloped and drained in accordance with NFPA 415.

4.1.12.4.1 The ramp or apron shall slope away from the rim or edge of fueling hydrants or fueling pits to prevent flooding.

4.1.12.4.2 Fueling hydrant boxes or fueling pits that are connected to a ramp drainage system shall be fitted with vapor-sealing traps.

4.2 Operations.

4.2.1 Security. (Reserved)

4.2.2 Training.

4.2.2.1* Only personnel trained in the safe operation of the equipment and the fuels they use, the operation of emergency controls, and the procedures to be followed in an emergency shall be permitted to handle fuel.

4.2.2.2* Fuel servicing personnel shall be trained in the use of the available fire-extinguishing equipment they could be expected to use.

4.2.3* Prevention and Control of Spills.

4.2.3.1 Following fueling of an aircraft or fuel servicing vehicle, all hoses shall be removed, including those from hydrant systems if applicable.

4.2.3.2 All hoses shall also be properly stowed.

4.2.3.3 Fuel nozzles shall not be dragged along the ground.

4.2.3.4 Approved pumps, either hand operated or power operated, shall be used where aircraft are fueled from drums.

4.2.3.4.1 Pouring or gravity flow shall not be permitted from a container with a capacity of more than 19 L (5 gal).

4.2.3.5 Fuel Spill Procedures.

4.2.3.5.1 Where a spill is observed, the fuel servicing shall be stopped immediately by release of the deadman controls.

4.2.3.5.2 In the event that a spill continues, the equipment emergency fuel shutoff shall be actuated.

4.2.3.5.3 In the event that a spill continues from a hydrant system, the system emergency fuel shutoff shall be actuated.

4.2.3.5.4 The supervisor shall be notified immediately.

4.2.3.5.5 Cleaning operations shall be performed by personnel trained in accordance with 4.2.2.1.

4.2.3.5.6 Operation shall not be resumed until the spill has been cleared and conditions are determined to be safe.

4.2.3.5.7 The airport fire crew, if established, or the local fire department serving the airport shall be notified if a spill covers over 3 m (10 ft) in any direction or is over 5 m² (50 ft²) in area, continues to flow, or is otherwise a hazard to persons or property.

4.2.3.5.8 The spill shall be investigated to determine the cause, to determine whether emergency procedures were properly carried out, and to determine the necessary corrective measures.

4.2.3.5.9 Corrective measures identified by the spill investigation shall be implemented as required by the authority having jurisdiction.

4.2.3.6 Transferring fuel by pumping from one tank vehicle to another tank vehicle within 61 m (200 ft) of an aircraft shall not be permitted.

4.2.3.7 Not more than one tank vehicle shall be permitted to be connected to the same aircraft fueling manifold, unless means are provided to prevent fuel from flowing back into a tank vehicle due to a difference in pumping pressure.

4.2.4 Emergency Fuel Shutoff.

4.2.4.1 Emergency fuel shutoff control stations shall be accessible at all times.

4.2.4.2 A procedure shall be established to notify the fire department serving the airport in the event of a control station activation.

4.2.4.3 If the fuel flow stops for an unknown reason, the emergency fuel shutoff system shall be checked first.

4.2.4.4 The cause of the shutoff shall be identified and corrected before fuel flow is resumed.

4.2.4.5 Emergency fuel shutoff systems shall be operationally checked at intervals not exceeding 6 months.

4.2.4.6 Each individual device shall be checked at least once during every 12-month period.

4.2.4.7 Suitable records shall be kept of tests required by this section.

4.2.5* Bonding.

4.2.5.1 Prior to making any fueling connection to an aircraft or fuel servicing vehicle, the fueling equipment shall be bonded to the aircraft or fuel servicing vehicle by use of a cable, thus providing a conductive path to equalize the potential between the fueling equipment and the aircraft.

4.2.5.1.1 The electrical bond shall be maintained until fueling connections have been removed, thus allowing separated charges that could be generated during the fueling operation to reunite.

4.2.5.1.2 Grounding for the sole purpose of aircraft fueling shall not be permitted.

4.2.5.2 Bonding for Overwing Fueling. In addition to the requirements in 4.2.5.1, where fueling overwing, the nozzle shall be bonded to a metallic component of the aircraft that is metallically connected to the tank filler port.

4.2.5.2.1 The bond connection shall be made before the filler cap is removed.

4.2.5.2.2 If a nozzle bond cable and plug receptacle or means for attaching a clip is available, the operator shall attach the nozzle bond cable before removing the cap in order to equalize the potential between the nozzle and the filler port.

4.2.5.2.3 If no plug receptacle or means for attaching a clip is available, the operator shall touch the filler cap with the nozzle spout before removing the cap in order to equalize the potential between the nozzle and the filler port.

4.2.5.2.4 The nozzle spout shall be kept in contact with the filler neck until the fueling is completed.

4.2.5.3 Where a funnel is used in aircraft fueling, it shall be kept in contact with the filler neck as well as the fueling nozzle spout or the supply container to avoid the possibility of a spark at the fill opening.

4.2.5.3.1* Only metal funnels shall be used.

4.2.5.4 Where a hydrant servicer or cart is used for fueling, the hydrant coupler shall be connected to the hydrant system prior to bonding the fuel equipment to the aircraft.

4.2.5.5 Bonding and fueling connections shall be disconnected in the reverse order of connection.

4.2.5.6 Conductive hose shall be used to prevent electrostatic discharge but shall not be used to accomplish required bonding.

4.2.6 Control of Fuel Flow.

4.2.6.1 Fuel flow shall be controlled by use of a deadman control device.

4.2.6.2 The use of any means that defeats the deadman control shall be prohibited.