National Fire Protection Association

1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • www.nfpa.org

M E M O R A N D U M

To: **NFPA Technical Committee on Aircraft Fuel Servicing**

From: **Colleen Kelly, Administrator – Technical Projects**

Date: **January 29, 2015**

Subject: **NFPA 407 First Draft TC FINAL Ballot Results (A2016)**

According to the final ballot results, all ballot items received the necessary affirmative votes to pass ballot.

27 **Members Eligible to Vote**
5 **Not Returned** (Bagnall, Bourdeau, Pattie, Stipkovits, Weaver)
17 **Affirmative on All Revisions**
4 **Affirmative with Comment on one or more Revisions** (Bosserman, Cnota, Gammon, Nuzzolese)
3 **Negative on one or more Revisions** (Bosserman, Gammon, Moody)
0 **Abstentions on one or more Revisions:**

The attached report shows the number of affirmative, negative, and abstaining votes as well as the explanation of the vote for **each** first revision**.**

There are two criteria necessary for **each** first revision to pass ballot: (1) simple majority and (2) affirmative $^{2}/_{3}$ vote. The **mock examples** below show how the calculations are determined.

(1) Example for Simple Majority: Assuming there are 20 vote eligible committee members, 11 affirmative votes are required to pass ballot. (Sample calculation: 20 members eligible to vote ÷ 2 = 10 + 1 = 11)

(2) Example for Affirmative $^{2}/_{3}$: Assuming there are 20 vote eligible committee members and 1 member did not return their ballot and 2 members abstained, the number of affirmative votes required would be 12. (Sample calculation: 20 members eligble to vote – 1 not returned – 2 abstentions = 17 x 0.66 = 11.22 = 12)

As always please feel free to contact me if you have any questions.

First Revision No. 16-NFPA 407-2014 [Section No. 1.1]

1.1 Scope.

This standard applies to the fuel servicing of all types of aircraft using liquid petroleum fuel. ~~It does not apply to any of the following:~~

~~In-flight fueling~~

~~Fuel servicing of flying boats or amphibious aircraft on water~~

~~Draining or filling of aircraft fuel tanks incidental to aircraft fuel system maintenance operations or manufacturing~~

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.

Supplemental Information

File Name	Description
A.1.1.2_FR-16.docx	

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 07 10:13:40 EDT 2014

Committee Statement

Committee Statement: This statement was added to acknowledge that there are other standards that may apply to aircraft fueling facilities.
Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
20 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
A.1.1.2 Change: Additional guidance can be obtained from other latest published documents, including, but not limited to: A4A Spec 103, SAE ARP5818,.....

Negative with Comment
Bosserman, Terry L.
the committee needs to study this document before entering it as a reference

First Revision No. 17-NFPA 407-2014 [New Section after 1.3]

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, 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.

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 07 10:22:11 EDT 2014

Committee Statement

Committee Statement: Retroactivity and equivalency clauses were added to allow the AHJ flexibility in enforcing the document.
Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters

5 Not Returned
20 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
1.3 Change: Applicability Add: These requirements apply as of the published date of this publication. However, if there was conformance before the effective date of these regulations to the prior publication and approval was granted, at the discretion of the authority having jurisdiction, approval may be granted to conform to the requirements of the prior publication in effect at the time the approval was granted. 1.3.4 Change: For existing equipment, where it would be impractical for updating the equipment to meet these latest standards and the equipment met the previous standard, a request may be made to the authority having jurisdiction providing all factors to be considered, and at the sole discretion of the authority having jurisdiction, allowance may be granted provided that the request clearly demonstrates that it would be impractical to perform any updates and that only it is clearly evident that a reasonable degree of safety is provided.

Negative with Comment
Bosserman, Terry L.
If we change the document to fit the latest requirements of the industry why would we let older units not confirm to the latest and possibly cause a fire?

First Revision No. 2-NFPA 407-2014 [Chapter 2]

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,* ~~2010~~ 2013 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* ~~2012~~ 2015 edition.

NFPA 70®, National Electrical Code®, ~~2011~~ 2017 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids,* ~~2007~~ 2012 edition.

NFPA 410, *Standard on Aircraft Maintenance,* ~~2010~~ 2015 edition.

NFPA 415, *Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways,* ~~2008~~ 2016 edition.

NFPA 418, *Standard for Heliports,* ~~2011~~ 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~~ American Society of Mechanical Engineers , ~~3~~ Two Park Avenue, New York NY 10016-5990.

ANSI/ASME B31.3, *Process Piping*, ~~2008~~ 2012 .

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, ~~Revised 2006~~ reapproved 2012 .

2.3.3 AWS Publications.

American Welding Society, ~~550 N.W. LeJeune Road, Miami~~ 8669 Doral Blvd, Suite 130, Doral , FL 33126.

AWS A5.10, ~~*Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods*~~ *Welding Consumables — Wire Electrodes, Wires, and Rods for Welding of Aluminum and Aluminum Alloys — Classification* , ~~1999, Revised 2007~~ 2012 .

2.3.4 EI Publications.

Energy Institute, 61 New Cavendish Street, London W1G 7AR, UK.

EI 1529, *Aviation Fueling Hose and Hose Assemblies* , 6th edition, 2005.

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** API Publications.~~

~~American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.~~

~~API BULL 1529, *Aviation Fueling Hose* , 1998.~~

~~**2.3.2** ASME Publications.~~

~~ASME, 3 Park Avenue, New York NY 10016-5990.~~

~~ANSI/ASME B31.3, *Process Piping* , 2008.~~

~~**2.3.3** ASTM Publications.~~

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

~~ASTM D 380, *Standard Test Methods for Rubber Hose* , 1994, Revised 2006.~~

~~**2.3.4** AWS Publications.~~

~~American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.~~

~~AWS A5.10, *Specification for Bare Aluminum and Aluminum Alloy Welding Electrodes and Rods* , 1999, Revised 2007.~~

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*, ~~2006, Revised 2010~~ 8th edition, 2013 .

2.3.7 U.S. Government Publications.

U.S. Government Printing Office, Washington, DC 20402.

Title 49, Code of Federal Regulations, ~~1998, Revised 2003~~ 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~~, Revised 2006~~ .

2.4 References for Extracts in Mandatory Sections.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids,* ~~2007~~ 2012 edition.

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 17 14:17:05 EDT 2014

Committee Statement

Committee Statement: Updated and new references.
Response Message:
Public Input No. 32-NFPA 407-2014 [Chapter 2]
Public Input No. 36-NFPA 407-2014 [Section No. 2.3.3]

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
20 Affirmative All

2 Affirmative with Comments

0 Negative with Comments

0 Abstention

Not Returned

Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All

Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment

Gammon, James

3 2.1 – 2.4 – For the purposes of being current, I suggest that you specify “most current edition” to each document or you will be specifying out-of-date documents. Specifying the publishing date can get people in trouble with over-zealous authorities. They have to keep and follow old, out of date standards, which can also create a legal dilemma.

Nuzzolese, Aldo

2.1 Add: Incorporation by Reference: Where reference is made to conform with other standards, specifications, recommended practices, or industry consensus standards; the referenced items become a mandatory part of these requirements. Add 2.3.X: SAE Publications SAE International, SAE Aerospace Documents, 400 Commonwealth Drive, Warrendale, PA 15096 SAE ARP5818, Aircraft Refueling Vehicle Design & Performance Requirements

First Revision No. 18-NFPA 407-2014 [New Section after 3.3.17]

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

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 07 10:24:07 EDT 2014

Committee Statement

Committee Statement: Definition added for clarity.
Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
21 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.

Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
Change: 3.3.18 Aircraft Fueling Point. The fueling connection(s) located on an aircraft where fuel enters the aircraft from an external source.

First Revision No. 19-NFPA 407-2014 [Section No. 3.3.23]

3.3.24 Overshoot.

The ~~quantity of~~ fuel ~~passing~~ that passes through ~~the~~ a valve after the deadman control is released or another flow control device is activated .

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 07 10:33:45 EDT 2014

Committee Statement

Committee Statement: Definition revised for clarity.
Response Message:

Ballot Results

This item has passed ballot

27 Eligible Voters
5 Not Returned
21 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan

Gambino, Thomas D.
Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
Change: 3.3.24 Overshoot The quantity of fuel that is dispensed upon the release of any deadman control or when any emergency shutdown control or any other flow control device activates a shutdown.

First Revision No. 1-NFPA 407-2014 [Section No. 3.3.32]

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,**~~2007~~ 2012]

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 17 14:15:59 EDT 2014

Committee Statement

Committee Statement: Update extract.
Response Message:

Ballot Results

This item has passed ballot

27 Eligible Voters
5 Not Returned
20 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.

Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment

Nuzzolese, Aldo

3.3.33 Change: Tank Truck Any vehicle used to transport and/or dispense any aviation fuel that is classified as a hazardous material as defined by 49CFR172. A tank vehicle includes any vehicle with an integral tank, any tank trailer, or any tractor and semi-trailer combination. Add: Vehicle: Any motorized or non-motorized contrivance designed or used to transport any person or property, excluding aircraft, and includes automobiles, trucks, trailers, and any type of fueling vehicles (tankers, hydrant servicers, carts.)

Negative with Comment

Bosserman, Terry L.

we just can't list aviation fuel. What about mogas?

First Revision No. 20-NFPA 407-2014 [New Section after 3.3.35]

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

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Oct 07 10:35:53 EDT 2014

Committee Statement

Committee Statement: Definition added for clarity.
Response Message:

Ballot Results

This item has passed ballot

27 Eligible Voters
5 Not Returned
21 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.

Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
Change: 3.3.37 Aircraft Fuel Vent Point. The location on the exterior of an aircraft where the fuel vents are located that fuel vapors from the aircraft's fuel tanks or fuel tanks.

First Revision No. 21-NFPA 407-2014 [Chapter 4]

Chapter 4 ~~Design~~ General Requirements

4.1 ~~General~~ 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)

~~4.1.1~~ ~~Fueling Hose Apparatus.~~

~~Nozzle receptacles and hose storage shall be arranged to avoid kinks and maintain the hose bend radius within the requirements of API BULL 1529.~~

~~4.1.2~~ ~~Electrostatic Hazards and Bonding.~~

~~4.1.2.1~~

~~A provision for bonding shall be incorporated in the design of fuel servicing vehicles or carts and systems to prevent differences in electrostatic potential in accordance with Section 5.4 .~~

~~4.1.2.2~~

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

~~4.1.2.3~~

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

~~4.1.2.4~~

~~Bonding connections shall be electrically and mechanically firm. Jacks, plugs, clamps, and connecting points shall be clean, unpainted metal to provide a positive electrical connection.~~

~~4.1.2.5~~

~~API BULL 1529 Type C hose (semiconductive) shall be used to prevent electrostatic discharges but shall not be used to accomplish required bonding. API BULL 1529 Type A hose that does not have a semiconductive cover shall not be used. Type F hose (hard wall) and Type CT hose (cold temperature) shall be permitted because they have semiconductive covers.~~

~~4.1.2.6~~* ~~The design of airport fueling systems shall incorporate the provision of a 30-second relaxation period between the filter separator, monitors, or other filtration devices discharging into tanks.~~

~~4.1.2.6.1~~

~~Paragraph 4.1.2.6 shall not apply to the actual refueling of an aircraft.~~

~~4.1.2.6.2~~

~~Paragraph 4.1.2.6 shall not apply to fuels with static dissipater additives.~~

~~4.1.3~~ ~~No Smoking Signs.~~

~~Entrances to fueling areas shall be posted with "no smoking" signs.~~

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.

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 discharge of the AAV or AAE shall be contained.

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.

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.

4.1.4 ~~Radar Equipment.~~

4.1.4.1 ~~Aircraft Radar Equipment.~~

4.1.4.1.1

~~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.~~

4.1.4.1.2

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

4.1.4.2* ~~Ground Radar Equipment.~~

4.1.4.2.1

~~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). Aircraft fuel servicing shall not be conducted within this 90 m (300 ft) distance.~~

4.1.4.2.2

~~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). Aircraft fuel servicing or any other operations involving flammable liquids or vapors shall not be conducted within 30 m (100 ft) of such antennas.~~

4.1.5 ~~Emergency Fire Equipment Accessibility.~~

~~Accessibility to aircraft by emergency fire equipment shall be considered in establishing aircraft fuel servicing positions.~~

4.1.6 ~~Portable Fire Extinguishers.~~

4.1.6.1* ~~Portable extinguishers shall be provided in accordance with 4.3.9 and Section 5.13 .~~

4.1.6.2 ~~Extinguishers shall conform to the requirements of NFPA 10 .~~

4.1.7* ~~Deadman Controls.~~

4.1.7.1

~~The valve that controls the flow of fuel to an aircraft shall have a deadman control. The deadman control device shall be arranged to accommodate the operational requirements of Section 5.15 . The fuel flow control valve shall be one of the following:~~

- ~~The hydrant pit valve~~
- ~~At the tank outlet on a tank vehicle~~
- ~~A separate valve on the tank vehicle~~
- ~~On the hose nozzle for overwing servicing~~

4.1.7.2 ~~Deadman controls shall be designed to preclude defeating their intended purpose.~~

4.1.8 ~~Pressure Fuel Servicing System Controls.~~

~~The system shall be designed to minimize surge pressure. The overshoot shall not exceed 5 percent of actual flow rate from the time the deadman is released until the flow stops completely. The control valve shall be located and designed so that it will not be rendered inoperative by a surface accident, power failure, or spill. The control valve shall be fail-safe by closing completely in the event of control power loss.~~

4.2 ~~Aircraft Fueling Hose Requirements.~~ 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 m^2 (50 ft^2) 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.
4.2.7 Fire Protection.
4.2.7.1*
During fueling operations, fire extinguishers shall be available on aircraft servicing ramps or aprons, in accordance with NFPA 410 .
4.2.7.2*
Extinguishers shall be kept clear of elements such as ice and snow.
4.2.7.3
Extinguishers located in enclosed compartments shall be readily accessible, and their location shall be marked clearly in letters at least 50 mm (2 in.) high.
4.2.7.4
Fuel servicing personnel shall be trained in the use of the available fire-extinguishing equipment they could be expected to use. (See A.4.2.2.2 .)
4.2.8 Maintenance.
4.2.8.1
Fuel servicing equipment shall be maintained in safe operating condition.
4.2.8.2
Malfunctioning equipment shall be removed from service.
4.2.8.3
Where a valve or electrical device is used for isolation during maintenance or modification of a fuel system, it shall be tagged and locked out.
4.2.8.4
The tag/lock shall not be removed until the operation is completed.
4.2.8.5
All inspection and maintenance activities shall be recorded.
4.2.8.6
Inspection and maintenance records shall be retained for a minimum of 12 months.
4.2.9* Aircraft Fueling Hose.
Any hose found to be defective, in accordance with 4.2.9.1 through 4.2.9.4 , shall be removed from service.
4.2.9.1
Suitable records shall be kept of required inspections and hydrostatic tests.
4.2.9.2
Aircraft fueling hose shall be removed from service after 10 years from the date of manufacture.
4.2.9.3
Aircraft fueling hose not placed into service within 2 years of the date of manufacture shall not be used.
4.2.9.4 Daily Inspection.
Aircraft fueling hose shall be inspected before use each day.
4.2.9.4.1
The hose shall be extended as it normally would be for fueling.
4.2.9.4.2
The hose shall be checked for evidence of any of the following defects:

(1) Blistering
(2) Carcass saturation or separation
(3) Exposure of the reinforcement material
(4) Slippage, misalignment, or leaks at couplings

4.2.9.5 Monthly Inspection.

At least once each month the hose shall be completely extended and inspected as required in 4.2.9.4 and 4.2.9.5 .

4.2.9.5.1*

The hose couplings and the hose shall be examined for structural weakness or soft spots.

4.2.9.5.2

With the hose completely extended, it shall be pressurized to the working pressure of the fueling equipment to which it is attached and checked for defects, such as abnormal twisting or blistering.

4.2.9.6 Quarterly Inspection.

4.2.9.6.1

The nozzle screens shall be examined for evidence of hose deterioration.

4.2.9.7

Kinks or short loops in fueling hose shall be avoided.

4.2.10* Lightning.

A written procedure shall be established to set the criteria for when and where fueling operations are to be suspended at each airport as approved by the fueling agent and the airport authority.

4.2.11 Aircraft Fuel Servicing.

4.2.11.1 Location of Aircraft During Fuel Servicing.

4.2.11.1.1

Aircraft fuel servicing shall be performed outdoors.

4.2.11.1.2

Aircraft fuel servicing incidental to aircraft fuel system maintenance operations shall comply with the requirements of NFPA 410 .

4.2.11.1.3*

Aircraft being fueled shall be positioned so that aircraft fuel system vents or fuel tank openings are not closer than 7.6 m (25 ft) to any terminal building, hangar, service building, or enclosed passenger concourse other than a loading walkway.

4.2.11.1.4

Aircraft being fueled shall be positioned so that the vent or tank openings are not closer than 15 m (50 ft) of any combustion and ventilation air intake to any boiler, heater, or incinerator room.

4.2.11.1.5

Accessibility to aircraft by emergency fire equipment shall be maintained for aircraft fuel servicing positions.

4.2.11.2 Aircraft Occupancy During Fuel Servicing.

4.2.11.2.1

If passengers remain on board an aircraft during fuel servicing, at least one qualified person trained in emergency evacuation procedures shall be in the aircraft at or near a door at which there is a passenger loading walkway, integral stairs that lead downward, or a passenger loading stair or stand.

4.2.11.2.1.1

A clear area for emergency evacuation of the aircraft shall be maintained at not less than one additional exit.

4.2.11.2.1.2

Where fueling operations take place with passengers on board away from the terminal building, and stairways are not provided, such as during inclement weather (diversions), all slides shall be armed and the aircraft rescue and fire fighting (ARFF) services shall be notified to respond in standby position in the vicinity of the fueling activity with at least one vehicle.

4.2.11.2.1.3

Aircraft operators shall establish specific procedures covering emergency evacuation under such conditions for each type of aircraft they operate.

4.2.11.2.1.4

All “no smoking” signs shall be displayed in the cabin(s), and the no smoking rule shall be enforced.

4.2.11.2.2

For each aircraft type, aircraft operators shall determine the areas through which it could be hazardous for boarding or deplaning passengers to pass while the aircraft is being fueled.

4.2.11.2.2.1

Controls shall be established so that passengers avoid such areas.

4.2.12 Fire Hazards on Aircraft Fuel Servicing Ramps.

4.2.12.1* Electrical Equipment Operated on Aircraft Fuel Servicing Ramps or Aprons.

4.2.12.1.1

Battery chargers on any fueling equipment shall not be connected or disconnected while fuel servicing is performed on an aircraft.

4.2.12.1.2*

Aircraft ground-power generators or other electrical ground-power supplies shall not be connected or disconnected while fuel servicing is performed on the aircraft.

4.2.12.1.3

Electric tools or similar tools likely to produce sparks or arcs shall not be used while fuel servicing is performed on an aircraft.

4.2.12.1.4

Other than aircraft fuel servicing vehicles, battery-powered vehicles that do not comply with the provisions of this standard shall not be operated within 3 m (10 ft) of fueling equipment or spills.

4.2.12.1.5*

Communication equipment located outside of the cab of fuel servicing vehicles and used during aircraft fuel servicing operations within 3 m (10 ft) of the fill or vent points of aircraft fuel systems shall be listed as intrinsically safe for Class I, Division 1, Group D hazardous (classified) locations in accordance with ANSI/UL 913.

4.2.12.2 Open Flames on Aircraft Fuel Servicing Ramps.

4.2.12.2.1

Entrances to fueling areas shall be posted with “no smoking” signs.

4.2.12.2.2

Open flames on aircraft fuel servicing ramps or aprons within 15 m (50 ft) of any aircraft fuel servicing operation or fueling equipment shall be prohibited.

4.2.12.2.3

The category of open flames and lighted open-flame devices shall include, but shall not be limited to, the following:

(1) Lighted cigarettes, cigars, or pipes

(2) Electronic cigarettes (e.g., personal vaporizers or electronic nicotine delivery systems)

(3) Exposed flame heaters, liquid, solid, or gaseous devices, including portable and wheeled gasoline or kerosene heaters

(4) Heat-producing welding or cutting devices and blowtorches

(5) Flare pots or other open-flame lights

4.2.12.2.4

The authority having jurisdiction can establish other locations where open flames and open-flame devices shall not be permitted.

4.2.12.2.5

Personnel shall not carry lighters, matches, or electronic cigarettes on their person while engaged in fuel servicing operations.

4.2.12.2.6

Lighters, matches, or electronic cigarettes shall not be permitted on or in fueling equipment.

4.2.12.2.7

Equipment performing aircraft servicing functions shall not be positioned within a 3 m (10 ft) radius of aircraft fuel system vent openings.

4.2.12.3 Operation of Aircraft Engines and Heaters.

4.2.12.3.1

Fuel servicing shall not be performed on a fixed wing aircraft while an onboard engine is operating, except as permitted by 4.2.12.3.2 or 4.2.14.

4.2.12.3.2

Aircraft auxiliary power units (APUs) that direct exhaust away from the fueling operation shall be permitted to operate during fuel servicing.

4.2.12.3.3

Combustion heaters on aircraft (e.g., wing and tail surface heaters, integral cabin heaters) shall not be operated during fueling operations.

4.2.13 Defueling of Aircraft.

4.2.13.1

All requirements of this standard shall apply to defueling operations.

4.2.13.2

Each operator shall establish procedures to prevent the overfilling of the tank vehicle, which is a special hazard when defueling.

4.2.14 Rapid Refueling.

4.2.14.1

Rapid refueling of aircraft shall be limited to the following aircraft types:

(1) Helicopters

(2) Agricultural aircraft actively engaged in aerial application duties

(3) Medical aircraft actively engaged in the transport of medical patients

(4) Fire-fighting and search-and-rescue aircraft actively engaged in emergency operations

4.2.14.2

Only turbine engine aircraft fueled with JET A or JET A-1 fuels shall be permitted to be fueled while an onboard engine is operating.

4.2.14.3

Aircraft permitted to be fueled while an onboard engine is operating shall have all sources of ignition of potential fuel spills located above the fuel inlet port(s) and above the vents or tank openings, including but not limited to the following:

(1) Engines

(2) Exhausts

(3) Auxiliary power units (APUs)

(4) Combustion-type cabin heater

4.2.14.4

Aircraft fueling while onboard engines are operating shall be permitted only under the following conditions:

(1) A pilot licensed by the appropriate governmental body shall be at the aircraft controls during the entire fueling operation.

(2) All passengers shall be deboarded to a safe location prior to rapid refueling operations, except as permitted in (3).

(3) Patients on board medical transport aircraft shall be permitted to remain on board the aircraft during rapid refueling operations if, in the opinion of the medical provider, removal from the aircraft would be detrimental to the patient's condition.

(4) Passengers shall not board or deboard during rapid refueling operations.

(5) Only designated personnel, properly trained in rapid refueling operations, shall operate the equipment. Written procedures shall include the safe handling of the fuel and equipment.

(6) All doors, windows, and access points allowing entry to the interior of the aircraft that are adjacent to, or in the immediate vicinity of, the fuel inlet ports shall be closed and shall remain closed during refueling operations.

(7) Fuel shall be permitted to be dispensed by one of the following methods:

(a) Dispensed into an open port from approved deadman-type nozzles with a flow rate not to exceed 227 L/min (60 gpm)

(b) Dispensed through close-coupled pressure fueling ports.

(8) Where fuel is dispensed from fixed piping systems, the hose cabinet shall not extend into the rotor space.

(9) Clearance between aircraft fuel servicing vehicles and rotating components shall be maintained by one of the following methods:

(a) A curb or other approved barrier shall be provided to restrict the fuel servicing vehicle from coming closer than within 3 m (10 ft) of any aircraft rotating components

(b) Fuel servicing vehicles shall be kept 6 m (20 ft) away from any aircraft rotating components, and a trained person shall direct fuel servicing vehicle approach and departure.

4.2.1 ~~Performance Requirements.~~

~~Hose shall comply with the requirements of API BULL 1529. Couplings shall comply with the requirements of API BULL 1529.~~

4.2.2 ~~Additional Requirements.~~

4.2.2.1

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

4.2.2.2

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

- Manufacturer's name of hose
- Manufacturer's name of couplings
- Hose type
- Hose grade
- Size and length of hose
- Serial number or reference number of hose
- Quarter and year of manufacture of hose
- Model number of couplings
- Sizes of coupling ferrules
- Hydrostatic test pressures
- Coupled length serial number
- Identification of individual responsible for coupling the hose
- Name and address of company responsible for coupling the hose
- Date of certification

4.2.2.3

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

4.2.2.4

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

4.2.2.5

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.

4.2.4 Hydrostatic Testing.

Hydrostatic testing shall be in accordance with ASTM D 380.

4.2.4.1

Following a hydrostatic test, all of the water shall be drained and the hose shall be dried internally. The open ends, including the threads of the couplings, shall be suitably covered to protect the threads and to prevent contamination.

4.2.4.2

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

4.3 Aircraft Fuel Servicing Vehicles and Carts.

Aircraft fuel servicing tank vehicles that are used on public highways also shall comply with NFPA 385 .

4.3.1 Materials.

4.3.1.1

In addition to any specific requirements in this chapter, only materials safe for use in the service intended and compatible with fuel applications shall be used in the construction of aircraft fuel servicing vehicles and hydrant fuel service carts.

4.3.1.2

Magnesium shall not be used in the construction of any portion of an aircraft fuel servicing vehicle or cart.

4.3.2 Vehicle Cargo Tanks.

Every cargo tank shall be supported by and attached to, or shall be a part of, the tank vehicle upon which it is carried in accordance with NFPA 385 .

4.3.3 Static Protection.

4.3.3.1

All metallic components and vehicle or cart chassis shall be electrically bonded to prevent a difference in their electrostatic potential.

4.3.3.2

A provision shall be made for the bonding of the tank to the fill pipe or the loading rack as specified in 5.20.2.1 . Electrical continuity between the loading rack and fill pipe shall be accomplished as specified in Section 5.4 .

4.3.3.3

Cables shall be provided on the vehicle or cart to allow the bonding operations specified in Section 5.4 .

4.3.3.4

A cable with a clip or plug shall be attached to each overwing nozzle to facilitate compliance with 5.4.2 .

4.3.4 Propulsion or Power Engine Compartments.

Propulsion or power engine equipment shall be in a compartment housing that shall minimize the hazard of fire in the event of leakage or spillage of fuel during the servicing of an aircraft.

4.3.4.1

The engine air intake shall retain the manufacturer's configuration to prevent the emission of flame in case of backfiring.

4.3.4.2

Where provided, the sediment bowl in the fuel supply line shall be of steel or material of equivalent fire resistance.

4.3.5 Containers and Systems for Flammable Liquids Other than Cargo Tanks.

4.3.5.1

Vehicle or cart fuel tanks and containers for other flammable liquids shall be made of metal and shall be designed, constructed, and located in a manner that precludes hazardous arrangements. Tanks shall be substantially protected by their location, and fill pipes shall not project beyond the vehicle profile. Tanks and containers shall vent away from sources of ignition during filling. Any arrangement not protected by location shall be listed for such use. The fuel tank arrangement shall allow for drainage without the tank's removal from its mountings.

4.3.5.2

Gravity feed systems shall not be used.

4.3.5.3

All portions of the flammable liquid feed system shall be constructed and located to minimize the fire hazard. The lines shall be made of materials not adversely affected by the fluid or by other materials likely to be encountered, shall be of adequate strength for the purpose, and shall be secured to avoid chafing or undue vibration.

4.3.6 Engine Exhaust System.

4.3.6.1 *

The engine exhaust system shall be designed, located, and installed to minimize the hazard of fire in the event of any of the following:

- Leakage of fuel from the vehicle or cart (where applicable) fuel tank or fuel system
- Leakage from the fuel dispensing system of the vehicle or cart
- Spillage or overflow of fuel from the vehicle or cart (if applicable) fuel tank or the cargo tank
- Spillage of fuel during the servicing of an aircraft

4.3.6.2

Exhaust system components shall be secured and located clear of components carrying flammable liquids and separated from any combustible materials used in the construction of the vehicle.

4.3.6.3

Suitable shielding shall be provided to drain possible fuel spillage or leakage away from exhaust system components safely.

4.3.6.3.1

Diesel particulate filter (DPF) regeneration system piping shall be shielded from the engine discharge manifold to the outlet at the tailpipe.

4.3.6.3.2

DPF regeneration–equipped vehicles shall have a listed diffuser installed at the outlet of the exhaust tailpipe.

4.3.6.4

Exhaust gases shall not be discharged where they could ignite fuel vapors that could be released during normal operations or by accidental spillage or by leakage of fuel.

4.3.6.4.1

DPF regeneration–equipped vehicles shall have a lockout mode that will prevent automatic regeneration when these vehicles are operated within 30 m (100 ft) of aircraft parking areas.

4.3.6.5

A muffler (or silencer) cutout shall not be provided.

4.3.6.6

Gasoline-powered engines on fuel servicing vehicles shall be provided with flame- and spark-arresting exhaust systems.

4.3.6.7*

Non-turbo-charged diesel engines on fuel servicing vehicles shall be equipped with flame- and spark-arresting exhaust systems.

4.3.7 Vehicle or Cart Lighting and Electrical Equipment.

4.3.7.1 Battery Compartments.

Batteries that are not in engine compartments shall be securely mounted in compartments to prevent accidental arcing. The compartment shall be separate from fueling equipment. Suitable shielding shall be provided to drain possible fuel spillage or leakage away from the compartment. The compartment shall be provided with a vent at the top of the compartment.

4.3.7.2

Wiring shall be of adequate size to provide the required current-carrying capacity and mechanical strength. Wiring shall be installed to provide protection from physical damage and from contact with spilled fuel either by its location or by enclosing it in metal conduit or other oil-resistant protective covering. All circuits shall have overcurrent protection. Junction boxes shall be weatherproofed.

4.3.7.3

Spark plugs and other exposed terminal connections shall be insulated to prevent sparking in the event of contact with conductive materials.

4.3.7.4*

Motors, alternators, generators, and associated control equipment located outside of the engine compartment or vehicle cab shall be of a type listed for use in accordance with *NFPA 70* Class I, Division 1, Group D locations.

4.3.7.5

Electrical equipment and wiring located within a closed compartment shall be of a type listed for use in accordance with *NFPA 70* Class I, Division 1, Group D locations.

4.3.7.6

Lamps, switching devices, and electronic controls, other than those covered in 4.3.7.4 and 4.3.7.5 , shall be of the enclosed, gasketed, weatherproof type. Other electrical components shall be of a type listed for use in accordance with *NFPA 70* Class I, Division 2, Group D locations.

4.3.7.7

Electrical service wiring between a tractor and trailer shall be designed for heavy-duty service. The connector shall be of the positive-engaging type. The trailer receptacle shall be mounted securely.

4.3.8 Cabinets.

All cabinets housing vehicle auxiliary equipment shall have expanded metal flooring, perforated metal grating-type flooring, or open floor to facilitate air circulation within the enclosed space and to prevent the accumulation of fuel.

4.3.9 Fire Extinguishers for Aircraft Fuel Servicing Vehicles or Carts.

4.3.9.1

Each aircraft fuel servicing tank vehicle shall have two listed fire extinguishers, each having a rating of at least 20-B:C with one extinguisher mounted on each side of the vehicle.

4.3.9.2

~~One listed extinguisher having a rating of at least 20-B:C shall be installed on each hydrant fuel servicing vehicle or cart.~~

4.3.9.3

~~Extinguishers shall be readily accessible from the ground. The area of the paneling or tank adjacent to or immediately behind the extinguisher(s) on fueling vehicles or carts shall be painted with a contrasting color.~~

4.3.9.4

~~Extinguishers shall be kept clear of elements such as ice and snow. Extinguishers located in enclosed compartments shall be readily accessible, and their location shall be marked clearly in letters at least 50 mm (2 in.) high.~~

4.3.10 ~~Full Trailers and Semitrailers.~~

4.3.10.1

~~Trailer connections shall be designed to secure the trailer firmly and to prevent the towed vehicle from swerving from side to side at the speeds anticipated so that the trailer essentially remains in the path of the towing vehicle.~~

4.3.10.2

~~Full trailers and semitrailers shall be equipped with brakes on all wheels.~~

4.3.11 ~~Smoking Restrictions.~~

4.3.11.1

~~A "no smoking" sign shall be posted prominently in the cab of every aircraft fuel servicing vehicle.~~

4.3.11.2

~~Smoking equipment such as cigarette lighters and ash trays shall not be provided. If a vehicle includes such equipment when initially procured, it shall be removed or rendered inoperable.~~

4.3.12 ~~Cargo Tanks.~~

4.3.12.1

~~Cargo tanks shall be constructed in accordance with 49 CFR 178.34,5 DOT MC406, or other equivalent standard for international application.~~

4.3.12.2

~~Aluminum alloys for high-strength welded construction shall be joined by an inert gas arc welding process using filler metals R-GR40A, E-GR40A (5154 alloy), R-GM50A, and E-GM50A (5356 alloy) in accordance with AWS A5.10.~~

4.3.12.3

~~Tank outlets shall be of substantial construction and shall be attached securely to the tank.~~

4.3.12.4

~~Every cargo tank or compartment over 2.3 m (7.5 ft) long shall be provided with baffles, the total number of which shall be such that the distance between any two adjacent baffles, or between any tank head or bulkhead and the baffle closest to it, shall in no case exceed 1.5 m (5 ft). The cross-sectional area of each baffle shall be not less than 80 percent of the cross-sectional area of the tank, and the thickness of a baffle shall be not less than that required for the heads and bulkheads of the cargo tank in which it is installed.~~

4.3.12.5

~~Venting shall be in accordance with 49 CFR, DOT MC406.~~

4.3.12.6

~~Cargo drawoff valves or faucets projecting beyond the frame of a tank vehicle shall be protected against damage.~~

4.3.13 ~~Fill Openings and Top Flashings.~~

4.3.13.1

~~Dome covers shall be provided with a forward-mounted hinge and self-latching catches and shall be fitted with watertight fuel-resistant seals or gaskets (designed to prevent spillage or leakage from overturn and to prevent water entry). Dome covers shall automatically close and latch with the forward motion of the vehicle.~~

4.3.13.2

~~Drains from top flashing shall divert spilled fuel from possible sources of ignition, including the engine, the engine exhaust system, the electrical equipment, or an auxiliary equipment enclosure.~~

4.3.13.3

~~The tank fill openings shall be protected against overturn damage by a rigid member(s) fixed to the tank and extending a minimum of 25 mm (1 in.) above any dome cover, handle, vent opening, or projection of the unit. Overturn protection shall be braced adequately to prevent collapse. The overturn protection shall be designed to channel rain water, snow, or fuel to the exterior of the cargo tank.~~

4.3.14 ~~Piping, Joints, Flanged Connections, and Couplings.~~

4.3.14.1

~~Product piping shall be metal and rated for the system working pressure or at least 860 kPa (125 psi), whichever is greater.~~

4.3.14.2

~~Except as provided in 4.3.14.3 , all joints shall be welded. Elbows and fittings shall be kept to a minimum and, where used, shall be of the preformed welding type.~~

4.3.14.3

~~Flanged connections or approved couplings shall be provided to avoid the need for cutting and welding where components are serviced or replaced. Gaskets in flanged connections shall be of a material and design that resist fire exposure for a time comparable to the flange and bolts.~~

4.3.14.4

~~Piping shall be supported adequately.~~

4.3.15 ~~Outlet Valves and Emergency Shutoff Controls.~~

4.3.15.1

~~The outlets of each cargo tank or compartment, including water drawoffs, shall be equipped with shutoff valves located inside the shell or in the sump where it is an integral part of the shell. The cargo tank outlet shall be designed so that the valve needs to be kept closed except during loading and unloading operations. The water drawoff connection shall be of a type that cannot be blocked open.~~

4.3.15.2

~~The operating mechanism for each tank outlet valve shall be adjacent to the fuel delivery system operating controls and shall be arranged so that the outlet valve(s) can be closed simultaneously and instantly in the event of a fire or other emergency. A means shall be provided to assure proper operation. The vehicle shall have at least two emergency shutoff controls, one mounted on each side of the vehicle. These controls shall be quick-acting to close the tank outlet valve in case of emergency. They also shall be remote from the fill openings and discharge outlets and shall be operable from a ground-level standing position. In addition, all vehicles or carts equipped with a top deck platform shall have an emergency shutoff control operable from the deck.~~

4.3.15.3

~~Emergency fuel shutoff controls shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high and shall be of a color that contrasts with the placard background for visibility. The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate. The words EMERGENCY FUEL SHUTOFF shall not be used to identify any control or device on the vehicle other than the emergency fuel shutoff controls.~~

4.3.15.4

~~Each outlet valve shall be provided with a fusible device that causes the valve to close automatically in case of fire.~~

4.3.15.5

~~A shear section shall be provided between shutoff valve seats and discharge outlets that breaks under strain unless the discharge piping is arranged to afford the same protection and leave the shutoff valve seat intact.~~

4.3.15.6

~~Openings in cargo tank compartments that are connected to pipe or tubing shall be fitted with a spring-loaded check valve, a self-closing valve, or similar device to prevent the accidental discharge of fuel in case of equipment malfunction or line breakage. Unless such valves are located inside the tank, they shall be equipped with a shear section as described in 4.3.15.5 .~~

4.3.16 ~~Fuel Dispensing System.~~

4.3.16.1

~~The valve that controls the flow of fuel from an aircraft fuel servicing vehicle or cart to an aircraft shall have a deadman control(s) in accordance with the requirements of 4.1.7 .~~

4.3.16.2

The deadman flow control in the nozzle shall be permitted for overwing fueling. Notches or latches in the nozzle handle that could allow the valve to be locked open shall be prohibited. Each overwing servicing nozzle shall have a cable with a plug or clip for bonding to the aircraft. *(See 5.4.2 .)*

4.3.16.3

Nozzles for underwing fueling shall be designed to be attached securely to the aircraft adapter before the nozzle can be opened. Disengaging the nozzle from the aircraft adapter shall not be possible until the nozzle is fully closed.

4.3.16.4

Fuel servicing pump mechanisms shall be designed and arranged so that failure or seizure does not cause rupture of the pump housing, a tank, or of any component containing fuel. Fuel pressure shall be controlled within the stress limits of the hose and plumbing by means of either an in-line pressure controller, a system pressure relief valve, or other suitable means. The working pressure of any system component shall equal or exceed any pressure to which it could be subjected.

4.3.16.5

On tank full trailer or tank semitrailer vehicles, the use of a pump in the tractor unit with flexible connections to the trailer shall be prohibited unless one of the following conditions exists:

Flexible connections are arranged above the liquid level of the tank in order to prevent gravity or siphon discharge in case of a break in the connection or piping.

The cargo tank discharge valves required by 4.3.16.1 are arranged to be normally closed and to open only when the brakes are set and the pump is engaged.

4.3.16.6

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

4.3.16.7

Aircraft fuel servicing vehicles and carts shall have an integral system or device that prevents the vehicle or cart from being moved unless all fueling nozzles and hydrant couplers are properly stowed and mechanical lifts are lowered to their stowed position.

4.3.16.8 Air Elimination.

Aircraft fuel servicing tank vehicles having a positive displacement product pump shall be equipped with a product tank low-level shutdown system that prevents air from being ingested into the fueling system.

4.3.17 Tests.

4.3.17.1

Cargo tanks, at the time of manufacture, shall be tested by a minimum air or hydrostatic pressure of 24.4 kg/m^2 (5 psi) applied to the whole tank (or each compartment thereof if the tanks are compartmented). Such pressure shall be maintained for a period of at least 5 minutes during which, if the test is by air pressure, the entire exterior surface of all joints shall be coated with a solution of soap and water, heavy oil, or other substance that causes foaming or bubbling that indicates the presence of leaks. Hydrostatic pressure, if used, shall be gauged at the top of the tank. The tank shall be inspected at the joints for the issuance of liquid to indicate leaks. Any leakage discovered by either of the methods described, or by any other method, shall be considered evidence of failure to meet these requirements.

4.3.17.2

At the time of manufacture, the section of the fuel dispensing system that is under pressure during service shall be subjected to a hydrostatic test pressure equal to 150 percent of the working pressure of the system for at least 30 minutes and shall be proven tight before it is placed in service. Hose connections shall be permitted to be plugged during this test.

4.3.18 Product Identification Signs.

Each aircraft fuel servicing vehicle or cart shall have a sign on each side and the rear to identify the product. The sign shall have letters at least 75 mm (3 in.) high and shall be of a color contrasting sharply with the sign background for visibility. The word FLAMMABLE and the name of the product carried, such as JET A, JET B, GASOLINE, or AVGAS, shall appear on the sign.

4.3.19 Loading.

4.3.19.1

No cargo tank or compartment shall be loaded to the point where it is liquid full. The ullage expansion space shall not be less than 1 percent of the volume of the tank compartment. Where local climatic conditions warrant, the ullage expansion space shall be increased to prevent leakage or overflow from expansion of the contents due to a rise in atmospheric temperature or direct exposure to the sun.

4.3.19.2

A heat-actuated shutoff valve shall be provided in the piping immediately upstream of the loading hose or swing arm connection.

4.3.20 Top Loading.

4.3.20.1

Drop tubes used in top loading or overhead loading of tank vehicles shall be designed to minimize turbulence. Drop tubes shall be metallic.

4.3.20.2

Fixed drop tubes permanently mounted in the vehicle tank shall extend to the bottom of the tank or to the inside of the sump to maintain submerged loading and avoid splashing of the fuel.

4.3.20.3

Drop tubes attached to loading assemblies extending into the vehicle tank shall extend to the bottom of the tank and shall be maintained in that position until the tank is loaded to provide submerged loading and to avoid splashing or free fall of fuel through the tank atmosphere.

4.3.20.4

Loading arms shall be counterbalanced properly.

4.3.20.5

A deadman control shall be provided and located so that the operator can observe the liquid level in the tank as it fills.

4.3.21 Bottom Loading.

4.3.21.1

Loading hose shall conform to the requirements of Section 4.2 . Swivel connections shall be provided at each end of the hose to allow free movement to compensate for changes in the position of the vehicle connection during loading.

4.3.21.2

Swinging loading arms shall be counterbalanced properly. Swivel joints shall be used to allow free movement and to compensate for changes in the attitude of the vehicle during loading.

4.3.21.3

The connection between the tank truck and the arm or hose shall be a dry-break coupler that cannot be opened until it is engaged to the vehicle tank adapter. It shall not be possible to disconnect the hose coupler from the tank vehicle until the coupler valve is fully closed.

4.3.21.4*

The bottom loading fitting of the tank vehicle shall be a spring-loaded check valve that remains in a closed position until opened by connecting the coupler.

4.3.21.5

Aircraft fuel servicing vehicles shall incorporate an integral brake interlock system that prevents the vehicle from being moved until the bottom loading coupler has been disconnected from the vehicle.

4.3.21.6

The supply piping terminating at the loading hose or swing arm shall be supported to carry the loads imposed.

4.3.21.7

The filling of the vehicle cargo tank shall be controlled by a deadman control so that a fueling operator can monitor the operation while activating the control. In addition, a float-actuated shutoff or other automatic sensing device shall be provided. This requirement shall apply to defueling also. *(See 5.14.1 .)* Any liquid bled from a sensing device during loading shall be piped to the bottom of the cargo tank.

4.3.21.8

The fill pipe and valving on bottom-loaded tank vehicles shall be arranged to prevent fuel spray and turbulence in the cargo tank.

4.3.22 Emergency Remote Control Stations.

4.3.22.1

Each tank vehicle loading station shall be provided with an emergency fuel shutoff system, in addition to the deadman control required by 4.3.20.5 for top loading and by 4.3.21.7 for bottom loading. It shall be the purpose of this system to shut down the flow of fuel in the entire system or in sections of the system if an emergency occurs. This system shall be of a fail-safe design.

4.3.22.2

Each emergency fuel shutoff station location shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high. The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate. Any action necessary to gain access to the shutoff device (e.g., BREAK GLASS) shall be shown clearly. Lettering shall be of a color contrasting sharply with the placard background for visibility. Placards shall be weather resistant, shall be located at least 2.1 m (7 ft) above grade, and shall be positioned so that they can be seen readily from a distance of at least 7.6 m (25 ft).

4.3.23 Product Recovery Tanks.

The refueling system product recovery tank shall be equipped with a control that shuts down the vehicle's fuel dispensing system when the refueling system product recovery tank is three-quarters full.

4.4 Airport Fuel Systems.

4.4.1 Design Approval.

Work shall not be started on the construction or alteration of an airport fuel system until the design, plans, and specifications have been approved by the authority having jurisdiction.

4.4.2 System Approval.

The authority having jurisdiction shall inspect and approve the completed system before it is put into service.

4.4.3 General Requirements.

4.4.3.1

Each installation planned shall be designed and installed in conformity with the requirements of this standard and with any additional fire safety measures deemed necessary by the authority having jurisdiction.

4.4.3.2

The system and each of its components shall be designed for the working pressure of the system.

4.4.3.3

The emergency fuel shutoff system shall be designed and installed as an integral part of the airport fuel system. Operating controls for emergency fuel shutoff of the system shall be located to be accessible readily and safely in the event of an accident or spill.

4.4.3.4

In establishing each aircraft fuel dispensing location, consideration shall be given to the accessibility of the location in an emergency by fire-fighting personnel and equipment.

4.4.4 Fuel Storage Tanks.

4.4.4.1*

Fuel storage tanks shall conform to the applicable requirements of NFPA 30 .

4.4.4.2

The authority having jurisdiction shall determine the clearances required from runways, taxiways, and other aircraft movement and servicing areas to any aboveground fuel storage structure or fuel transfer equipment, with due recognition given to national and international standards establishing clearances from obstructions. Tanks located in designated aircraft movement areas or aircraft servicing areas shall be underground or mounded over with earth. Vents from such tanks shall be constructed in a manner to preclude collision hazards with operating aircraft. Aircraft operators shall be consulted regarding the height and location of such vents to avoid venting flammable vapors in the vicinity of ignition sources, including operating aircraft and automotive equipment permitted in the area.

4.4.5 Emergency Fuel Shutoff Systems.

4.4.5.1

Each fuel system, as required by 4.4.3.3 , shall have means for quickly and completely shutting off the flow of fuel in an emergency. This requirement shall be in addition to the requirement in 4.1.7 for deadman control of fuel flow.

4.4.5.2*

The method of fuel transfer (gravity, pumping, or use of hydraulic or inert gas pressure) shall be considered in the design of the emergency fuel shutoff system and the location of the emergency fuel shutoff valve.

4.4.5.3

~~The emergency fuel shutoff system shall include shutoff stations located outside of probable spill areas and near the route that normally is used to leave the spill area or to reach the fire extinguishers provided for the protection of the area.~~

4.4.5.4*

~~At least one emergency shutoff control station shall be conveniently accessible to each fueling position.~~

4.4.5.5

~~The emergency fuel shutoff system shall be designed so that operation of a station shuts off fuel flow to all hydrants that have a common exposure.~~

4.4.5.6

~~Emergency fuel shutoff systems shall be designed so that they shut off the flow of fuel if the operating power fails.~~

4.4.5.7

~~Each emergency fuel shutoff station shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high. The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate. Any action necessary to gain access to the shutoff device (e.g., BREAK GLASS) shall be shown clearly. Lettering shall be of a color contrasting sharply with the placard background for visibility. Placards shall be weather resistant, shall be located at least 2.1 m (7 ft) above grade, and shall be positioned so that they can be seen readily from a distance of at least 7.6 m (25 ft). Valves used to shut off a hydrant for maintenance purposes shall not have placards that could create confusion in an emergency.~~

4.4.6 ~~Transfer Piping.~~

4.4.6.1

~~Underground piping shall be used in the vicinity of aircraft movement areas unless the piping is protected by a substantial barrier guard. Piping shall be protected by suitable sleeves or casings to protect the pipe from shock hazards where it crosses sewer manholes, service tunnels, catch basins, or other underground services. Piping shall be laid on firm supports using clean, noncorrosive backfill.~~

4.4.6.2

~~Transfer piping located within buildings not specifically designed for the purpose of fuel transfer shall be located within a steel casing of a pressure rating equal to that of the carrier pipe. This casing shall extend beyond the building and shall terminate at a low point(s) with an automatic leak detection system. The casing shall be capable of being drained to a safe location.~~

4.4.6.3

~~Fuel piping that runs under a building or a passenger concourse shall be protected by a steel casing that encloses only the piping.~~

4.4.6.4

~~Piping, valves, and fittings shall be of metal, suitable for aviation fuel service, and designed for the working pressure and mechanically and thermally produced structural stresses to which they could be subjected and shall comply with ANSI/ASME B31.3. Deviations from ANSI/ASME B31.3 shall be permitted, provided they are authorized by the authority having jurisdiction where engineering data can be presented to justify such deviations.~~

4.4.6.5

~~Cast-iron, copper, and galvanized steel piping, valves, and fittings shall not be permitted. Ductile iron valves shall be permitted.~~

4.4.6.6

~~Aluminum piping, valves, and fittings shall be used only where specifically approved by the authority having jurisdiction.~~

4.4.6.7

In the selection of pipe, valves, and fittings, the following shall be considered:

- Working pressure
- Bending and mechanical strength requirements (including settlement)
- Internal and external corrosion
- Impact stresses
- Method of system fabrication and assembly
- Location of piping and accessibility for repair or replacement
- Exposure to mechanical, atmospheric, or fire damage
- Expected period of service and effect of future operations

4.4.6.8

Gaskets in flanged connections shall resist fire temperatures for a duration comparable to the temperature resistance of the flange and bolts.

4.4.6.9

Allowances shall be made for thermal expansion and contraction by the use of pipe bends, welded elbows, or other flexible design. Pressure relief valves shall be provided in lines that can be isolated.

4.4.6.10

Welded joints shall be made by qualified welders in accordance with the standards of the American Welding Society and ANSI/ASME B31.3.

4.4.6.11 *

Isolation valves or devices shall be provided to facilitate dismantling portions of the fueling system. These valves shall be capable of being locked closed.

4.4.6.12

Buried flanges and valves shall not be permitted.

4.4.7 Fuel Flow Control.

4.4.7.1

Hydrant valves shall be designed so that the flow of fuel shall shut off when the hydrant coupler is closed. Hydrant valves shall be of the self-closing, dry-break type.

4.4.7.2

The flow control valve shall be an integral part of the hydrant valve or coupler. The fuel control valve shall be arranged so that it is not rendered inoperative by a surface accident, spill, or malfunction and shall shut off the flow of fuel if the operating energy fails. The fuel control system shall be designed to minimize overshoot. The system shall be designed to shut off fuel flow quickly and effectively, even if there is a reduction of pressure downstream of the flow control valve such as could result from a major line or hose break. A screen shall be provided ahead of the valve to trap foreign material that could interfere with complete closure of the valve. The hydrant valve that allows the flow of fuel to the aircraft shall have a deadman control. The use of any means that allows fuel to flow without the operator activating this control shall not be permitted. The deadman control shall be arranged so that the fueling operator can observe the operation while activating the control.

4.4.7.3 *

The pressure of the fuel delivered to the aircraft shall be automatically controlled so that it is not higher than that specified by the manufacturer of the aircraft being serviced.

4.4.8 Filter Vessels.

All sections of the filtering system shall have electrical continuity with adjoining piping and equipment. In freezing climates, filter separator sumps and associated piping that could contain water shall be protected to prevent freezing and bursting. Heaters shall be constructed of noncorrosive materials.

4.4.9 Electrical Equipment.

All electrical equipment and wiring shall comply with the requirements of *NFPA 70* , Article 515, utilizing the Class I liquids requirements for all applications.

4.4.10 Fuel Servicing Hydrants, Pits, and Cabinets.

4.4.10.1

Piping, valves, meters, filters, air eliminators, connections, outlets, fittings, and other components shall be designed to meet the working pressure requirements of the system.

4.4.10.2

Fueling hydrants and fueling pits that are recessed below a ramp or apron surface and are subject to vehicle or aircraft traffic shall be fitted with a cover designed to sustain the load of vehicles or aircraft that taxi over all or part of them.

4.4.10.3

Fueling hydrants, cabinets, and pits shall be located at least 15.2 m (50 ft) from any terminal building, hangar, service building, or enclosed passenger concourse (other than loading bridges).

4.4.11 Drainage.

4.4.11.1

Aircraft servicing ramps or aprons shall be sloped and drained in accordance with NFPA 415 . The ramp or apron shall slope away from the rim or edge of fueling hydrants or fueling pits to prevent flooding.

4.4.11.2

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

4.4.12* Cathodic Protection.

All fueling systems with underground piping shall have cathodic protection to mitigate corrosion. Systems provided with cathodic protection shall have appropriate signs, located at points of entry, warning against separation of units without prior deenergization or without proper jumpers across the sections to be disconnected.

4.4.13 Hydrostatic Test.

After completion of the installation (including fill and paving), the airport fuel systems shall be subjected to a temperature-compensated hydrostatic test pressure equal to 150 percent of the system working pressure for at least 4 hours and shall be proven tight before the system is placed into service.

4.5 Fueling at Rooftop Heliports.

Fueling on rooftop heliports shall be permitted only where approved by the authority having jurisdiction.

4.5.1 General Limitations.

4.5.1.1

In addition to the special requirements in this chapter, the heliport shall comply with the requirements of NFPA 418 .

4.5.1.2

Facilities for dispensing fuel with a flash point below 37.8°C (100°F) shall not be permitted at any rooftop heliport.

4.5.2 Fueling Facilities.

4.5.2.1

In addition to the special requirements of this chapter, the fuel storage, piping, and dispensing system shall comply with the requirements of NFPA 30 and with applicable portions of this standard.

4.5.2.2

The entire system shall be designed so that no part of the system is subjected to pressure above its working pressure.

4.5.2.3

The fuel storage system shall be located at or below ground level.

4.5.3 Pumps.

4.5.3.1

Pumps shall be located at or below ground level. Relay pumping shall not be permitted.

4.5.3.2

Pumps installed outside of buildings shall be located not less than 1.5 m (5 ft) from any building opening. They shall be substantially anchored and protected against physical damage from collision.

4.5.3.3

Pumps installed within a building shall be in a separate room with no opening into other portions of the building. The pump room shall be adequately ventilated. Electrical wiring and equipment shall conform to the requirements of *NFPA 70* , Article 515.

4.5.4 Piping.

Piping above grade shall be steel and, unless otherwise approved by the authority having jurisdiction, shall be suitably cased or shall be installed in a duct or chase. Such piping duct or chase shall be constructed so that a piping failure does not result in the entry of fuel liquid or vapor entering the building. All pipe casings, ducts, and chases shall be drained. Piping shall be anchored and shall be protected against physical damage for a height of at least 2.4 m (8 ft) above the ground. An isolation valve shall be installed on the suction and discharge piping of each pump. In addition, a check valve shall be installed at the base of each fuel piping riser to automatically prevent the reverse flow of the fuel into the pump room in the event of pump seal failure, pipe failure, or other malfunction. *(See 4.4.6 .)*

4.5.4.1

Piping within buildings shall comply with 4.4.6.2 .

4.5.4.2

Piping above grade exterior to buildings shall be of steel. Piping shall be located within a steel casing. The pressure rating of the pipe casing shall be equal to that of the carrier pipe. The casing shall be capable of being drained to a safe location. An automatic leak detection system shall be provided at the casing low point(s).

4.5.4.3

Piping shall be anchored and shall be protected against physical damage for a height of at least 2.4 m (8 ft) above the ground.

4.5.4.4

An isolation valve shall be installed on the suction and discharge piping of each pump. In addition, a check valve shall be installed at the base of each fuel piping riser to automatically prevent the reverse flow of fuel into the pump room in the event of a pump seal failure, pipe failure, or other malfunction.

4.5.5 Nozzles.

4.5.5.1

Overwing nozzles shall conform to 4.3.16.2 .

4.5.5.2

Underwing nozzles shall conform to 4.3.16.3 .

4.5.6 Hose.

Hose shall comply with the requirements of Section 4.2 .

4.5.7 Static Electricity.

The provisions of 4.1.2 shall apply, as appropriate, to guard against electrostatic hazards during helicopter fuel servicing operations.

4.5.8 Deadman Control.

Each fuel dispensing hose shall have a deadman-controlled fuel shutoff conforming to the requirements of 4.1.7 and 4.1.8 .

4.5.9 Emergency Fuel Shutoff Stations.

4.5.9.1

A system shall be provided to completely shut off the flow of fuel in an emergency. The system shall shut off the fuel at the ground level. The emergency fuel shutoff controls shall be in addition to the normal operating controls for the pumps and deadman control.

4.5.9.2

At least two emergency fuel shutoff stations located on opposite sides of the heliport at exitways or at similar locations shall be provided. An additional emergency fuel shutoff station shall be located at ground level and shall be near, but at least 3 m (10 ft) from, the pumps.

4.5.9.3

Each emergency fuel shutoff station location shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high. The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate. Any action necessary to gain access to the shutoff device (e.g., BREAK GLASS) shall be shown clearly. Lettering shall be of a color contrasting sharply with the placard background for visibility. Placards shall be weather resistant, shall be conspicuously located, and shall be positioned so that they can be seen readily from a distance of at least 7.6 m (25 ft).

4.5.10 Fire Protection.

Fire protection shall conform to the requirements of NFPA 418 .

4.5.11 Personnel Training.

All heliport personnel shall be trained in the operation of emergency fuel shutoff controls and in the use of the available fire extinguishers.

4.6 Self-Service Aircraft Fueling.

4.6.1

Self-service fueling shall be permitted, subject to the approval of the authority having jurisdiction.

4.6.2 Fueling Facilities.

In addition to the special requirements of this chapter, the fuel storage, piping, and dispensing system shall comply with the requirements of NFPA 30 and with applicable portions of this standard.

4.6.3 Dispensing Devices.

4.6.3.1

Listed or approved dispensing devices shall be used.

4.6.3.2

Access to dispensing equipment shall be controlled by means of mechanical or electronic devices designed to resist tampering and to prevent access or use by unauthorized persons.

4.6.3.3

Dispensing devices shall have a listed or approved emergency shutoff valve, incorporating a fusible link or other thermally actuated device designed to close automatically in case of fire. This valve also shall incorporate a shear section that automatically shuts off the flow of fuel due to severe impact. This valve shall be rigidly mounted at the base of the dispenser in accordance with the manufacturer's instructions.

4.6.3.4

Dispensing devices shall be located on an island to protect against collision damage or shall be suitably protected with pipe bollards or other suitable protection.

4.6.3.5*

Dispensing devices or cabinets shall be designed so that a proper bond between the aircraft and the fueling equipment can be established in accordance with Section 5.4 .

4.6.4

Hose shall comply with the requirements of Section 4.2 . Two or more lengths of hose shall not be coupled together.

4.6.5 Nozzles.

4.6.5.1

Overwing nozzles shall conform to 4.3.16.2 .

4.6.5.2

Underwing nozzles shall conform to 4.3.16.3 .

4.6.6 Emergency Fuel Shutoff System.

4.6.6.1

A system conforming with 4.4.5 shall be provided to shut off the flow of fuel completely in an emergency. The emergency fuel shutoff controls shall be in addition to the normal operating controls for the dispenser and deadman control.

4.6.6.2

The controls shall be designed to allow only authorized personnel to reset the system after an emergency fuel shutoff.

4.6.6.3

The emergency fuel shutoff controls shall be installed in a location acceptable to the authority having jurisdiction and shall be more than 6 m (20 ft) but less than 30 m (100 ft) from the dispensers.

4.6.7

A clearly identified means to notify the fire department shall be provided and shall be located in the immediate vicinity of each emergency fuel shutoff control.

4.6.8

Each facility shall have a minimum of one fire extinguisher with a rating of at least 20-B:C located at the dispenser and one fire extinguisher with a rating of at least 20-B:C at each emergency fuel shutoff control.

~~**4.6.9**~~

~~In addition to the warning signs specified in 4.4.5.7 and 5.8.1 , emergency instructions shall be conspicuously posted in the dispensing area and at the emergency fuel shutoff control and shall provide the address of the site and shall incorporate the following or equivalent wording:~~

~~EMERGENCY INSTRUCTIONS:~~

~~In case of fire or spill:~~

~~Use emergency fuel shutoff~~

~~Report accident by calling (specify local fire emergency reporting number) on phone~~

~~Report address of site (list address of site here)~~

~~**4.6.10** Operating Instructions.~~

~~Operating instructions shall be posted. The instructions shall include the proper operation and use of all equipment, correct bonding procedures, the procedures that are to be employed to dispense fuel safely, the location and use of the emergency fuel shutoff controls, the use of the available fire extinguishers, and the procedures to be used in the event of an emergency.~~

Supplemental Information

File Name	Description
407_Reorganization.xlsx	
407_Chapter_4.docx	New chapter with mark-up and SL notes (red)
407_Chapter_4_Clean.docx	Clean copy of new chapter

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 22 14:19:43 EDT 2014

Committee Statement

Committee Statement: The existing content in Chapters 4 (Design) and 5 (Operations), along with the associated Annex material, has been reorganized into new chapters: 4 General Requirements, 5 Aviation Fueling Facilities, 6 Airport Fueling Vehicles, 7 Rooftop Heliports, and 8 Self-Service Aircraft Fueling. The new document structure intends to build symmetry between the chapters, so that the same topic will be found under the same level 3 section number of each chapter. The applicability of chapters is described in 4.1.1 of the new Chapter 4. Individual technical changes for Chapter 4 are addressed below.

4.1.3 [4.3.16.2] Deleted requirement for a bonding cable on all overwing nozzles. Bonding is addressed elsewhere in the standard. It is not necessary to require a bonding clip on all nozzles, since other methods are sometimes employed.

4.1.4.3.6 [5.16.4] Deleted requirements for hose repair methods. The method of repair is outside the scope of this document. (Public Input 25)

4.1.8 [new] Added requirement for automatic air vent/eliminator on filter vessels. AAVs and AAEs prevent filter vessel fires and explosions.

4.1.10 [4.1.6, 5.13.1, 5.13.4] Added reference to NFPA 410 and deleted requirement for specific extinguisher rating/capacity based on open-hose flow rate. Portable fire extinguishers for ramps are

already covered within the scope of NFPA 410. Added prohibition of ABC dry chemical, which was adopted as TIA 12-1 and is reconfirmed by the committee. Removed the specific reference to aluminum components in the annex. (Public Input 18)

4.2.3.5.7 [5.2.6] Revised requirement for notification of airport fire crew for spills over 3 m. The term airport fire crew seems to imply an airport based fire department or fire crew has been established and is available. There are many smaller municipal airports and small private airports and landing strips where no official airport fire crew has been established or is present. In those cases it should be required that the local fire department serving the airport area shall be notified. (Public Input 27)

4.2.3.5.9 [new] Added requirement for implementation of corrective measures after a spill investigation to permit the AHJ to enforce corrective actions to prevent future spills.

4.2.5.1.2 [5.4.1] Revised requirement for grounding during aircraft fueling. The revision clarifies that grounding should not be practiced unless necessitated by other operations or conditions. Refer to the existing annex material in A.4.2.5 [A.5.4]. (Public Input 11)

4.2.5.2 [5.4.2] Removed the requirement to use a bond cable as the means of bonding, since other methods may be used. However, where a bond cable and connection point are available, they shall be used as the preferred method of bonding.

4.2.9.2 [new] and 4.2.9.3 [new] Added new requirements for maximum hose life. Aligns with the requirements of ATA 103.

4.2.9.4 [5.16.1] Revised requirement for daily hose inspections. The section was revised to clarify the various defects and to comply with the Manual of Style. The requirement to determine the cause of defects was unenforceable. The requirement to replace defective hoses will drive root-cause analysis. (Public Input 22)

4.2.10 [5.9.2] Revised requirements for lightning precautions. Removed an unenforceable requirement [5.9.1]. The revised text allows the airport to develop appropriate policies. (Public Input 20)

4.2.11.2.2 [5.11.2] Deleted requirement for passengers to proceed directly between the aircraft and gate. Passenger safety while on the ramp is already addressed in 4.2.11.2.2. (Public Input 21)

4.2.12.1 [5.7.4] Deleted requirement to prohibit photographic equipment with 3m (10 ft) of the fueling operation. This was an outdated requirement.

4.2.12.3 [5.5] Revised requirements for engines operating during fueling. Aircraft auxiliary power units (APUs) are commonly operated at airports where ground-provided electrical and heating/air conditioning are not available. The exhausts of these units are generally directed away from fueling operations. At locations where quick-turnarounds of aircraft take place, APUs are necessary to provide lighting and environmental controls inside the cabin of the aircraft to allow passenger boarding/deboarding and cleaning, which generally take place coincidentally with fueling. (Public Input 19)

4.2.14 [5.21] Revised requirements for rapid refueling. The section was revised to permit rapid refueling of fixed-wing aircraft in certain situations, where the risk to passengers is low. (Public Input 38 and 35)

Response Message:

Public Input No. 18-NFPA 407-2014 [Section No. 5.13.4]
Public Input No. 19-NFPA 407-2014 [New Section after 5.5.1]
Public Input No. 20-NFPA 407-2014 [Section No. 5.9.1]
Public Input No. 21-NFPA 407-2014 [Section No. 5.11.3]
Public Input No. 22-NFPA 407-2014 [Section No. 5.16.1]
Public Input No. 25-NFPA 407-2014 [Section No. 5.16.4]
Public Input No. 27-NFPA 407-2014 [Section No. 5.2.6]

Public Input No. 35-NFPA 407-2014 [Section No. 5.21]
Public Input No. 38-NFPA 407-2014 [New Section after 5.5.1]
Public Input No. 11-NFPA 407-2013 [Section No. 5.4.1]

Ballot Results

This item has passed ballot

27 Eligible Voters
5 Not Returned
18 Affirmative All
3 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Bosserman, Terry L.
4.1.7.1 should also list the hydrant pit coupler 4.1.8 with a fuel over fuel controlling system for pressure control we also should state that it is fail safe with a pressure control loss. 4.2.11.1 fueling to be performed indoors with approval from authority having jurisdiction. 4.2.12..1.1 battery chargers can be already connected prior to and with fueling they just can't be reconnected during fueling 4.3.6.3.2 need to add the word OEM to diffuser 4.3.6.6 Need to make this statement the same as 6.1.13.6 in that only carburetor engines only need a spark arrestor 4.3.7.6 gaskets are not required on explosion proof electrical boxes so gaskets would not be required with all connections. 4.3.12.2 need to add that a tank can also meet MC306 not just MC406 4.3.12.5 same as 4.3.12.2 4.3.14.3 I don'tthink any manufacture uses a gasket that can withstand the same melt time as the flange bolts.
Gammon, James
4.2.9.6.1 – I suggest you add the word “internal” so it reads “…evidence of internal hose deterioration.” The

reason is that many people don't consider the interior to be of concern, of being vulnerable and this educates them on what they are looking for. But perhaps "…evidence of internal hose deterioration of other equipment failure." Is better. We have also seen metal bits from defective meters and bad welds in nozzle screens and failed valve seals.

Nuzzolese, Aldo

4.1.3.2 Add: Overwing fueling shall be performed using the preset meter. 4.1.3.7 Change: Aircraft refueling systems shall operate in a fail-safe manner to continuously control refueling pressure. Hydrant servicers and carts shall be equipped with two independent pressure regulating/control systems installed between the hydrant riser and the aircraft refueling adapter, where they are both controlled by the vehicle's refueling system. Tanker Vehicles shall be equipped with two independent pressure regulating/control systems installed between the pump discharge and the aircraft refueling adapter, where they are both controlled by the vehicle's refueling system. Adequate provisions shall be provided for flow control, surge control, emergency shutdowns, and safeguards to prevent fuel spills. Fuel pressure and surge pressure shall be controlled within the aircraft's limits during all flow conditions. Add: The refueling system and all of its components shall have a minimum working pressure rating of 150 PSIG or the minimum pressure up to which the refueling system and each component will function satisfactorily including pressure transients (surges), throughout the life of the component without any external leakage, failure and/or malfunction, or permanent deformation. Add 4.2.7.5: Powder type fire extinguishers installed on vehicles shall be installed in the horizontal position. 4.2.11.2.1.2 Add: When required by the authority having jurisdiction.

Negative with Comment

Moody, William E.

Comment for 4.2.4.5. I have been vocal on this point for some time now, and would like to know reasoning for not changing to meet API, JIG, and rest off the globe on this one. It would be good to get global alignment on this as it seems NFPA 407 is the only regulation globally that still asks to bond in this sequence. The bonding sequence when hydrant fueling in North America is slightly different than what is used primarily outside North America at this time. In API/EI 1540 [9.2.4.2] the bonding sequence is to bond the aircraft and vehicle fist then connect the pit coupler. In NFPA 407 [5.4] it says to connect the pit coupler before bonding the equipment. The API/EI undertook an electro static review to determine which sequence would be the safest. It says that in most instances that there is no difference from a safety stand point in the sequence except in one particular condition the sequence described in 1540 is safer. In the hopes of aligning practices globally I would like to suggest the NFPA group review this work to see if it should revise its current bonding sequence practice

First Revision No. 25-NFPA 407-2014 [Chapter 5]

Chapter 5 ~~Operations~~ Aviation Fueling Facilities

5.1 ~~General.~~ Design and Construction.

~~**5.1.1***~~

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

~~**5.1.2**~~

~~Where a valve or electrical device is used for isolation during maintenance or modification of the fuel system, it shall be tagged/locked. The tag/lock shall not be removed until the operation is completed.~~

~~**5.1.3**~~

~~Aircraft fueling vehicles shall be marked with the name of the operator or the responsible organization.~~

~~**5.1.3.1**~~

~~The marking shall be approved, legible signs on both sides of the exterior of the vehicle.~~

~~**5.1.4***~~

~~The authority having jurisdiction shall determine the suitability of fuel servicing vehicles utilizing tunnels, enclosed roadways, or the like.~~

5.1.1 General Requirements.

5.1.1.1

Each installation shall be designed and installed in conformity with the requirements of this standard and with any additional fire safety measures deemed necessary by the authority having jurisdiction.

5.1.1.2

The system and each of its components shall be designed for the working pressure of the system.

5.1.1.3

The emergency fuel shutoff system shall be designed and installed as an integral part of the airport fuel system.

5.1.1.4

Operating controls for emergency fuel shutoff of the system shall be located to be accessible readily and safely in the event of an accident or spill.

5.1.1.5

In establishing each aircraft fuel dispensing location, consideration shall be given to the accessibility of the location in an emergency by fire-fighting personnel and equipment.

5.1.1.6 System Design and Approval.

5.1.1.6.1 Design Approval.

Work shall not be started on the construction or alteration of an airport fuel system until the design, plans, and specifications have been approved by the authority having jurisdiction.

5.1.1.6.2 System Approval.

The authority having jurisdiction shall inspect and approve the completed system before it is put into service.

5.1.1.6.3 Hydrostatic Test.

5.1.1.6.3.1

After completion of the installation (including fill and paving), new airport fuel piping systems shall be subjected to a temperature-compensated hydrostatic test pressure equal to 150 percent of the system working pressure for at least 4 hours and shall be proven tight before the system is placed into service.

5.1.1.6.3.2

For additions or modifications to existing airport fuel piping systems, hydrostatic testing of new piping prior to final tie-in to existing piping shall be permitted, with final closure (tie-in) welds examined in-process in accordance with ASME B31.3, 100 percent radiographic or ultrasonic examination.

5.1.2 Fuel Storage Tanks.

5.1.2.1*

Fuel storage tanks shall conform to the applicable requirements of NFPA 30 .

5.1.2.2
Tanks shall be located in accordance with FAA AC-150/5300 or equivalent and any applicable regulations.

5.1.3 Pumps and Piping Systems.

5.1.3.1
Underground piping shall be used in the vicinity of aircraft operating areas unless the piping is protected by a substantial barrier guard.

5.1.3.2
Piping shall be protected by suitable sleeves or casings to protect the pipe from shock hazards where it crosses sewer lines, service tunnels, or other underground services.

5.1.3.3
Piping shall be laid on firm supports using clean, noncorrosive backfill.

5.1.3.4
Transfer piping located within buildings not specifically designed for the purpose of fuel transfer shall be located within a steel casing of a pressure rating equal to that of the carrier pipe.

5.1.3.4.1
The casing shall extend beyond the building.

5.1.3.4.2
The casing shall terminate at a low point(s) with an automatic leak detection system.

5.1.3.4.3
The casing shall be capable of being drained to a safe location.

5.1.3.5
Fuel piping that runs under a building or a passenger concourse shall be protected by a steel casing that encloses only the piping.

5.1.3.6
Piping, valves, and fittings shall be of metal suitable for aviation fuel service and designed for the working pressure and mechanically and thermally produced structural stresses to which they could be subjected and shall comply with ANSI/ASME B31.3.

5.1.3.7
Cast-iron, copper, copper alloy, and galvanized steel piping, valves, and fittings shall not be permitted.

5.1.3.8
Ductile iron valves shall be permitted.

5.1.3.9
Aluminum piping, valves, and fittings shall be used only where specifically approved by the authority having jurisdiction.

5.1.3.10
In the selection of pipe, valves, and fittings, the following shall be considered:

(1) Working pressure
(2) Bending and mechanical strength requirements (including settlement)
(3) Internal and external corrosion
(4) Impact stresses
(5) Method of system fabrication and assembly
(6) Location of piping and accessibility for repair or replacement
(7) Exposure to mechanical, atmospheric, or fire damage
(8) Expected period of service and effect of future operations

5.1.3.11
Gaskets in flanged connections shall resist fire temperatures for a duration comparable to the temperature resistance of the flange and bolts.

5.1.3.12
Allowances shall be made for thermal expansion and contraction by the use of pipe bends, welded elbows, or other flexible design.

5.1.3.13
Pressure relief valves shall be provided in lines that can be isolated.
5.1.3.14
Welded joints shall be made by qualified welders in accordance with the standards of the American Welding Society and ANSI/ASME B31.3.
5.1.3.15*
Isolation valves or devices shall be provided to facilitate dismantling portions of the fueling system.
5.1.3.16
Isolation valves shall be capable of being locked closed.
5.1.3.17
Buried flanges and valves shall not be permitted.
5.1.3.18*
All fueling systems with underground piping shall have cathodic protection to mitigate corrosion.
5.1.3.19
A heat-actuated shutoff valve shall be provided in the piping immediately upstream of loading hoses or swing arm connections.
5.1.4 Hose and Nozzles. (Reserved)
5.1.5 Bonding. (Reserved)
5.1.6 Electrical Systems.
5.1.6.1 Electrical Equipment.
All electrical equipment and wiring shall comply with the requirements of *NFPA 70* , Article 515, utilizing the Class I liquids requirements for all applications.
5.1.7 Control of Fuel Flow.
5.1.7.1* Deadman Controls.
5.1.7.1.1
The valve that controls the flow of fuel to an aircraft or fueling vehicle shall have a deadman control.
5.1.7.1.2
The fuel flow control means shall be one of the following:

(1) The hydrant pit valve
(2) At the feed-side of the fueling hose
(3) A separate valve on the fuel piping system
(4) On the hose nozzle for overwing servicing
(5) An electronic control to stop the pump

5.1.7.1.3
Deadman controls shall be designed to preclude defeating their intended purpose.
5.1.7.2 Pressure Fuel Servicing System Controls.
5.1.7.2.1
The system shall be designed to minimize surge pressure.
5.1.7.2.2*
The overshoot shall not exceed 5 percent of actual flow rate in L/min (gal/min) at the time the deadman is released.
5.1.7.2.3
The control valve shall be located and designed so that it will not be rendered inoperative by a surface accident, power failure, or spill.
5.1.7.2.4
The control valve shall be fail-safe by closing completely in the event of control power loss.
5.1.7.3 Hydrant Valves.
Hydrant valves shall be designed so that the flow of fuel shall shut off when the hydrant coupler is closed.
5.1.7.3.1
Hydrant valves shall be of the self-closing, dry-break type.

5.1.7.4 Flow Control Valves.

The flow control valve shall be an integral part of the hydrant valve or coupler.

5.1.7.4.2

The fuel control valve shall be arranged so that it is not rendered inoperative by a surface accident, spill, or malfunction and shall shut off the flow of fuel if the operating energy fails.

5.1.7.4.3

The fuel control system shall be designed to minimize overshoot.

5.1.7.4.4

The system shall be designed to shut off fuel flow quickly and effectively, even if there is a reduction of pressure downstream of the flow control valve such as could result from a major line or hose break.

5.1.7.4.5

A screen shall be provided ahead of the valve to trap foreign material that could interfere with complete closure of the valve.

5.1.7.4.6

The hydrant valve that allows the flow of fuel to the aircraft shall have a deadman control.

5.1.7.4.7

The use of any means that allows fuel to flow without the operator activating the deadman shall not be permitted.

5.1.7.4.8

The deadman control shall be arranged so that the fueling operator can observe the operation while activating the control.

5.1.7.4.9

Wireless deadman controls shall be permitted.

5.1.7.5* Fuel Pressure.

The pressure of the fuel delivered to the aircraft shall be automatically controlled so that it is not higher than that specified by the manufacturer of the aircraft being serviced.

5.1.8 Filters and Ancillary Equipment.

5.1.8.1

All sections of the filtering system shall have electrical continuity with adjoining piping and equipment.

5.1.8.2

In freezing climates, filter separator sumps and associated piping that could contain water shall be protected to prevent freezing and bursting.

5.1.8.3

Heaters shall be constructed of noncorrosive materials.

5.1.8.4

Piping, valves, meters, filters, air eliminators, connections, outlets, fittings, and other components shall be designed to meet the working pressure requirements of the system.

5.1.9 Emergency Fuel Shutoff Systems.

5.1.9.1

Each tank vehicle loading station shall be provided with an emergency fuel shutoff system, in addition to the deadman control required by 5.1.7.4 .

5.1.9.2

The emergency fuel shutoff system shall shut down the flow of fuel in the entire system or in sections of the system.

5.1.9.3

The emergency fuel shutoff system shall be of a fail-safe design.

5.1.9.4*

The method of fuel transfer (gravity, pumping, or use of hydraulic or inert gas pressure) shall be considered in the design of the emergency fuel shutoff system and the location of the emergency fuel shutoff valve.

5.1.9.5

The emergency fuel shutoff system shall include shutoff stations located outside of probable spill areas and near the route that normally is used to leave the spill area or to reach the fire extinguishers provided for the protection of the area.

5.1.9.6* At least one emergency shutoff control station shall be accessible to each fueling vehicle loading position or aircraft fueling position.

5.1.9.7 The emergency fuel shutoff system shall be designed so that operation of a station shuts off fuel flow to all hydrants that have a common exposure.

5.1.9.8 Emergency fuel shutoff systems shall be designed so that they shut off the flow of fuel if the operating power fails.

5.1.9.9 Emergency fuel shutoffs shall not be located beneath piping, pumps, vents, or other components containing fuel or fuel vapors.

5.1.10 Fire Protection.

At least one fire extinguisher, with a minimum rating of 80-B:C, shall be provided at each fueling vehicle loading position or rack.

5.1.11 Marking and Labeling.

5.1.11.1 Emergency fuel shutoff signs shall be located at least 2.1 m (7 ft) above grade, measured to the bottom of the placard.

5.1.11.2 Emergency fuel shutoff signs shall be positioned so that they can be seen readily from a distance of at least 15.2 m (50 ft).

5.1.11.3 Systems provided with impressed current cathodic protection shall have appropriate signs, located at points of entry, warning against separation of units without prior de-energization or without proper jumpers across the sections to be disconnected.

5.1.11.4 Fuel storage tanks shall be labelled in accordance with the requirements of NFPA 704 .

5.1.11.5 Fuel transfer piping shall be marked in accordance with EI 1542 as to the product type conveyed through the pipe and the proper direction of flow of the product.

5.1.12 Aircraft Fuel Servicing Vehicle Loading and Unloading Racks.

5.1.12.1 The loading rack shall be equipped with an automatic shutdown system that stops the tank loading operation when the fuel servicing vehicle tank is full.

5.1.12.2 All fuel servicing tank vehicle primary shutdown systems shall be compatible with the system utilized at the loading rack.

5.1.12.3 The automatic secondary shutoff control shall not be used for normal filling control.

5.1.12.4 New and existing loading systems shall comply with 5.1.12.1 through 5.1.12.3 within 5 years of the effective date of this edition.

5.1.13 Fuel Servicing Hydrants, Pits, and Cabinets.

5.1.13.1 Fueling hydrants and fueling pits that are recessed below a ramp or apron surface and are subject to vehicle or aircraft traffic shall be fitted with a cover designed to sustain the load of vehicles or aircraft that taxi over all or part of them.

5.1.13.2 Fueling hydrants, cabinets, and pits shall be located at least 15.2 m (50 ft) from any terminal building, hangar, service building, or enclosed passenger concourse (other than loading bridges).

5.2 ~~Prevention and Control of Spills.~~ Operations.

~~5.2.1~~ ~~Fuel servicing equipment shall comply with the requirements of this standard and shall be maintained in safe operating condition. Leaking or malfunctioning equipment shall be removed from service.~~

~~**5.2.2**~~

~~Following fueling of an aircraft, all hoses shall be removed, including those from hydrant systems. All hoses shall also be properly stowed.~~

~~**5.2.3**~~

~~Fuel nozzles shall not be dragged along the ground.~~

~~**5.2.4**~~

~~Approved pumps, either hand operated or power operated, shall be used where aircraft are fueled from drums. Pouring or gravity flow shall not be permitted from a container with a capacity of more than 19 L (5 gal).~~

~~**5.2.5**~~

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

~~**5.2.5.1**~~

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

~~**5.2.5.2**~~

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

~~**5.2.5.3**~~

~~The supervisor shall be notified immediately.~~

~~**5.2.5.4**~~

~~Cleaning operations shall be performed by personnel trained in accordance with Section 5.1.1 .~~

~~**5.2.5.5**~~

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

~~**5.2.6**~~

~~The airport fire crew shall be notified if a spill covers over 3 m (10 ft) in any direction or is over 5 m^2 (50 ft^2) in area, continues to flow, or is otherwise a hazard to persons or property. 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.~~

~~**5.2.7**~~

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

~~**5.2.8**~~

~~Not more than one tank vehicle shall be permitted to be connected to the same aircraft fueling manifold.~~

~~*Exception: Where means are provided to prevent fuel from flowing back into a tank vehicle because of a difference in pumping pressure.*~~

5.2.1* Security.

Access to fuel storage and fuel vehicle loading areas shall be secured.

5.2.2 Personnel. (Reserved)

5.2.3 Prevention and Control of Spills. (Reserved)

5.2.4 Emergency Fuel Shutoff. (Reserved)

5.2.5 Bonding. (Reserved)

5.2.6 Control of Fuel Flow.

If a wireless deadman control is used, the operator shall be located at the fueling point during the fueling operation.

5.2.7 Fire Protection.

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

5.2.8 Maintenance. (Reserved)

5.2.9 Aircraft Fueling Hose. (Reserved)

~~**5.3** Emergency Fuel Shutoff.~~

~~**5.3.1**~~

~~Access to emergency fuel shutoff control stations shall be kept clear at all times.~~

5.3.2

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

5.3.3

If the fuel flow stops for any reason, it first shall be presumed that an emergency fuel shutoff system has been actuated. The cause of the shutoff shall be corrected before fuel flow is resumed.

5.3.4

Emergency fuel shutoff systems shall be operationally checked at intervals not exceeding 6 months. Each individual device shall be checked at least once during every 12-month period.

5.3.5

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

5.4 Bonding.

5.4.1

Prior to making any fueling connection to the aircraft, the fueling equipment shall be bonded to the aircraft by use of a cable, thus providing a conductive path to equalize the potential between the fueling equipment and the aircraft. The bond shall be maintained until fueling connections have been removed, thus allowing separated charges that could be generated during the fueling operation to reunite. Grounding during aircraft fueling shall not be permitted.

5.4.2

In addition to the requirements in 5.4.1 , where fueling overwing, the nozzle shall be bonded with a nozzle bond cable having a clip or plug to a metallic component of the aircraft that is metallically connected to the tank filler port. The bond connection shall be made before the filler cap is removed. 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. The spout shall be kept in contact with the filler neck until the fueling is completed.

5.4.3*

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. Only metal funnels shall be used.

5.4.4

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.

5.4.5

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

5.4.6

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

5.5 Operation of Aircraft Engines and Heaters.

5.5.1

Fuel servicing shall not be performed on a fixed wing aircraft while an onboard engine is operating. *(See Section 5.21 .)*

Exception: In an emergency resulting from the failure of an onboard auxiliary power unit on a jet aircraft and in the absence of suitable ground support equipment, a jet engine mounted at the rear of the aircraft or on the wing on the side opposite the fueling point shall be permitted to be operated during fueling to provide power, provided that the operation follows written procedures approved by the authority having jurisdiction.

5.5.2

Combustion heaters on aircraft (e.g., wing and tail surface heaters, integral cabin heaters) shall not be operated during fueling operations.

5.6 Use of Equipment Powered by Internal Combustion Engines Around Aircraft.

5.6.1

Equipment, other than that performing aircraft servicing functions, shall not be permitted within 15 m (50 ft) of aircraft during fuel servicing operations.

5.6.2

Equipment performing aircraft servicing functions shall not be positioned within a 3 m (10 ft) radius of aircraft fuel system vent openings.

5.6.3

During overwing aircraft fuel servicing where aircraft fuel system vents are located on the upper wing surface, equipment shall not be positioned under the trailing edge of the wing.

5.6.4

All vehicles that have engines equipped with an exhaust after-treatment device, such as a DPF, that requires the filter to be cleaned at high temperature (regenerated) while installed on the vehicle shall meet the requirements of 5.6.4.1 through 5.6.4.7 .

5.6.4.1

DPF regeneration shall be performed only in area(s) designated by the authority having jurisdiction.

5.6.4.2

DPF regeneration shall not be performed within 30 m (100 ft) of any aircraft refueling operations.

5.6.4.3* Vehicle Regeneration Area.

5.6.4.3.1

The immediate area surrounding the DPF exhaust outlet shall be concrete or other high temperature–resistant material and shall be clear of any grass, soil, or flammable materials.

5.6.4.3.2

The area shall be in a remote location that is a minimum of 30 m (100 ft) from the nearest aircraft parking location, airport terminal, or flammable storage or a minimum of 15 m (50 ft) from any other building.

5.6.4.3.3

The area shall be clearly marked with a minimum 61 cm by 30 cm (2 ft by 1 ft) sign reading "Vehicle DPF Regeneration Area," which shall have letters at least 75 mm (3 in.) high and shall be of a color contrasting sharply with the sign background for visibility.

5.6.4.4

The regeneration cycle shall be performed only by trained personnel, who shall remain with the vehicle until the regeneration cycle is complete.

5.6.4.5

The vehicle shall be visually inspected for any signs of fluid leaks under or around the vehicle before regeneration is initiated. DPF regeneration shall not be initiated if there are any signs of any fluid leaks on or beneath the vehicle.

5.6.4.6

Once a regeneration cycle is started, it shall be completed without interruption.

5.6.4.7

After the regeneration process is successfully completed, the vehicle shall be permitted to return to normal service. Problems occurring during the regeneration cycle shall be corrected prior to the vehicle returning to normal service.

5.6.4.8

Aircraft refueling operations shall not be initiated if the regenerative system indicates regeneration is required.

5.7 Electrical Equipment Used on Aircraft Servicing Ramps.

5.7.1

Battery chargers shall not be connected, operated, or disconnected while fuel servicing is performed on the aircraft.

5.7.2*

Aircraft ground-power generators or other electrical ground-power supplies shall not be connected or disconnected while fuel servicing is performed on the aircraft.

5.7.3

Electric tools or similar tools likely to produce sparks or arcs shall not be used while fuel servicing is performed on the aircraft.

5.7.4

Photographic equipment shall not be used within 3 m (10 ft) of the fueling equipment or the fill or vent points of aircraft fuel systems.

5.7.5

Other than aircraft fuel servicing vehicles, battery-powered vehicles that do not comply with the provisions of this standard shall not be operated within 3 m (10 ft) of fueling equipment or spills. *(See Section 5.6 .)*

5.7.6* Communication equipment located outside of the cab of the vehicle and used during aircraft fuel servicing operations within 3 m (10 ft) of the fill or vent points of aircraft fuel systems shall be listed as intrinsically safe for Class I, Division 1, Group D hazardous (classified) locations in accordance with ANSI/UL 913.

5.8 Open Flames on Aircraft Fuel Servicing Ramps.

5.8.1 Entrances to fueling areas shall be posted with “no smoking” signs.

5.8.2 Open flames on aircraft fuel servicing ramps or aprons within 15 m (50 ft) of any aircraft fuel servicing operation or fueling equipment shall be prohibited.

5.8.3 The category of open flames and lighted open-flame devices shall include, but shall not be limited to, the following:

- Lighted cigarettes, cigars, pipes
- Exposed flame heaters, liquid, solid, or gaseous devices, including portable and wheeled gasoline or kerosene heaters
- Heat-producing, welding, or cutting devices and blowtorches
- Flare pots or other open-flame lights

5.8.4 The authority having jurisdiction can establish other locations where open flames and open-flame devices shall not be permitted.

5.8.5 Personnel shall not carry lighters or matches on their person while engaged in fuel servicing operations.

5.8.6 Lighters or matches shall not be permitted on or in fueling equipment.

5.9 Lightning Precautions.

5.9.1 Fuel servicing operations shall be suspended where lightning flashes are in the immediate vicinity of the airport.

5.9.2 A written procedure shall be established to set the criteria for where fueling operations are to be suspended at each airport as approved by the fueling agent and the airport authority.

5.10 Aircraft Fuel Servicing Locations.

5.10.1 Aircraft fuel servicing shall be performed outdoors. Aircraft fuel servicing incidental to aircraft fuel system maintenance operations shall comply with the requirements of NFPA 410 .

5.10.2* Aircraft being fueled shall be positioned so that aircraft fuel system vents or fuel tank openings are not closer than 7.6 m (25 ft) to any terminal building, hangar, service building, or enclosed passenger concourse other than a loading walkway. Aircraft being fueled shall not be positioned so that the vent or tank openings are within 15 m (50 ft) of any combustion and ventilation air-intake to any boiler, heater, or incinerator room.

5.10.3 Accessibility to aircraft by emergency fire equipment shall be established for aircraft fuel servicing positions.

5.11 Aircraft Occupancy During Fuel Servicing Operations.

5.11.1

If passengers remain onboard an aircraft during fuel servicing, at least one qualified person trained in emergency evacuation procedures shall be in the aircraft at or near a door at which there is a passenger loading walkway, integral stairs that lead downward, or a passenger loading stair or stand. A clear area for emergency evacuation of the aircraft shall be maintained at not less than one additional exit. Where fueling operations take place with passengers onboard away from the terminal building, and stairways are not provided, such as during inclement weather (diversions), all slides shall be armed and the Aircraft Rescue and Fire Fighting (ARFF) services shall be notified to respond in standby position in the vicinity of the fueling activity with at least one vehicle. Aircraft operators shall establish specific procedures covering emergency evacuation under such conditions for each type of aircraft they operate. All “no smoking” signs shall be displayed in the cabin(s), and the no smoking rule shall be enforced.

5.11.2

For each aircraft type, operators shall determine the areas through which it could be hazardous for boarding or deplaning passengers to pass while the aircraft is being fueled. Controls shall be established so that passengers avoid such areas.

5.11.3

Passengers shall not be permitted to linger about the plane but shall proceed directly between the loading gate and the aircraft.

5.12 Positioning of Aircraft Fuel Servicing Vehicles and Carts.

5.12.1

Aircraft fuel servicing vehicles and carts shall be positioned so that a clear path of egress from the aircraft for fuel servicing vehicles shall be maintained.

5.12.2

The propulsion or pumping engine of aircraft fuel servicing vehicles or carts shall not be positioned under the wing of the aircraft during overwing fueling or where aircraft fuel system vents are located on the upper wing surface. Aircraft fuel servicing vehicles or carts shall not be positioned within a 3 m (10 ft) radius of aircraft fuel system vent openings.

5.12.3

Parking brakes shall be set on all fuel servicing vehicles or carts before operators begin the fueling operation.

5.13 Portable Fire Extinguishers.

5.13.1

During fueling operations, fire extinguishers shall be available on aircraft servicing ramps or aprons.

5.13.2

Each aircraft fuel servicing tank vehicle shall have two listed fire extinguishers, each having a rating of at least 20-B:C, with one extinguisher mounted on each side of the vehicle.

5.13.3

One listed fire extinguisher having a rating of at least 20-B:C shall be installed on each hydrant fuel servicing vehicle or cart.

5.13.4

Where the open hose discharge capacity of the aircraft fueling system or equipment is more than 750 L/min (200 gpm), at least one listed wheeled extinguisher having a rating of not less than 80-B:C and a minimum capacity of 55 kg (125 lb) of agent shall be provided.

5.13.5*

Extinguishers shall be kept clear of elements such as ice and snow. Extinguishers located in enclosed compartments shall be readily accessible, and their location shall be marked clearly in letters at least 50 mm (2 in.) high.

5.13.6*

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

5.14 Defueling.

5.14.1

The transfer of fuel from an aircraft to a tank vehicle through a hose generally is similar to fueling, and the same requirements shall apply. In addition, each operator shall establish procedures to prevent the overfilling of the tank vehicle, which is a special hazard when defueling *(see 4.3.21.7)* .

5.14.1.1

There shall be a procedure to eliminate air ingested during a defueling operation prior to the aircraft fuel servicing tank vehicle being reused.

5.14.2

Where draining residual fuel from aircraft tanks incidental to aircraft fuel system maintenance, testing, manufacturing, salvage, or recovery operations, the procedures of NFPA 410 shall apply.

5.15 Deadman Control Monitoring.

5.15.1

The fueling operator shall monitor the panel of the fueling equipment and the aircraft control panel during pressure fueling or shall monitor the fill port during overwing fueling.

5.15.2

Fuel flow shall be controlled by use of a deadman control device. The use of any means that defeats the deadman control shall be prohibited.

5.16 Aircraft Fueling Hose.

5.16.1

Aircraft fueling hose shall be inspected before use each day. The hose shall be extended as it normally would be for fueling and checked for evidence of blistering, carcass saturation or separation, cuts, nicks, or abrasions that expose reinforcement material, and for slippage, misalignment, or leaks at couplings. If coupling slippage or leaks are found, the cause of the problem shall be determined. Defective hose shall be removed from service.

5.16.2

At least once each month the hose shall be completely extended and inspected as required in 5.16.1 . The hose couplings and the hose shall be examined for a length approximately 305 mm (12 in.) adjacent to the couplings. Structural weakness shall be checked by pressing the hose in this area around its entire circumference for soft spots. Hoses that show evidence of soft spots shall be removed from service. The nozzle screens shall be examined for rubber particles. The presence of such particles indicates possible deterioration of the interior, and the hose shall be removed from service. With the hose still completely extended, it shall be checked at the working pressure of the fueling equipment to which it is attached. Any abnormal twisting or ballooning during this test indicates a weakening of the hose carcass, and the hose shall be removed from service.

5.16.3

A hose assembly that has been subjected to abuse, such as severe end-pull, flattening or crushing by a vehicle, or sharp bending or kinking, shall be removed from service. The hose assembly that has been subjected to abuse shall be hydrostatically tested prior to use. *(See 4.2.2.1 .)*

5.16.4*

If inspection shows that a portion of a hose has been damaged, the damaged portion shall be cut off and the undamaged portion recoupled. Two lengths of hose shall not be coupled together. Only couplings that are an exact match for the interior and exterior dimensions of the hose shall be used. Recoupled hose assemblies shall be hydrostatically tested. *(See 4.2.2.1 .)*

5.16.5

Before any hose assembly, new or recoupled, is placed in service, it shall be visually inspected for evidence of damage or deterioration.

5.16.6

Kinks or short loops in fueling hose shall be avoided.

5.16.7

Suitable records shall be kept of required inspections and hydrostatic tests.

5.17 Maintenance of Aircraft Fuel Servicing Vehicles and Carts.

5.17.1

Aircraft fuel servicing vehicles or carts shall not be operated unless they are in proper repair and free of accumulations of grease, oil, or other combustibles.

5.17.2

Leaking vehicles or carts shall be removed from service, defueled, and parked in a safe area until repaired.

5.17.3

Maintenance and servicing of aircraft fuel servicing vehicles and carts shall be performed outdoors or in a building approved for the purpose.

5.18 Parking Aircraft Fuel Servicing Tank Vehicles.

Parking areas for unattended aircraft fuel servicing tank vehicles shall be arranged to provide the following:

Dispersal of the vehicles in the event of an emergency

A minimum of 3 m (10 ft) of clear space between parked vehicles for accessibility for fire control purposes

Prevention of any leakage from draining to an adjacent building or storm drain that is not suitably designed to handle fuel

A minimum of 15 m (50 ft) from any parked aircraft and buildings other than maintenance facilities and garages for fuel servicing tank vehicles

5.19 Parking Aircraft Fuel Servicing Hydrant Vehicles and Carts.

Parking areas for unattended aircraft fuel servicing hydrant vehicles or carts shall be arranged to provide the following:

Dispersal of the vehicles in the event of an emergency

Prevention of any leakage from draining to an adjacent building or storm drain that is not suitably designed to handle fuel

5.20 Loading of Aircraft Fuel Servicing Tank Vehicles.

5.20.1 General Requirements.

5.20.1.1 Loading and Unloading.

5.20.1.1.1

Aircraft fuel servicing tank vehicles shall be loaded only at an approved loading rack.

5.20.1.1.2

Aircraft fuel servicing tank vehicles shall not be loaded from a hydrant pit under emergency conditions unless permitted by the authority having jurisdiction.

5.20.1.2

Filling of the vehicle cargo tank shall be under the observation and control of a qualified and authorized operator at all times.

5.20.1.3

The required deadman and automatic overfill controls shall be in normal operating condition during the filling operation. The controls shall not be blocked open or otherwise bypassed.

5.20.1.4

The engine of the tank vehicle shall be shut off before starting to fill the tank.

5.20.1.5

To prevent leakage or overflow from expansion of the contents due to a rise in atmospheric temperature or direct exposure to the sun, no cargo tank or compartment shall be loaded to the point where it is liquid full.

5.20.2 Top Loading.

5.20.2.1

Where loading tank trucks through open domes, a bond shall be established between the loading piping and the cargo tank to equalize potentials. The bond connection shall be made before the dome is opened and shall be removed only after the dome is closed.

5.20.2.2

Drop tubes attached to loading assemblies extending into the vehicle tank shall extend to the bottom of the tank and shall be maintained in that position until the tank is loaded to provide submerged loading and avoid splashing or free fall of fuel through the tank atmosphere. The flow rate into the tanks shall not exceed 25 percent of the maximum flow until the outlet is fully covered.

5.20.2.3

The level in the tank shall be visually monitored at all times during top loading.

5.20.3 Bottom Loading.

~~5.20.3.1~~

~~A bonding connection shall be made between the cargo tank and the loading rack before any fuel connections are made and shall remain in place throughout the loading operation.~~

~~5.20.3.2~~

~~The operator shall initiate fuel flow by means of a deadman control device.~~

~~5.20.3.3~~

~~The operator shall perform the precheck on each compartment shortly after flow has started, to ensure that the automatic high-level shutoff system is functioning properly.~~

~~5.20.3.4~~

~~At least monthly the operator shall perform a check to ensure complete closure of the bottom-loading valve on the tank vehicle.~~

~~5.21 Rapid Refueling of Helicopters.~~

~~5.21.1~~

~~Only turbine engine helicopters fueled with JET A or JET A-1 fuels shall be permitted to be fueled while an onboard engine is operating. Helicopters permitted to be fueled while an onboard engine is operating shall have all sources of ignition of potential fuel spills located above the fuel inlet port(s) and above the vents or tank openings. Ignition sources shall include, but shall not be limited to, engines, exhausts, auxiliary power units (APUs), and combustion-type cabin heater exhausts.~~

~~5.21.2~~

~~Helicopter fueling while onboard engines are operating shall be permitted only under the following conditions:~~

~~An FAA-licensed helicopter pilot shall be at the aircraft controls during the entire fuel servicing process.~~

~~* Passengers shall be deboarded to a safe location prior to rapid refueling operations. Where the pilot in command deems it necessary for passengers to remain onboard for safety reasons, the provisions of 5.11.1 shall apply.~~

~~Passengers shall not board or deboard during rapid refueling operations.~~

~~Only designated personnel, properly trained in rapid refueling operations, shall operate the equipment. Written procedures shall include the safe handling of the fuel and equipment.~~

~~All doors, windows, and access points allowing entry to the interior of the helicopter that are adjacent to, or in the immediate vicinity of, the fuel inlet ports shall be closed and shall remain closed during refueling operations.~~

~~Fuel shall be dispensed into an open port from approved deadman-type nozzles, with a flow rate not to exceed 227 L/min (60 gpm), or it shall be dispensed through close-coupled pressure fueling ports. Where fuel is dispensed from fixed piping systems, the hose cabinet shall not extend into the rotor space. A curb or other approved barrier shall be provided to restrict the fuel servicing vehicle from coming closer than within 3 m (10 ft) of any helicopter rotating components. If a curb or approved barrier cannot be provided, fuel servicing vehicles shall be kept 6 m (20 ft) away from any helicopter rotating components, and a trained person shall direct fuel servicing vehicle approach and departure.~~

~~5.22 Self-Service Fueling.~~

~~Occupancy of the aircraft during self-service fueling shall be prohibited.~~

Supplemental Information

File Name	Description
407_Reorganization.xlsx	
407_Chapter_5.docx	New chapter with mark-up and SL notes (red)
407_Chapter_5_Clean.docx	Clean copy of new chapter

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 22 14:35:55 EDT 2014

Committee Statement

Committee Statement: The existing content in Chapters 4 (Design) and 5 (Operations), along with the associated Annex material, has been reorganized into new chapters: 4 General Requirements, 5 Aviation Fueling Facilities, 6 Airport Fueling Vehicles, 7 Rooftop Heliports, and 8 Self-Service Aircraft Fueling. The new document structure intends to build symmetry between the chapters, so that the same topic will be found under the same level 3 section number of each chapter. The applicability of chapters is described in 4.1.1 of the new Chapter 4. Individual technical changes for Chapter 5 are addressed below.

5.1.1.6.3 [4.4.13] Revised requirements for hydrostatic test following modifications to existing fuel systems. ASME B31.3 allows radiographic or ultrasonic examination as a standard procedure when connecting to existing systems per 345.2.3. With limited allowable downtimes of airport fueling operations to perform tie-ins (typically overnight), pressure testing of new and existing piping systems combined following a tie-in is not always practical or possible.

5.1.2.2 [new] Revised requirement for fuel storage tank location. Removed guidance on tank location within NFPA 407 and added reference to the applicable FAA Advisory Circular. This clarifies that tank location is not within the scope of NFPA 407 and is more appropriately determined by other standards or regulations.

5.1.3.6 [4.4.6.4] Deleted requirement to permit deviations from ANSI/ASME B31.3. Such deviations are now covered by the new equivalency clause in 1.5.

5.1.7.2.2 [4.1.8] Revised requirement for overshoot allowance. The current requirement does not give a time for the given rate. A strict reading could result in enforcement of a gallon-per-hour rate, allowing a very large overshoot. Specifying a one minute time limit for the given rate will allow for consistent enforcement. (Public Input 23)

5.1.7.4.9 [new] Added requirement to permit wireless deadman controls to allow the use of new technology.

5.1.9.9 [new] Added requirement for EFSO location to be away from sources of fuel vapor emissions.

5.1.10 [new] Added requirement for 80-B:C extinguishers at all loading positions or racks.

5.1.11.1 [4.3.22.2] Revised requirement for height of ESOF signs. As currently written, the 7 foot height is difficult to enforce, as it does not specify whether the distance is to the bottom of the sign, bottom of the text, middle of the sign, top of the text, or top of the sign. The requirement was clarified to specify where the measurement is taken. (Public Input 24)

5.1.11.2 [4.3.22.2] Revised requirement for visibility of ESOF signs. Section 5.1.13.4 [4.4.10.3] requires Emergency Fuel Shutoff stations to be located at least 50 feet from terminal buildings, hangars, service buildings, or enclosed concourses. Most Emergency Fuel Shutoff stations are mounted on the building adjacent to the fueling cabinet or hydrant. If the fueling equipment is at least 50 feet from the Emergency Fuel Shutoff, the sign should be visible from the fueling equipment. (Public Input 17)

5.1.11.4 [new] and 5.1.11.5 [new] Added requirements for marking tanks and pipe. Provided appropriate references.

5.1.12 [new] Added requirements for loading/unloading rack shutoffs. NFPA 30 requires a primary and secondary shutdown, and the racks provide the primary.

5.2.1 [new] Added requirement to secure loading areas.

Response Message:

Public Input No. 17-NFPA 407-2014 [Section No. 4.4.5.7]
Public Input No. 23-NFPA 407-2014 [Section No. 4.1.8]
Public Input No. 24-NFPA 407-2014 [Section No. 4.4.5.7]

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
19 Affirmative All
2 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Cnota, Fred A.

We still need to get our report from the piping task force and add in those changes

Nuzzolese, Aldo

5.1.3.1 Add: Where open grates are used, fuel valves shall be a minimum of 12 inches below the grate and all service piping shall terminate with a cap or plug.

Negative with Comment

Gammon, James

5.1.3.10 - Suggest (9) Dissimilar metal corrosion 5.1.3.11 - I suggest you add to the end, "…or other adjacent components." An allowed aluminum meter will fail in a fire long before a steel pipe flange. This is also not needed if the flange gasket in question is downstream of a deadman control of fusible link valve, or adjacent to a hose. The reason is that it is overkill to use a fire proof gasket next to a hose, especially if located just after a heat actuated shut off valve as shown in 5.1.3.19 or a deadman valve. I am not even sure a fireproof gasket is available for, as an example, a square LC meter flange. One could well argue that on a system with underground tanks, the entire system should be exempted. On above ground tanks with only top connections, a siphon spoiler or anti-siphon valve is a safe alternative. 5.1.3.19 – The purpose of this section is to prevent a siphoning flow from the tank in the event of a fire. If the "deadman" function is to stop the pump, this is a real danager, but with a proper deadman valve or anti-siphoning provision, this will not happen. This is not an issue if other means are used to prevent such a problem. Suggest you add to end "… unless the tanks are underground or other means are used to stop flow in the event of a fire." In truth, very few locations have these fusible valves and this issue is commonly ignored except where it is an issue. The even that sponsored this was the Denver Stapleton fire. I know, I got there right after it was put out. I have many pictures. There was no way to stop flow from bottom connections on a vertical tank. The contents spilled out completely. You might also add a section forbidding non-stainless steel tubing. 5.1.8.3 – Suggest adding "… and be thermostatically controlled." 5.1.9.9 - Suggest instead of "beneath", use "In such a way as to have access obstructed by" 5.1.12.1 – We have a dilemma. Here we require this control, which in turn requires a modification of every refueler truck to include the interface to the loading rack, but this is not shown in the vehicle design section. In the vehicle section, we require two levels of shutoff on the vehicle unless this section is followed, then one level of protection is all that is needed on the vehicle. This is disjointed. We should require one or the other, either two levels of overfill protection on the truck, or one plus a second one on the loading rack – but also the vehicle modified to interface with the loading rack.

First Revision No. 22-NFPA 407-2014 [New Section after 5.22]

Chapter 6 Airport Fueling Vehicles

6.1 Design and Construction.

6.1.1 General Requirements.

6.1.1.1

Aircraft fuel servicing tank vehicles that are used on public highways shall comply with the requirements of NFPA 385 .

6.1.1.2

In addition to any specific requirements in this chapter, only materials safe for use in the service intended and compatible with fuel applications shall be used in the construction of aircraft fuel servicing vehicles and hydrant fuel service carts.

6.1.1.3

Magnesium shall not be used in the construction of any portion of an aircraft fuel servicing vehicle or cart.

6.1.1.4

Trailer connections shall be designed to secure the trailer firmly and to prevent the towed vehicle from swerving from side to side at the speeds anticipated so that the trailer essentially remains in the path of the towing vehicle.

6.1.2 Tanks.

6.1.2.1

Every cargo tank shall be supported by and attached to, or shall be a part of, the tank vehicle upon which it is carried in accordance with NFPA 385 .

6.1.2.2

Cargo tanks shall be constructed in accordance with 49 CFR 178.345, DOT 406, or other equivalent standard for international application.

6.1.2.3

Aluminum alloys for high-strength welded construction shall be joined by an inert gas arc welding process using filler metals R-GR40A, E-GR40A (5154 alloy), R-GM50A, and E-GM50A (5356 alloy) in accordance with AWS A5.10.

6.1.2.4

Tank outlets shall be of substantial construction.

6.1.2.5

Tank outlets shall be attached securely to the tank.

6.1.2.6 Baffles.

Every cargo tank or compartment over 2.3 m (7.5 ft) long shall be provided with baffles, the total number of which shall be such that the distance between any two adjacent baffles, or between any tank head or bulkhead and the baffle closest to it, shall in no case exceed 1.5 m (5 ft).

6.1.2.6.1

The cross-sectional area of each baffle shall be not less than 80 percent of the cross-sectional area of the tank.

6.1.2.6.2

The thickness of a baffle shall be not less than that required for the heads and bulkheads of the cargo tank in which it is installed.

6.1.2.7

Venting shall be in accordance with 49 CFR, DOT 406.

6.1.2.8

Cargo draw-off valves or faucets projecting beyond the frame of a tank vehicle shall be protected against damage.

6.1.2.9 Fill Openings and Top Flashings.

6.1.2.9.1
Dome covers shall be provided with a forward mounted hinge and self-latching catches and shall be fitted with watertight fuel-resistant seals or gaskets designed to prevent spillage or leakage from overturn and to prevent water entry.

6.1.2.9.2
Dome covers shall automatically close and latch with the forward motion of the vehicle.

6.1.2.9.3
Drains from top flashing shall divert spilled fuel from possible sources of ignition, including the engine, the engine exhaust system, the electrical equipment, or an auxiliary equipment enclosure.

6.1.2.9.4
The tank fill openings shall be protected against overturn damage by a rigid member(s) fixed to the tank and extending a minimum of 25 mm (1 in.) above any dome cover, handle, vent opening, or projection of the unit.

6.1.2.9.5
Overturn protection shall be braced adequately to prevent collapse.

6.1.2.9.6
Overturn protection shall be designed to channel rainwater, snow, or fuel to the exterior of the cargo tank and away from vehicle exhaust components.

6.1.2.10 Tanks for Flammable Liquids Other than Fuel.
Vehicle or cart fuel tanks and containers for other flammable liquids shall be made of metal and shall be designed, constructed, and located in a manner that precludes hazardous arrangements.

6.1.2.10.1
Tanks shall be substantially protected by their location.

6.1.2.10.2
Fill pipes shall not project beyond the vehicle profile.

6.1.2.10.3
Tanks and containers shall vent away from sources of ignition during filling.

6.1.2.10.4
Any arrangement not protected by location shall be listed for such use.

6.1.2.10.5
The fuel tank arrangement shall allow for drainage without the tank's removal from its mountings.

6.1.2.11 Tests.
Cargo tanks, at the time of manufacture, shall be tested by a minimum air or hydrostatic pressure of 24.4 kg/m^2 (5 psi) applied to the whole tank (or each compartment thereof if the tanks are compartmented) for a period of at least 5 minutes.

6.1.2.11.1
If the test is by air pressure, the entire exterior surface of all joints shall be coated with a solution of soap and water, heavy oil, or other substance that causes foaming or bubbling that indicates the presence of leaks.

6.1.2.11.2
If the test is by hydrostatic pressure, it shall be gauged at the top of the tank, and the tank shall be inspected at the joints for the issuance of liquid to indicate leaks.

6.1.2.11.3
Any leakage discovered by either of the methods described in 6.1.2.11.1 and 6.1.2.11.2 , or by any other method, shall be considered evidence of failure to meet these requirements.

6.1.3 Pumps and Piping System.

6.1.3.1
All portions of the flammable liquid feed system shall be constructed and located to minimize the fire hazard.

6.1.3.2
Piping and plumbing shall be made of materials not adversely affected by the fluid or by other materials likely to be encountered.

6.1.3.3
Piping and plumbing shall be of adequate strength for the purpose.

6.1.3.4
Piping and plumbing shall be secured to avoid chafing or undue vibration.

6.1.3.5
Piping and plumbing shall be supported adequately.

6.1.3.6
Product piping shall be metal and rated for the system working pressure or at least 860 kPa (125 psi), whichever is greater.

6.1.3.7
Except as provided in 6.1.3.8 , all joints shall be welded.

6.1.3.8
Flanged connections or approved couplings shall be provided to avoid the need for cutting and welding where components are serviced or replaced.

6.1.3.9
Gaskets in flanged connections shall be of a material and design that resist fire exposure for a time comparable to the flange and bolts.

6.1.3.10
Gravity feed systems shall not be used.

6.1.3.11
At the time of manufacture, the section of the fuel dispensing system that is under pressure during service shall be subjected to a hydrostatic test pressure equal to 150 percent of the working pressure of the system for at least 30 minutes and shall be proven tight before it is placed in service.

6.1.3.11.1
Hose connections shall be permitted to be plugged during this test.

6.1.3.12 Loading System.

6.1.3.12.1 Top Loading.

6.1.3.12.1.1
Drop tubes shall be used.

6.1.3.12.1.2
Splash filling shall be prohibited.

6.1.3.12.1.3
Drop tubes used in top loading or overhead loading of tank vehicles shall be designed to minimize turbulence.

6.1.3.12.1.4
Drop tubes shall be metallic.

6.1.3.12.1.5
Drop tubes shall extend to the bottom of the tank or to the inside of the sump to maintain submerged loading and to avoid splashing of the fuel.

6.1.3.12.2 Bottom Loading.

6.1.3.12.2.1
The bottom-loading connection of a tank truck shall be a dry-break coupler that cannot be opened until it is engaged to the vehicle tank adapter.

6.1.3.12.2.2
It shall not be possible to disconnect the hose coupler from the tank vehicle until the coupler valve is fully closed.

6.1.3.12.2.3*
The bottom loading fitting of the tank vehicle shall be a spring-loaded check valve that remains in a closed position until opened by connecting the coupler.

6.1.3.12.2.4
A float-actuated shutoff or other automatic sensing device shall be provided to close the bottom-loading valve when the tank is filled.

6.1.3.12.2.5
Any liquid bled from a sensing device during loading shall be piped to the bottom of the cargo tank.

6.1.3.12.2.6
The fill pipe and valving on bottom-loaded tank vehicles shall be arranged to prevent fuel spray and turbulence in the cargo tank.

6.1.3.12.2.7

The cargo tank vehicle shall be equipped with an automatic primary shutdown system that stops the tank loading operation when the tank is full, unless an automatic shutdown is provided on the loading rack in accordance with 5.1.12 .

6.1.3.12.2.8

The cargo tank vehicle shall be equipped with an automatic secondary shutdown system that stops the tank loading operation when the tank is full.

6.1.3.12.2.9

The automatic secondary shutoff control shall not be used for normal filling control.

6.1.3.13

Each outlet valve shall be provided with a fusible device that causes the valve to close automatically in case of fire.

6.1.3.14

A shear section shall be provided between shutoff valve seats and discharge outlets that breaks under strain, unless the discharge piping is arranged to afford the same protection and leave the shutoff valve seat intact.

6.1.3.15

Openings in cargo tank compartments that are connected to pipe or tubing shall be fitted with a spring-loaded check valve, a self-closing valve, or a similar device to prevent the accidental discharge of fuel in case of equipment malfunction or line breakage.

6.1.3.15.1

Unless the valves required in 6.1.3.15 are located inside the tank, they shall be equipped with a shear section as described in 6.1.3.14 .

6.1.3.16

The operating mechanism for each tank outlet valve shall be adjacent to the fuel delivery system operating controls.

6.1.3.16.1

The operating mechanism for each tank outlet valve shall be arranged so that the outlet valve(s) can be closed simultaneously and instantly in the event of a fire or other emergency.

6.1.3.16.2

A means shall be provided to assure proper operation.

6.1.4 Hose and Nozzles. (Reserved)

6.1.5 Bonding.

6.1.5.1

All metallic components and vehicle or cart chassis shall be electrically bonded to prevent a difference in their electrostatic potential.

6.1.5.2

Such bonding shall be inherent to the installation or by physical application of a suitable bonding mechanism.

6.1.5.3

A provision shall be provided on the vehicle to bond the tank to a fill pipe or loading rack as specified in 6.2.11.10.1 .

6.1.5.4

Cables shall be provided on the vehicle or cart to allow the bonding operations specified in 4.2.5 .

6.1.6 Electrical System.

6.1.6.1 Battery Compartments.

Batteries that are not in engine compartments shall be securely mounted in compartments to prevent accidental arcing.

6.1.6.1.1

The compartment shall be separate from fueling equipment.

6.1.6.1.2

Suitable shielding shall be provided to drain possible fuel spillage or leakage away from the compartment.

6.1.6.1.3

The compartment shall be provided with a vent at the top of the compartment.

6.1.6.2 Wiring.

Wiring shall be of adequate size to provide the required current-carrying capacity and mechanical strength.

6.1.6.2.1

Wiring shall be installed to provide protection from physical damage and from contact with spilled fuel either by its location or by enclosing it in metal conduit or other oil-resistant protective covering.

6.1.6.2.2

All circuits shall have overcurrent protection.

6.1.6.2.3

Junction boxes shall be weatherproofed.

6.1.6.3

Spark plugs and other exposed terminal connections shall be insulated to prevent sparking in the event of contact with conductive materials.

6.1.6.4*

Motors, alternators, generators, and their associated control equipment located outside of the engine compartment or vehicle cab shall be of a type listed for use in accordance with *NFPA 70* , Class I, Division 1, Group D locations.

6.1.6.5

Electrical equipment and wiring located within a closed compartment shall be of a type listed for use in accordance with *NFPA 70* , Class I, Division 1, Group D locations.

6.1.6.6

Lamps, switching devices, and electronic controls, other than those covered in 6.1.6.4 and 6.1.6.5 , shall be of the enclosed, gasketed, weatherproof type.

6.1.6.7

Other electrical components not covered in 6.1.6.4 through 6.1.6.6 shall be of a type listed for use in accordance with *NFPA 70* , Class I, Division 2, Group D locations.

6.1.6.8

Electronic equipment shall not be installed in compartments with other equipment that can produce flammable vapors, unless permitted by *NFPA 70* .

6.1.6.9 Tractor Trailer Wiring.

Electrical service wiring between a tractor and trailer shall be designed for heavy-duty service.

6.1.6.9.1

The connector shall be of the positive-engaging type.

6.1.6.9.2

The trailer receptacle shall be mounted securely.

6.1.7 Control of Fuel Flow.

6.1.7.1*

The valve that controls the flow of fuel to an aircraft shall have a deadman control.

6.1.7.2

The fuel flow control valve shall be one of the following:

(1) The hydrant pit valve

(2) At the tank outlet on a tank vehicle

(3) A separate valve on the tank vehicle

(4) On the hose nozzle for overwing servicing

6.1.7.3

Deadman controls shall be designed to preclude defeating their intended purpose.

6.1.7.4 Pressure Fuel Servicing System Controls.

6.1.7.4.1

The system shall be designed to minimize surge pressure.

6.1.7.4.2*

The overshoot shall not exceed 5 percent of actual flow rate in L/min (gal/min) at the time the deadman is released.

6.1.7.4.3

The control valve shall be located and designed so that it will not be rendered inoperative by a surface accident, power failure, or spill.

6.1.7.4.4

The control valve shall be fail-safe by closing completely in the event of control power loss.

6.1.7.5

On tank full trailer or tank semitrailer vehicles, the use of a pump in the tractor unit with flexible connections to the trailer shall be prohibited unless one of the following conditions exists:

(1) Flexible connections are arranged above the liquid level of the tank in order to prevent gravity or siphon discharge in case of a break in the connection or piping.

(2) The cargo tank discharge valves required by 6.1.7.1 are arranged to be normally closed and to open only when the brakes are set and the pump is engaged.

6.1.7.6 Air Elimination.

Aircraft fuel servicing tank vehicles having a positive displacement product pump shall be equipped with a product tank low-level shutdown system that prevents air from being ingested into the fueling system.

6.1.8 Filters and Ancillary Equipment.

6.1.8.1 Cabinets.

6.1.8.1.1

All cabinets, other than those housing electronic equipment, shall be vented to prevent the accumulation of fuel vapors. *(See 6.1.6 .)*

6.1.8.1.2

All cabinets, other than those housing electronic equipment, shall be constructed of noncombustible materials. *(See 6.1.6 .)*

6.1.8.2 Product Recovery Tanks.

The refueling system product recovery tank shall be equipped with a control that shuts down the vehicle's fuel dispensing system when the refueling system product recovery tank is three-quarters full.

6.1.9 Emergency Fuel Shutoff Systems.

6.1.9.1

The vehicle shall have at least two emergency shutoff controls, one mounted on each side of the vehicle.

6.1.9.2

The emergency fuel shutoff controls shall be quick-acting to close the outlet valve in case of emergency.

6.1.9.3

The emergency fuel shutoff controls shall be remote from the fill openings and discharge outlets and shall be operable from a ground level standing position.

6.1.9.4

All vehicles or carts equipped with a top deck or elevating platform shall have an additional emergency shutoff control operable from the deck or platform.

6.1.10 Fire Protection.

6.1.10.1

Each aircraft fuel servicing tank vehicle shall have two listed fire extinguishers, each having a rating of at least 80-B:C, with one extinguisher mounted on each side of the vehicle.

6.1.10.2

One listed fire extinguisher having a rating of at least 80-B:C shall be installed on each hydrant fuel servicing vehicle or cart.

6.1.10.3

Extinguishers shall be readily accessible from the ground.

6.1.10.4

The area of the paneling or tank adjacent to or immediately behind the extinguisher(s) on fueling vehicles or carts shall be painted a color contrasting with that of the extinguisher.

6.1.10.5

Extinguishers shall be kept clear of elements such as ice and snow.

6.1.10.6
Extinguishers located in enclosed compartments shall be readily accessible, and their location shall be marked clearly in letters at least 50 mm (2 in.) high.

6.1.10.7 Smoking Equipment.

6.1.10.7.1*
Smoking equipment, such as cigarette lighter elements and ashtrays, shall not be provided.

6.1.10.7.2
If a vehicle includes smoking equipment, it shall be removed or rendered inoperable.

6.1.10.7.3
Subsection 6.1.10.7.2 shall be retroactive to existing vehicles.

6.1.11 Marking and Labeling.

6.1.11.1
Aircraft fueling vehicles shall be marked with the name of the operator or the responsible organization.

6.1.11.2
The marking shall be approved, legible signs on both sides of the exterior of the vehicle.

6.1.11.3 Signage.
Each aircraft fuel servicing vehicle or cart shall have a signage viewable from all sides of the vehicle.

6.1.11.3.1
Signs shall have letters at least 75 mm (3 in.) high.

6.1.11.3.2
Signs shall be of a color contrasting sharply with the sign background for visibility.

6.1.11.3.3
The words “FLAMMABLE,” “NO SMOKING,” and the name of the product carried, such as JET A, JET B, GASOLINE, or AVGAS, shall appear on each sign.

6.1.11.4 Emergency Fuel Shutoff Signs.

6.1.11.4.1
Each emergency fuel shutoff station location shall be placarded EMERGENCY FUEL SHUTOFF in letters at least 50 mm (2 in.) high.

6.1.11.4.2
The method of operation shall be indicated by an arrow or by the word PUSH or PULL, as appropriate.

6.1.11.4.3
Any action necessary to gain access to the shutoff device (e.g., BREAK GLASS) shall be shown clearly.

6.1.11.4.4
Lettering shall be of a color contrasting sharply with the placard background for visibility.

6.1.11.4.5
Placards shall be weather resistant.

6.1.11.5
A “NO SMOKING” sign shall be posted prominently in the cab of every aircraft fuel servicing vehicle.

6.1.11.6
Hazardous material placards meeting the requirements of 49 CFR 172.504 or equivalent shall be displayed on all four sides of fuel servicing tank vehicles.

6.1.12 Drive Train.

6.1.12.1
Propulsion or power engine equipment shall be in a compartment housing that shall minimize the hazard of fire in the event of leakage or spillage of fuel during the servicing of an aircraft.

6.1.12.2
The engine air intake shall retain the manufacturer’s configuration to prevent the emission of flame in case of backfiring.

6.1.12.3
Where provided, the sediment bowl in the fuel supply line shall be of steel or material of equivalent fire resistance.

6.1.12.4
Full trailers and semitrailers shall be equipped with brakes on all wheels.

6.1.12.5

Self-propelled aircraft fuel servicing vehicles shall have an integral system or device that prevents the vehicle from being moved unless all of the following conditions are met:

(1) All fueling nozzles and hydrant couplers are properly stowed.

(2) All mechanical lifts are lowered to their stowed position.

(3) Bottom-loading couplers have been disconnected from the vehicle.

6.1.13 Exhaust System.

6.1.13.1*

The engine exhaust system shall be designed, located, and installed to minimize the hazard of fire in the event of any of the following:

(1) Leakage of fuel from the vehicle or cart (where applicable) fuel tank or fuel system

(2) Leakage from the fuel dispensing system of the vehicle or cart

(3) Spillage or overflow of fuel from the vehicle or cart (if applicable) fuel tank or the cargo tank

(4) Spillage of fuel during the servicing of an aircraft

6.1.13.2

Exhaust system components shall be secured and located clear of components carrying flammable liquids and separated from any combustible materials used in the construction of the vehicle.

6.1.13.3

Suitable shielding shall be provided to drain possible fuel spillage or leakage away from exhaust system components safely.

6.1.13.3.1

Diesel particulate filter (DPF) regeneration system piping shall be shielded from the engine discharge manifold to the outlet at the tailpipe.

6.1.13.3.2

DPF regeneration–equipped vehicles shall have a listed diffuser installed at the outlet of the exhaust tailpipe.

6.1.13.4

Exhaust gases shall not be discharged where they could ignite fuel vapors that could be released during normal operations or by accidental spillage or by leakage of fuel.

6.1.13.4.1

DPF regeneration–equipped vehicles shall have a lockout mode that will prevent automatic regeneration when these vehicles are operated within 30 m (100 ft) of aircraft parking areas.

6.1.13.5

A muffler (or silencer) cutout shall not be provided.

6.1.13.6

Carbureted gasoline-powered engines on fuel servicing vehicles shall be provided with flame- and spark-arresting exhaust systems.

6.1.13.7*

Non-turbo-charged diesel engines on fuel servicing vehicles shall be equipped with flame- and spark-arresting exhaust systems.

6.2 Operations.

6.2.1 Security.

6.2.1.1 Parking of Aircraft Fuel Servicing Tank Vehicles.

Parking areas for unattended aircraft fuel servicing tank vehicles shall be arranged to provide the following:

(1) Dispersal of the vehicles in the event of an emergency

(2) A minimum of 3 m (10 ft) of clear space between parked vehicles for accessibility for fire control purposes

(3) Prevention of any leakage from draining to an adjacent building or storm drain that is not suitably designed to handle fuel

(4) A minimum of 15 m (50 ft) from any parked aircraft and buildings other than maintenance facilities and garages for fuel servicing tank vehicles

6.2.1.2 Parking of Aircraft Fuel Servicing Hydrant Vehicles and Carts.

Parking areas for unattended aircraft fuel servicing hydrant vehicles or carts shall be arranged to provide the following:

(1) Dispersal of the vehicles in the event of an emergency

(2) Prevention of any leakage from draining to an adjacent building or storm drain that is not suitably designed to handle fuel

6.2.1.3*

The authority having jurisdiction shall determine the suitability of tunnels, enclosed roadways, or other limited access areas for use by fuel servicing vehicles.

6.2.2 Training. (Reserved)

6.2.3 Prevention and Control of Spills. (Reserved)

6.2.4 Emergency Fuel Shutoff. (Reserved)

6.2.5 Bonding. (Reserved)

6.2.6 Control of Fuel Flow.

6.2.6.1

The fueling operator shall monitor the fueling operation.

6.2.6.2

During overwing fueling, the operator shall monitor the fill port.

6.2.7 Fire Protection. (Reserved)

6.2.8 Maintenance.

6.2.8.1

Aircraft fuel servicing vehicles or carts shall not be operated unless they are in proper repair and free of accumulations of grease, oil, or other combustibles.

6.2.8.2

Leaking vehicles or carts shall be removed from service, defueled, and parked in a safe area until repaired.

6.2.8.3

Maintenance and servicing of aircraft fuel servicing vehicles and carts shall be performed outdoors or in a building approved for the purpose.

6.2.8.4

At least monthly the operator shall perform a check to ensure complete closure of the bottom-loading valve on the tank vehicle.

6.2.9 Aircraft Fueling Hose. (Reserved)

6.2.10 Exhaust System.

6.2.10.1

All vehicles that have engines equipped with an exhaust after-treatment device, such as a DPF, that requires the filter to be cleaned at high temperature (regenerated) while installed on the vehicle shall meet the requirements of 6.2.10.2 through 6.2.10.9 .

6.2.10.2

DPF regeneration shall be performed only in area(s) designated by the authority having jurisdiction.

6.2.10.3

DPF regeneration shall not be performed within 30 m (100 ft) of any aircraft refueling operations.

6.2.10.4* Vehicle Regeneration Area.

6.2.10.4.1

The immediate area surrounding the DPF exhaust outlet shall be concrete or other high temperature–resistant material and shall be clear of any grass, soil, or flammable materials.

6.2.10.4.2

The area shall be in a remote location that is a minimum of 30 m (100 ft) from the nearest aircraft parking location, airport terminal, or flammable storage or a minimum of 15 m (50 ft) from any other building.

6.2.10.4.3

The area shall be clearly marked with a minimum 61 cm by 30 cm (2 ft by 1 ft) sign reading “Vehicle DPF Regeneration Area,” which shall have letters at least 75 mm (3 in.) high and shall be of a color contrasting sharply with the sign background for visibility.

6.2.10.5

The regeneration cycle shall be performed only by trained personnel, who shall remain with the vehicle until the regeneration cycle is complete.

6.2.10.6

The vehicle shall be visually inspected for any signs of fluid leaks under or around the vehicle before regeneration is initiated. DPF regeneration shall not be initiated if there are any signs of any fluid leaks on or beneath the vehicle.

6.2.10.7

Once a regeneration cycle is started, it shall be completed without interruption.

6.2.10.8

After the regeneration process is successfully completed, the vehicle shall be permitted to return to normal service.

6.2.10.9

Problems occurring during the regeneration cycle shall be corrected prior to the vehicle returning to normal service.

6.2.10.10

Aircraft refueling operations shall not be initiated if the regenerative system indicates regeneration is required.

6.2.11 Loading and Unloading.

6.2.11.1

Aircraft fuel servicing tank vehicles shall be loaded only at an approved loading rack.

6.2.11.2

Aircraft fuel servicing tank vehicles shall not be loaded from a hydrant pit, unless permitted by the authority having jurisdiction under emergency circumstances.

6.2.11.3

Filling of the vehicle cargo tank shall be under the observation and control of a qualified and authorized operator at all times.

6.2.11.4

The required deadman and automatic overfill controls shall be in normal operating condition during the filling operation.

6.2.11.5

The controls shall not be blocked open or otherwise bypassed.

6.2.11.6

The engine of the tank vehicle shall be shut off before starting to fill the tank.

6.2.11.7

To prevent leakage or overflow from expansion of the contents due to a rise in atmospheric temperature or direct exposure to the sun, no cargo tank or compartment shall be loaded to the point where it is liquid full.

6.2.11.7.1

No cargo tank or compartment shall be loaded above the rated net capacity, as specified by the manufacturer’s data plate.

6.2.11.7.2

Space for thermal expansion, in no case less than 3 percent of the tank volume, shall be provided to prevent leakage.

6.2.11.8

The driver, operator, or attendant of any tank vehicle shall not remain in the vehicle but shall not leave the vehicle unattended during the loading or unloading process.

6.2.11.8.1

Delivery hose, when attached to a tank vehicle, shall be considered to be a part of the tank vehicle.

6.2.11.9

No fuel shall be transferred to or from any tank vehicle until the parking brake and wheel chocks have been set to prevent motion of the vehicle.

6.2.11.10 Top Loading.

6.2.11.10.1

Where loading tank trucks through open domes, a bond shall be established between the loading piping and the cargo tank to equalize potentials.

6.2.11.10.2

The bond connection shall be made before the dome is opened and shall be removed only after the dome is closed.

6.2.11.10.3

Drop tubes attached to loading assemblies extending into the vehicle tank shall extend to the bottom of the tank and shall be maintained in that position until the tank is loaded to provide submerged loading and avoid splashing or free falling of fuel through the tank atmosphere.

6.2.11.10.4

Splash filling shall be prohibited.

6.2.11.10.5

The flow rate into the tanks shall not exceed 25 percent of the maximum flow until the outlet is fully covered.

6.2.11.10.6

Fixed drop tubes permanently mounted in the vehicle tank shall extend to the bottom of the tank or to the inside of the sump to maintain submerged loading and to avoid splashing of the fuel.

6.2.11.10.7

The level in the tank shall be visually monitored at all times during top loading.

6.2.11.11 Bottom Loading.

6.2.11.11.1

A bonding connection shall be made between the cargo tank and the loading rack before any fuel connections are made and shall remain in place throughout the loading operation.

6.2.11.11.2

The operator shall initiate fuel flow by means of a deadman control device.

6.2.11.11.3

The operator shall ensure that the automatic high-level shutoff system is functioning properly for each compartment shortly after flow has been initiated.

6.2.12 Positioning of Aircraft Fuel Servicing Vehicles and Carts During Fueling.

6.2.12.1

Aircraft fuel servicing vehicles and carts shall be positioned so that a clear path of egress from the aircraft for fuel servicing vehicles shall be maintained.

6.2.12.2

The propulsion or pumping engine of aircraft fuel servicing vehicles or carts shall not be positioned under the wing of the aircraft during overwing fueling or where aircraft fuel system vents are located on the upper wing surface.

6.2.12.3

Aircraft fuel servicing vehicles or carts shall not be positioned within a 3 m (10 ft) radius of aircraft fuel system vent openings.

6.2.12.4

Parking brakes and chocks shall be set on all fuel servicing vehicles or carts before operators begin the fueling operation.

6.2.12.5

During overwing aircraft fuel servicing where aircraft fuel system vents are located on the upper wing surface, equipment shall not be positioned under the trailing edge of the wing.

Supplemental Information

File Name	Description
407_Reorganization.xlsx	
407_Chapter_6.docx	New chapter with mark-up and SL notes (red)
407_Chapter_6_Clean.docx	Clean copy of new chapter

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Oct 22 14:28:43 EDT 2014

Committee Statement

Committee Statement: The existing content in Chapters 4 (Design) and 5 (Operations), along with the associated Annex material, has been reorganized into new chapters: 4 General Requirements, 5 Aviation Fueling Facilities, 6 Airport Fueling Vehicles, 7 Rooftop Heliports, and 8 Self-Service Aircraft Fueling. The new document structure intends to build symmetry between the chapters, so that the same topic will be found under the same level 3 section number of each chapter. The applicability of chapters is described in 4.1.1 of the new Chapter 4. Individual technical changes for Chapter 6 are addressed below.

6.1.3.12.2.7 [new], 6.1.3.12.2.8 [new], and 6.1.3.12.2.9 [new] New requirements for primary and secondary automatic shutdown for loading of cargo tank vehicles. NFPA 30 requires a primary and secondary shutdown.

6.1.3.13 [4.3.15.1] Deleted requirements for shutoff valve location and design.

6.1.7.4.2 [4.1.8] Revised requirement for overshoot allowance. The current requirement does not give a time for the given rate. A strict reading could result in enforcement of a gallon-per-hour rate, allowing a very large overshoot. Specifying a one minute time limit for the given rate will allow for consistent enforcement. (Public Input 23)

6.1.10.7 [4.3.11.2] Revised requirement prohibiting vehicle cigarette lighters for clarity, including new annex material. Added new requirement for removal of such devices to be retroactively applied to existing vehicles.

6.1.11.6 [new] Added requirement for hazardous materials signs on fuel servicing tank vehicles. It is accepted industry practice to provide hazmat information for first responders, even where operated on private property.

6.2.9.7 [5.20.1.5], 6.2.9.7.1 [new], and 6.2.9.7.2 [new] Added new requirements for maximum fill level of tank vehicles. The rated net capacity on the manufacturer's data plate provides ullage space for thermal expansion of the fuel. A minimum ullage space of 3% is normal industry practice. (Public Input 10)

6.2.9.8 [new], 6.2.9.8.1 [new], and 6.2.9.9 [new] Added new requirements for vehicle occupancy, attendance, and brakes/wheel chocks during loading and unloading of tank vehicles.

Response Message:

Public Input No. 10-NFPA 407-2013 [Section No. 5.20.1.5]

Ballot Results

This item has passed ballot

27 Eligible Voters
5 Not Returned
20 Affirmative All
1 Affirmative with Comments
1 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
6.1.1.1 Add: Aircraft fuel servicing vehicles shall comply with the requirements of SAE ARP 5818. 6.1.6.4 Add: Where motors, generators, relays, and all other electrical components are located outside of the vehicle's cab or engine compartment, these components may be covered by an adequate enclosure that protects them from spilled fuel and the area under the cover is deemed as an engine compartment provided that the cover can only be removed for maintenance purposes. 6.1.13.3.1 Change: Diesel particulate filter (DPF) regeneration system piping and components that extend outside of the cab or engine compartment shall be equipped with adequate

shield(s) to divert any product spils away from all hot surfaces. All shields shall have ventilation to allow adequate heat dissipation to prevent abnormal heat accumulation. Change: DPF regeneration–equipped vehicles shall have a lockout mode that will prevent automatic regeneration. Refueling vehicles shall only be able to perform manual regeneration. Move This Requirement to Operations Section: Regeneration shall not be performed within 30 m (100 ft) of aircraft parking areas.

Negative with Comment

Gammon, James

6.1.3.7 and 6.1.3.8 – It is a bit silly to require only metal pipe and fittings, flanged or welded connections, yet not address plastic tubing, or tubing at all. Then we are concerned that the gaskets are able to last as long as the bolts in the event of a fire? Is this even possible, available? Who “approves” the couplings? If you want to outlaw Victaulic connections, then say so, but why do so at the inlet of a hose reel? The Vic will last longer than the hose. Most important is availability and reason. The system is only as good as the weakest link. Plastic tubing covers these trucks and the refueling hose is no safer in a fire. Why must the meter flange gasket be fire safe? 6.1.3.12.2.7 and 6.1.3.12.2.8 – Refer to my comments on 5.1.12.1 – We have a dilemma. Here we require this control, which in turn requires a modification of every refueler truck to include the interface to the loading rack, but this is not specifically shown in the vehicle design section. In the vehicle section, we require two levels of shutoff on the vehicle unless this section is followed, then one level of protection is all that is needed on the vehicle. This is disjointed. We should require one or the other, either two levels of overfill protection on the truck, or one plus a second one on the loading rack – but also the vehicle modified to interface with the loading rack.

First Revision No. 23-NFPA 407-2014 [New Section after 5.22]

Chapter 7 Rooftop Heliports

7.1 Design and Construction.

7.1.1 General Requirements.

7.1.1.1 System Design and Approval.

7.1.1.1.1

Fueling on rooftop heliports shall be permitted only where approved by the authority having jurisdiction.

7.1.1.1.2

In addition to the special requirements in this chapter, the heliport shall comply with the requirements of NFPA 418 .

7.1.1.1.3

Facilities for dispensing fuel with a flash point below 37.8°C (100°F) shall not be permitted at any rooftop heliport.

7.1.1.1.4

In addition to the special requirements of this chapter, the fuel storage, piping, and dispensing system shall comply with the requirements of NFPA 30 and with applicable portions of this standard.

7.1.1.1.5

The entire system shall be designed so that no part of the system is subjected to pressure above its working pressure.

7.1.2 Fuel Storage Tanks.

7.1.2.1

Fuel storage tanks and components shall comply with the requirements of NFPA 30 .

7.1.2.2

The fuel storage system shall be located at or below ground level.

7.1.3 Pumps and Piping Systems.

7.1.3.1

Pumps and piping systems shall comply with the requirements of NFPA 30 .

7.1.3.2

Pumps shall be located at or below ground level. Relay pumping shall not be permitted.

7.1.3.3

Pumps installed outside of buildings shall be located not less than 1.5 m (5 ft) from any building opening.

7.1.3.4

Pumps shall be substantially anchored and protected against physical damage from collision.

7.1.3.5

Pumps installed within a building shall be in a separate room with no opening into other portions of the building.

7.1.3.6

The pump room shall be adequately ventilated.

7.1.3.7

Electrical wiring and equipment in pump rooms shall conform to the requirements of *NFPA 70* , Article 515.

7.1.3.8

Piping above grade shall be steel and, unless otherwise approved by the authority having jurisdiction, shall be suitably cased or shall be installed in a duct or chase.

7.1.3.8.1

Such piping duct or chase shall be constructed so that a piping failure does not result in the entry of fuel liquid or vapor entering the building.

7.1.3.8.2

All pipe casings, ducts, and chases shall be drained.

7.1.3.9
Piping shall be anchored and shall be protected against physical damage for a height of at least 2.4 m (8 ft) above the ground.

7.1.3.10
An isolation valve shall be installed on the suction and discharge piping of each pump.

7.1.3.11
A check valve shall be installed at the base of each fuel piping riser to automatically prevent the reverse flow of the fuel into the pump room in the event of pump seal failure, pipe failure, or other malfunction.

7.1.3.12
Piping within buildings shall comply with 5.1.3.4 .

7.1.4 Hose and Nozzles. (Reserved)

7.1.5 Electrostatic Bonding. (Reserved)

7.1.6 Electrical Systems. (Reserved)

7.1.7 Control of Fuel Flow. (Reserved)

7.1.8 Filters and Ancillary Equipment. (Reserved)

7.1.9 Emergency Fuel Shutoff Systems.

7.1.9.1
At least two emergency fuel shutoff stations located on opposite sides of the heliport at exitways or at similar locations shall be provided.

7.1.9.2
An additional emergency fuel shutoff station shall be located at ground level and shall be located at least 3 m (10 ft) from the pump but no further than 6 m (20 ft).

7.1.10 Fire Protection.
Fire protection shall conform to the requirements of NFPA 418 .

7.1.11 Marking and Labeling. (Reserved)

7.2 Operations.

7.2.1 Security. (Reserved)

7.2.2 Personnel.
All heliport personnel shall be trained in the use of the available fire extinguishers and fixed extinguishing systems.

7.2.3 Prevention and Control of Spills. (Reserved)

7.2.4 Emergency Fuel Shutoff.
All heliport personnel shall be trained in the operation of emergency fuel shutoff controls.

7.2.5 Bonding. (Reserved)

7.2.6 Monitoring of Fuel Flow. (Reserved)

7.2.7 Fire Protection. (Reserved)

7.2.8 Maintenance. (Reserved)

7.2.9 Aircraft Fueling Hose. (Reserved)

Supplemental Information

File Name	Description
407_Reorganization.xlsx	
407_Chapter_7.docx	New chapter with mark-up and SL notes (red)
407_Chapter_7_Clean.docx	Clean copy of new chapter

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:

Zip:

Submittal Date: Wed Oct 22 14:31:08 EDT 2014

Committee Statement

Committee Statement: The existing content in Chapters 4 (Design) and 5 (Operations), along with the associated Annex material, has been reorganized into new chapters: 4 General Requirements, 5 Aviation Fueling Facilities, 6 Airport Fueling Vehicles, 7 Rooftop Heliports, and 8 Self-Service Aircraft Fueling. The new document structure intends to build symmetry between the chapters, so that the same topic will be found under the same level 3 section number of each chapter. The applicability of chapters is described in 4.1.1 of the new Chapter 4. Individual technical changes for Chapter 7 are addressed below.

7.1.2.1 [new] Added requirement for fuel storage tanks to comply with NFPA 30. This clarifies that the fuel storage tanks are not within the scope of NFPA 407.

7.1.3.1 [new] Added requirement for fuel pumps and piping systems to comply with NFPA 30. This clarifies that the fuel pumps and piping systems are not within the scope of NFPA 407.

7.1.9.2 [4.5.9.2] Revised requirement for location of the emergency fuel shutoff. The requirement to locate the shutoff “near” the pump was vague and unenforceable. This was clarified by permitting a maximum distance of 6 m (20 ft).

Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
21 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.

Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
No Change

First Revision No. 24-NFPA 407-2014 [New Section after 5.22]

Chapter 8 Self-Service Aircraft Fueling

8.1 Design and Construction.

8.1.1 General Requirements.

8.1.1.1 System Design and Approval.

Self-service fueling shall be permitted, subject to the approval of the authority having jurisdiction.

8.1.1.2

Dispensing devices shall be located on an island to protect against collision damage or shall be suitably protected with pipe bollards or other suitable protection.

8.1.2 Fuel Storage Tanks.

In addition to the special requirements of this chapter, the fuel storage system shall comply with the requirements of NFPA 30 .

8.1.3 Pumps and Piping Systems.

8.1.3.1

In addition to the special requirements of this chapter, the piping and dispensing system shall comply with the requirements of NFPA 30 .

8.1.3.2

Listed or approved dispensing devices shall be used.

8.1.4 Hose and Nozzles. (Reserved)

8.1.5 Electrostatic Bonding. (Reserved)

8.1.6 Electrical Systems. (Reserved)

8.1.7 Control of Fuel Flow. (Reserved)

8.1.8 Filters and Ancillary Equipment. (Reserved)

8.1.9 Emergency Fuel Shutoff Systems .

8.1.9.1

The controls shall be designed to allow only authorized personnel to reset the system after an emergency fuel shutoff.

8.1.9.2

The emergency fuel shutoff controls shall be installed in a location acceptable to the authority having jurisdiction and shall be more than 6 m (20 ft) but less than 30 m (100 ft) from the dispensers.

8.1.9.3

A clearly identified means to notify the fire department shall be provided and shall be located in the immediate vicinity of each emergency fuel shutoff control.

8.1.9.4

Dispensing devices shall have a listed or approved emergency shutoff valve, incorporating a fusible link or other thermally actuated device designed to close automatically in case of fire.

8.1.9.5

The emergency shutoff valve also shall incorporate a shear section that automatically shuts off the flow of fuel due to severe impact.

8.1.9.6

The emergency shutoff valve shall be rigidly mounted at the base of the dispenser in accordance with the manufacturer's instructions.

8.1.10 Fire Protection.

8.1.10.1

Each facility shall have a minimum of one fire extinguisher with a rating of at least 80-B:C located at the dispenser.

8.1.10.2

At least one fire extinguisher with a rating of at least 80-B:C shall be provided at each emergency fuel shutoff control.

8.1.11 Marking and Labeling.

8.1.11.1
Emergency instructions shall be conspicuously posted in the dispensing area and at the emergency fuel shutoff control.

8.1.11.2
Emergency instructions shall incorporate the following or equivalent wording:

EMERGENCY INSTRUCTIONS
IN CASE OF FIRE OR SPILL

(1) Use emergency fuel shutoff.
(2) Report accident by calling (specify local fire emergency reporting number) on phone.
(3) Report address of site (list address of site here).

8.1.11.3 Operating Instructions.
Operating instructions shall be posted.

8.1.11.4
The operating instructions shall include the following:

(1) Proper operation and use of all equipment
(2) Correct bonding procedures
(3) Procedures to be employed to dispense fuel safely
(4) Location and use of the emergency fuel shutoff controls
(5) Procedures to be used in the event of an emergency

8.2 Operations.
8.2.1 Security.
Access to dispensing equipment shall be controlled by means of mechanical or electronic devices designed to resist tampering and to prevent access or use by unauthorized persons.
8.2.2 Training. (Reserved)
8.2.3 Prevention and Control of Spills. (Reserved)
8.2.4 Emergency Fuel Shutoff. (Reserved)
8.2.5 Bonding. (Reserved)
8.2.6 Monitoring of Fuel Flow. (Reserved)
8.2.7 Fire Protection. (Reserved)
8.2.8 Maintenance. (Reserved)
8.2.9 Occupancy.
The aircraft shall not be occupied during self-service fueling.

Supplemental Information

File Name	Description
407_Reorganization.xlsx	
407_Chapter_8.docx	New chapter with mark-up and SL notes (red)
407_Chapter_8_Clean.docx	Clean copy of new chapter

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
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Submittal Date: Wed Oct 22 14:33:26 EDT 2014

Committee Statement

Committee Statement: The existing content in Chapters 4 (Design) and 5 (Operations), along with the associated Annex material, has been reorganized into new chapters: 4 General Requirements, 5 Aviation Fueling Facilities, 6 Airport Fueling Vehicles, 7 Rooftop Heliports, and 8 Self-Service Aircraft Fueling. The new document structure intends to build symmetry between the chapters, so that the same topic will be found under the same level 3 section number of each chapter. The applicability of chapters is described in 4.1.1 of the new Chapter 4. Individual technical changes for Chapter 8 are addressed below.

8.1.10.2 [new] Added new requirement for 80-B:C extinguisher at each emergency fuel shutoff.

Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
21 Affirmative All
1 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All
Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.

Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment
Nuzzolese, Aldo
No Change

First Revision No. 4-NFPA 407-2014 [Section No. B.3.2]

B.3.2 Rate of Flame Spread.

Where fuel is spilled, there is a marked difference in the rates of flame spread over pools of JET ~~A~~ A– or kerosene ~~grades of~~ -grade turbine ~~fuel~~ fuels as compared with the other two types. Under these conditions, a direct relationship exists between the rate of flame spread and the vapor pressures of the materials. A report ~~dated October 1973~~ , entitled *An Evaluation of the Relative Fire Hazards of JET A and JET B for Commercial Flight* (N74-10709) [Hacker and Hibbard, 1973] , states that the rate (of flame spread) for JP-4 (JET B) is about 30 times greater than for aviation kerosene (JET A) at the temperatures most often encountered. This is an important factor in evaluating the severity of the fire hazard encountered under these conditions and also is a factor that affects the ease of fire control under similar conditions.

This slower rate of flame propagation for JET ~~A~~ A– or kerosene ~~grades of~~ -grade turbine ~~fuel~~ fuels does not occur, however, where the fuel is released as a fuel mist, as frequently results in aircraft impact accidents or where the fuels are heated to or above their flash point. If a flammable or combustible liquid exists in mist form or is at a temperature above its flash point, the speed of flame spread in the mist or vapor is essentially the same, regardless of the liquid spilled.

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 17 17:19:47 EDT 2014

Committee Statement

Committee Statement: Added author names for referenced paper.
Response Message:

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
20 Affirmative All
2 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All

Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gammon, James
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment

Bosserman, Terry L.

6.1.2.2 Again MC 306 for the tank design must be listed 6.1.2.7 same as 6.1.2.2 6.1.2.10 metal tanks need to list aluminum also 6.1.3.6 metal piping must also list aluminum piping 6.1.3.6 Again with a ex. proof switch it will have no gasket. 6.1.3.16 new design of units makes the opening of internal valves automatic with no separate motion from the operator. 6.1.6.2.3 Junction boxes only need to be weather proof if they are located in an area of climate concern. i.e if the box is mounted in the cab it would not need to be weatherproof 6.1.7.2 Same as 4.1.7.1 the hydrant pit coupler should also be listed. 6.13.12.28 Most units do not have a secondary overfill protection are we now asking for all units to change to this design?

Nuzzolese, Aldo

No Change

First Revision No. 3-NFPA 407-2014 [Chapter C]

Annex C Informational References

C.1 Referenced Publications.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

C.1.1 NFPA Publications.

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

NFPA 30, *Flammable and Combustible Liquids Code*, ~~2012~~ 2015 edition.

NFPA 70®, *National Electrical Code®*, ~~2011~~ 2017 edition.

NFPA 77, *Recommended Practice on Static Electricity*, ~~2007~~ 2014 edition.

NFPA 415, *Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways*, ~~2008~~ 2016 edition.

C.1.2 Other Publications.

C.1.2.1 A4A Publications.

Airlines for America, 1301 Pennsylvania Avenue, NW, Suite 1100, Washington, DC 20004.

Spec 103: *Standard for Jet Fuel Quality Control at Airports* , 2009.

C.1.2.2 API Publications.

American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.

API/~~IP Std 1529, *Aviation Fueling Hose and Hose Assemblies* , 6th edition. 2005~~ STD 607, *Fire Test for Quarter-Turn Valves and Valves Equipped With Nonmetallic Seats* , 2010. .

API RP 1595, *Design, Construction, Operation, Maintenance, and Inspection of Aviation Pre-Airfield Storage Terminals* , 2012.

API RP 2003, *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*, 2008.

C.1.2.3 ASTM Publications.

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

ASTM D86, *Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure* , ~~2009~~ 2012 .

ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*, 2008.

ASTM MNL5, *Aviation Fuel Quality Control Procedures:* 4th Edition, 2009

C.1.2.4 CRC Publications.

Coordinating Research Council Inc., 3650 Mansell Road, Suite 140, Alpharetta, GA 30022.

CRC Report No. 583, *Aircraft and Refueler Bonding and Grounding Study*, 1993.

C.1.2.5 EI Publications

Energy Institute, 61 Cavendish Street, London W1G 7AR, UK.

EI 1529, *Aviation Fueling Hose and Hose Assemblies* , 2005.

EI 1540, *Design, Construction, Operation, and Maintenance of Aviation Fueling Facilities* , 2010.

EI 1550, *Handbook on Equipment Used for the Maintenance and Delivery of Clean Aviation Fuel* , 2007.

EI 1581, *Specification and Qualification Procedures for Aviation Jet Fuel Filter/Separators* , 2011.

EI 1583, *Laboratory Tests and Minimum Performance Levels for Aviation Fuel Filter Monitors* , 2012.

EI 1590, *Specifications and Qualification Procedures for Aviation Fuel Microfilters* , 2008.

EI 1596, *Design and Construction of Aviation Fuel Filter Vessels* , 2013.

C.1.2.6 FAA Publications.

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

FAA AC-150-5230, *Aircraft Fuel Storage, Handling, Training, and Dispensing on Airports* , Rev 4B, 2012.

C.1.2.7 FM Publications.

FM Global, 1301 Atwood Avenue, P.O. Box 7500, Johnston, RI 02919.

FM Class 3610, *Approval Standard for Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, & and III Division 1, ~~and Class I, Zone 0 & 1~~ Hazardous (Classified) Locations,* ~~.~~ 2010

~~**C.1.2.8** ISA Publications.~~

~~ISA, 67 Alexander Drive, Research Triangle Park, NC 27709.~~

~~ANSI/ISA-60079-11 (12.02.01), Explosive Atmospheres Part 11: *Equipment Protection by Intrinsic Safety "i,"* 2009.~~

C.1.2.8 Joint Inspection Group Publications.

Joint Inspection Group, PO Box 33094, 6A Foscote Mews, London, UK, W9 2YX.

JIG 4, *Guidelines for Aviation Fuel Quality Control & Operating Procedures for Smaller Airports,* 2014.

C.1.2.9 NATA Publications.

National Air Transportation Association, 4226 King Street, Alexandria, VA 22302.

Refueling and Quality Control Procedures for Airport Service and Support Operations , 2011

C.1.2.10 NIST Publications.

National Institute of Standards and Technology, Gaithersburg, MD 20899-2600.

NIST Handbook 44, *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices* , 2012.

C.1.2.11 NTIS Publications.

National Technical Information Service, ~~5285 Port Royal Road, Springfield, VA 22161~~ 5301 Shawnee Rd., Alexandria, VA, 22312 .

Hacker, P.T., R. R. Hibbard, *An Evaluation of the Relative Fire Hazards of JET A and JET B for Commercial Flight* (~~N74-10709~~ N7410709), 1973 .

C.1.2.12 PEI Publishing.

Petroleum Energy Institute, 6931 S. 66th E. Ave., Suite 200, Tulsa, OK 74133.

PEI RP100, *Installation of Underground Liquid Storage Systems* , 2011.

PEI RP200, *Installation of Aboveground Storage Systems* , 2013.

PEI RP800, *Design and Installation of Bulk Storage Plants* , 2013.

PEI RP1300, *Aviation Fueling Systems* , 2013.

C.1.2.13 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*, ~~2006, Revised 2010~~ 2013 .

ANSI/UL 60079-11, ~~*Electrical Apparatus for Use in Class I, Zones 0, 1, & 2 Hazardous (Classified) Locations—Intrinsic Safety"i,"*~~ *Explosive Atmospheres --Part 11: Equipment Protection by Intrinsic Safety 'i',* ~~2009~~ 2013 .

C.1.2.14 U.S. Government Publications.

U.S. Government Printing Office, Washington, DC 20402.

OSHA, Title 29, Code of Federal Regulations.

EPA, Title 40, Code of Federal Regulations, Part 112 (Oil Pollution Prevention).

EPA, Title 40, Code of Federal Regulations, Part 280 (Underground Tanks).

C.1.2.15 Other Publications.

Bachman, K. C., and W. G. Dukek, *Static Electricity in Fueling Superjets,* 1972. ~~Exxon~~ Esso Research & Eng. Co. Brochure, Linden, NJ.

C.2 Informational References.

The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

C.2.1 API Publications.

American Petroleum Institute, 1220 L Street, N.W., Washington, DC 20005-4070.

API STD 2000, *Venting Atmospheric and Low-Pressure Storage Tanks: ~~Nonrefrigerated and Refrigerated~~* , ~~1999~~ 2014 .

C.2.2 ASTM Publications.

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

ASTM D910, *Standard Specification for Aviation Gasolines*, ~~2007~~ 2013A .

ASTM D1655, *Standard Specification for Aviation Turbine Fuels*, ~~2009~~ 2014 .

C.3 References for Extracts in Informational Sections.

(Reserved)

Submitter Information Verification

Submitter Full Name: [Not Specified]
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Sep 17 15:01:56 EDT 2014

Committee Statement

Committee Statement: Updated and new references.
Response Message:
Public Input No. 33-NFPA 407-2014 [Chapter C]
Public Input No. 37-NFPA 407-2014 [Section No. C.1.2.2]

Ballot Results

✔ **This item has passed ballot**

27 Eligible Voters
5 Not Returned
20 Affirmative All
2 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
Bagnall, John H.
Bourdeau, Mark
Pattie, Ronald F.
Stipkovits, Fred J.
Weaver, Larry S.

Affirmative All

Bosserman, Terry L.
Butler, Michael D.
Calderwood, Paul E.
Carlton, Haydee
Cnota, Fred A.
Creley, Roy
Demyan, John J.
Dukes, Chris
Frank, Dan
Gambino, Thomas D.
Gerlich, Nathan R.
Kluttz, Michael
Loveridge, Michael
Moody, William E.
Motschman, Michael
Potter, Dana W.
Skinner, Cary
Souza, Jeremy
Thickstun, Steve
White, Hal Douglas

Affirmative with Comment

Gammon, James

Annex c As in 3 2.1 – 2.4 – For the purposes of being current, I suggest that you specify “most current edition” to each document or you will be specifying out-of-date documents. Specifying the publishing date can get people in trouble with over-zealous authorities. They have to keep and follow old, out of date standards, which can also create a legal dilemma.

Nuzzolese, Aldo

Add C.2.X: SAE Publications SAE International, SAE Aerospace Documents, 400 Commonwealth Drive, Warrendale, PA 15096 SAE ARP5818, Aircraft Refueling Vehicle Design & Performance Requirements