



Public Comment No. 8-NFPA 96-2019 [Section No. 2.3.5]

2.3.5 UL Publications.

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

UL 197, *Commercial Electric Cooking Appliances*, 2010, revised 2018.

UL 199, *Automatic Sprinklers for Fire-Protection Service*, 2005, revised 2017.

UL 199B, *Outline of Investigation for Automatic Sprinkler Systems Used for Protection of Commercial Cooking Equipment*, 2015.

UL 199E, *Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers*, 2004.

UL 263, *Fire Tests of Building Construction and Materials*, 2011, revised 2018.

UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, 2005, revised 2017.

UL 710, *Exhaust Hoods for Commercial Cooking Equipment*, 2006, revised 2017.

UL 710A, *Safety for Rooftop Grease and Oil Collection and Containment Systems*, 2015.

UL 710B, *Recirculating Systems*, 2011, revised 2014.

UL 710C, *Outline of Investigation for Ultraviolet Radiation Systems for Use in the Ventilation Control of Commercial Cooking Operations*, 2006.

UL 723, *Test for Surface Burning Characteristics of Building Materials*, 2010, revised 2018.

UL 762, *Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances*, 2013.

UL 1046, *Grease Filters for Exhaust Ducts*, 2010, revised 2017.

UL 1479, *Fire Tests of Through-Penetration Firestops*, 2003, revised 2015.

UL 1484, *Residential Gas Detectors*, 2016, revised 2017.

UL 1978, *Grease Ducts*, 2010, revised 2017.

UL 2221, *Tests of Fire Resistive Grease Duct Enclosure Assemblies*, 2010.

Statement of Problem and Substantiation for Public Comment

UL would like to thank the committee for reviewing the CAN/ULC Standards that we believe are equivalent to UL standards under consideration from PI 81 (Global Input) and noted by the committee reasoning statement. Canada is a major user of NFPA codes and having these references located in this standard would be mutually beneficial.

Related Item

- PI-81 Global

Submitter Information Verification

Submitter Full Name: Kelly Nicoletto

Organization: UL LLC

Street Address:

City:

State:

Zip:

Submission Date: Tue May 07 10:30:32 EDT 2019

Committee: VEN-AAA

Committee Statement

Committee

Rejected but see related SR

Action:**Resolution:**[SR-10-NFPA 96-2019](#)**Statement:**

Added equivalent standards used in Canada throughout the standard and updated Section 2 accordingly.

US Standard:Canada Equivalent Standard

UL 710: CAN/ULC - S646

UL 1046: CAN/ULC - S649

UL Outline 762: CAN/ULC - S645

UL 1978: CAN/ULC - S662



Public Comment No. 2-NFPA 96-2019 [Section No. 3.3.37.2]

3.3.37.2 Limited-Combustible (Material).

~~Refers to a building construction material with limited burning characteristics that, when in the form in which it is used, does not comply with the definition of *noncombustible material* - (See 4.8.2.)~~

Statement of Problem and Substantiation for Public Comment

As shown this is not a definition. A definition explains what a term and does not state that the term "refers" to something. The move of definitions with requirements, like that of a limited combustible material (such as this is intended to be) have been eliminated from section 3 in many NFPA codes and standards in favor of placing the requirements in other parts of the standard (which is what NFPA 96 already did). This is redundant and incorrect.

Related Item

- pi72

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 04 18:44:19 EST 2019
Committee: VEN-AAA

Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-1-NFPA 96-2019](#)
Statement: The elimination of the first five words of the original provision satisfies the submitter's comment.



Public Comment No. 3-NFPA 96-2019 [Section No. 3.3.37.3]

3.3.37.3* Noncombustible Material.

~~A substance that will not ignite and burn under the conditions anticipated when subjected to a fire. (See 4.8.1.)~~

Statement of Problem and Substantiation for Public Comment

As shown this definition is inconsistent with the requirements for noncombustible materials in 4.8.1. There are two other options for a material to be noncombustible: meeting the requirements of ASTM E136 or those based on testing to ASTM E2652. In both cases, materials can ignite and exhibit some flaming and still be noncombustible. The move of definitions with requirements, like that of a noncombustible material (such as this is intended to be) have been eliminated from section 3 in many NFPA codes and standards in favor of placing the requirements in other parts of the standard (which is what NFPA 96 already did). This is redundant and incorrect.

Related Item

- pi73

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 04 18:49:03 EST 2019
Committee: VEN-AAA

Committee Statement

Committee Action: Accepted
Resolution: [SR-2-NFPA 96-2019](#)
Statement: This change removes the potential to be inconsistent with the noncombustible language provided in 4.8.1.



Public Comment No. 1-NFPA 96-2019 [Section No. 4.1.10]

4.1.10

Where a fire resistance rating is required in this standard, it shall be determined in accordance with ASTM E119 and or UL 263.

Statement of Problem and Substantiation for Public Comment

ASTM E119 and UL 263 are equivalent tests. Testing needs to be conducted in accordance with one of them (i.e. "or") not with both (i.e. "and").

Related Item

- fr13

Submitter Information Verification

Submitter Full Name: Marcelo Hirschler
Organization: GBH International
Street Address:
City:
State:
Zip:
Submittal Date: Mon Mar 04 18:42:13 EST 2019
Committee: VEN-AAA

Committee Statement

Committee Action: Accepted
Resolution: [SR-3-NFPA 96-2019](#)
Statement: ASTM E119 and UL 263 are equivalent tests. Testing needs to be conducted in accordance with one of them (i.e. "or") not with both (i.e. "and").



Public Comment No. 6-NFPA 96-2019 [Section No. 7.1.4 [Excluding any Sub-Sections]]

All ducts shall be installed with a minimum slope of $\frac{1}{4}$ in. per linear foot on horizontal runs up to 75 ft (22.86 m) and a minimum slope of 1 in. per linear foot on horizontal runs greater than 75 ft (22.86 m). Ducts shall slope towards exhaust hood.

Statement of Problem and Substantiation for Public Comment

This revision clarifies direction of slope.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 5-NFPA 96-2019 [Section No. 7.1.4.3]	Somewhat connected. Both relate to sloping of ductwork.
	Related Item
	• Somewhat connected. Both relate to sloping of ductwork.

Submitter Information Verification

Submitter Full Name: Robert England
Organization: R J England Consulting Ltd
Street Address:
City:
State:
Zip:
Submission Date: Tue Apr 02 15:36:23 EDT 2019
Committee: VEN-AAA

Committee Statement

Committee Action: Rejected
Resolution: The standard currently permits drains at low points in a horizontal duct which provides a mean for removing greasy residue. It is not necessary to have the duct sloped towards the exhaust hood.



Public Comment No. 5-NFPA 96-2019 [Section No. 7.1.4.3]

7.1.4.3 *

~~Drains shall be provided at low points in horizontal ducts.~~

7.1.4.3.1 –

~~Where provided, drains shall be continuously welded to the exhaust duct in accordance with the terms of the listing and the manufacturer's installation manual.~~

~~This sentence not used.~~

Statement of Problem and Substantiation for Public Comment

7.1.4.3 (and 7.1.4.3.1) are in direct contradiction to 7.1.4.4, and it is causing confusion. My suggestion would be to eliminate 7.1.4.3 (and 7.1.4.3.1), asterisk 7.1.4.4, and add 7.1.4.3, 7.1.4.3.1, and A.7.1.4.3 to 7.1.4.4 as asterisked material (i.e. A.7.1.4.4).

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 6-NFPA 96-2019 [Section No. 7.1.4 [Excluding any Sub-Sections]]	
Related Item	
• unknown	

Submitter Information Verification

Submitter Full Name: Robert England
Organization: R J England Consulting Ltd
Street Address:
City:
State:
Zip:
Submission Date: Tue Apr 02 15:24:40 EDT 2019
Committee: VEN-AAA

Committee Statement

Committee Action: Rejected but see related SR
Resolution: [SR-4-NFPA 96-2019](#)
Statement: Based on the action taken on public comment # 6, we must retain the requirements for drains at low points in horizontal ducts.

 Adding the word "or" clarifies the difference between field erected duct work and manufactured duct work.



Public Comment No. 7-NFPA 96-2019 [Chapter 16]

Chapter 16 Mobile and Temporary Cooking Operations

16.1 General.

16.1.1

Mobile and temporary cooking operations shall comply with the requirements of this chapter.

16.1.1.1

Cooking equipment that is powered on during transit shall be listed as installed for such use.

16.1.2

Cooking equipment used in processes producing smoke or grease-laden vapors shall be equipped with an exhaust system that complies with all the equipment and performance requirements of this standard.

16.1.2.1

Cooking equipment that has been listed in accordance with UL 197 or an equivalent standard for reduced emissions shall not be required to be provided with an exhaust system.

16.1.2.2

The listing evaluation of cooking equipment covered by 16.1.2.1 shall demonstrate that the grease discharge at the exhaust duct of a test hood placed over the appliance shall not exceed 0.00018 oz/ft^3 (5 mg/m^3) when operated with a total airflow of 500 cfm ($0.236 \text{ m}^3/\text{sec}$).

16.1.3

All such equipment and its performance shall be maintained in accordance with the requirements of this standard during all periods of operation of the cooking equipment.

16.1.4

The following equipment shall be kept in working condition:

- (1) Cooking equipment
- (2) Hoods
- (3) Ducts (if applicable)
- (4) Fans
- (5) Fire-extinguishing equipment
- (6) Special effluent or energy control equipment

16.1.4.1

Maintenance and repairs shall be performed on all components at intervals necessary to maintain good working condition.

16.1.5

All airflows shall be maintained.

16.1.6

The responsibility for inspection, testing, maintenance, and cleanliness of the ventilation control and fire protection of the commercial cooking operations, including cooking appliances, shall ultimately be that of the owner of the system, provided that this responsibility has not been transferred in written form to a management company, tenant, or other party.

16.1.7

All interior surfaces of the exhaust system shall be accessible for cleaning and inspection purposes.

16.2 Clearance.

Note: See Figure A.4.2(a) through Figure A.4.2(h) for clarification of the appropriate clearances required in Section 16.2.

16.2.1

Where enclosures are not required, hoods, grease removal devices, exhaust fans, and ducts shall have a clearance of at least 18 in. (457 mm) to combustible material, 3 in. (76 mm) to limited-combustible material, and 0 in. (0 mm) to noncombustible material.

16.2.2

Where a hood, duct, or grease removal device is listed for clearances less than those required in 16.2.1, the listing requirements shall be permitted.

16.2.3 Clearance Reduction.**16.2.3.1**

Where a clearance reduction system consisting of 0.013 in. (0.33 mm) (28 gauge) sheet metal spaced out 1 in. (25 mm) on noncombustible spacers is provided, there shall be a minimum of 9 in. (229 mm) clearance to combustible material.

16.2.3.2

Where a clearance reduction system consisting of 0.027 in. (0.69 mm) (22 gauge) sheet metal on 1 in. (25 mm) mineral wool batts or ceramic fiber blanket reinforced with wire mesh or equivalent spaced 1 in. (25 mm) on noncombustible spacers is provided, there shall be a minimum of 3 in. (76 mm) clearance to combustible material.

16.2.3.3

Where a clearance reduction system consisting of a listed and labeled field-applied grease duct enclosure material, system, product, or method of construction specifically evaluated for such purpose in accordance with ASTM E2336, the required clearance shall be in accordance with the listing.

16.2.3.4

Zero clearance to limited-combustible materials shall be permitted where protected by one of the following:

- (1) Metal lath and plaster
- (2) Ceramic tile
- (3) Quarry tile
- (4) Other noncombustible materials or assembly of noncombustible materials that are listed for the purpose of reducing clearance
- (5) Other materials and products that are listed for the purpose of reducing clearance

16.2.4 Clearance Integrity.**16.2.4.1**

In the event of damage, the material or product shall be repaired and restored to meet its intended listing or clearance requirements and shall be acceptable to the AHJ.

16.2.4.2

In the event of a fire within a kitchen exhaust system, the duct and its enclosure (rated shaft, factory-built grease duct enclosure, or field-applied grease duct enclosure) shall be inspected by qualified personnel to determine whether the duct and protection method are structurally sound, capable of maintaining their fire protection function, and in compliance with this standard for continued operation.

Note: The intent of this paragraph is to maintain the systems and their function in accordance with the requirements of the edition of NFPA 96 under which the systems were designed and installed.

16.2.4.3

Protection shall be provided on the wall from the bottom of the hood to the floor, or to the top of the noncombustible material extending to the floor, to the same level as required in 16.2.1.

16.2.4.4

The protection methods for ducts to reduce clearance shall be applied to the combustible or limited-combustible construction, not to the duct itself.

16.3 Duct Contact.**16.3.1**

A duct shall be permitted to contact noncombustible floors, interior walls, and other noncombustible structures or supports, but it shall not be in contact for more than 50 percent of its surface area for each linear foot of contact length.

16.3.2

Where duct contact must exceed the requirements of 16.3.1, the duct shall be protected from corrosion.

16.3.3

Where the duct is listed for zero clearance to combustibles or is otherwise protected with a material or product listed for the purpose of reducing clearance to zero, the duct shall be permitted to exceed the contact limits of 16.3.1 without additional corrosion protection.

16.3.4

Where the duct is listed for zero clearance to combustibles, the duct shall be permitted to exceed the contact limits of 16.3.1 without additional corrosion protection.

16.3.5 Duct Clearances to Enclosures.

Clearances between the duct and interior surfaces of enclosures shall meet the requirements of Section 16.2.

16.3.6 Drawings.

A drawing(s) of the exhaust system installation along with copies of operating schematics shall be kept in the mobile unit or temporary cooking operation unit.

16.3.7 Authority Having Jurisdiction Notification.

If required by the authority having jurisdiction, notification in writing shall be given of any alteration, replacement, or relocation of any exhaust or extinguishing system or part thereof or cooking equipment.

16.3.8 Materials.**16.3.8.1 Noncombustible Material.****16.3.8.1.1**

A material that complies with any of the following shall be considered a noncombustible material:

- (1) The material, in the form in which it is used, and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.
- (2) The material is reported as passing ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.*
- (3) The material is reported as complying with the pass/fail criteria of ASTM E136 when tested in accordance with the test method and procedure in ASTM E2652, *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750 Degrees C.*

[5000:7.1.4.1.1]

Note: The provisions of 16.3.8.1.1 do not require inherently noncombustible materials to be tested in order to be classified as noncombustible materials. Examples of such materials include steel, concrete, masonry, and glass.

16.3.8.1.2

Where the term *limited-combustible* is used in this [standard], it shall also include the term *noncombustible*. [5000:7.1.4.1.2]

16.3.8.2 Limited-Combustible Material.

A material shall be considered a limited-combustible material where both of the conditions of 16.3.8.2.1, and 16.3.8.2.2, and the conditions of either 16.3.8.2.3 or 16.3.8.2.4 are met. [5000:7.1.4.2]

16.3.8.2.1

The material does not comply with the requirements for a noncombustible material, in accordance with 16.3.8.1.1. [5000:7.1.4.2(1)]

16.3.8.2.2

The material, in the form in which it is used, exhibits a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), when tested in accordance with NFPA 259. [5000:7.1.4.2(2)]

16.3.8.2.3

The material shall have a structural base of a noncombustible material with a surfacing not exceeding a thickness of $\frac{1}{8}$ in. (3.2 mm) where the surfacing exhibits a flame spread index not greater than 50 when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*. [5000:7.1.4.2.1]

16.3.8.2.4

The material shall be composed of materials that, in the form and thickness used, neither exhibit a flame spread index greater than 25 nor evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723 and are of such composition that all surfaces that would be exposed by cutting through the material on any plane would neither exhibit a flame spread index greater than 25 nor exhibit evidence of continued progressive combustion when tested in accordance with ASTM E84 or UL 723. [5000:7.1.4.2.2]

16.3.8.2.5

Where the term *limited-combustible* is used in this [standard], it shall also include the term *noncombustible*. [5000:7.1.4.2.4]

16.4 Hoods.**16.4.1 Construction.****16.4.1.1**

The hood or that portion of a primary collection means designed for collecting cooking vapors and residues shall be constructed of and be supported by steel not less than 0.048 in. (1.21 mm) (No. 18 MSG) in thickness, stainless steel not less than 0.036 in. (0.91 mm) (No. 20 MSG) in thickness, or other approved material of equivalent strength and fire and corrosion resistance.

16.4.1.2

All seams, joints, and penetrations of the hood enclosure that direct and capture grease-laden vapors and exhaust gases shall have a liquidtight continuous external weld to the hood's lower outermost perimeter.

16.4.1.3

Seams, joints, and penetrations of the hood shall be permitted to be internally welded, provided that the weld is formed smooth or ground smooth, so as to not trap grease, and is cleanable.

16.4.1.4

Internal hood joints, seams, filter support frames, and appurtenances attached inside the hood shall be sealed or otherwise made greasetight.

Note: Welding is one acceptable method.

16.4.1.5

Penetrations shall be permitted to be sealed by devices that are listed for such use and whose presence does not detract from the hood's or duct's structural integrity.

16.4.1.6

Listed exhaust hoods with or without exhaust dampers shall be permitted to be constructed of materials required by the listing.

16.4.1.7

Listed exhaust hoods with or without exhaust dampers shall be permitted to be assembled in accordance with the listing requirements.

16.4.1.8 Eyebrow-Type Hoods.**16.4.1.8.1**

Eyebrow-type hoods over gas or electric ovens shall be permitted to have a duct constructed as required in Section 16.6 from the oven flue(s) connected to the hood canopy upstream of the exhaust plenum, as shown in Figure 5.1.8.1.

16.4.1.8.2

The duct connecting the oven flue(s) to the hood canopy shall be connected with a continuous weld or have a duct-to-duct connection. [See Figure 8.1.3.2(b) through Figure 8.1.3.2(d).]

16.4.1.9

Insulation materials other than electrical insulation shall have a flame spread index of 25 or less, when tested in accordance with ASTM E84 or UL 723.

16.4.1.10

Adhesives or cements used in the installation of insulating materials shall comply with the requirements of 16.4.1.9 when tested with the specific insulating material.

16.4.1.11

Penetrations shall be sealed with listed devices in accordance with the requirements of 16.4.1.12.

16.4.1.12

Devices that require penetration of the hood, such as pipe and conduit penetration fittings and fasteners, shall be listed in accordance with UL 1978.

16.4.1.13

Wall-mounted exhaust hood assemblies shall be tight fitting against the back wall so as to not permit passage of grease vapor behind the hood or between the back wall and the hood assembly.

16.4.2 Hood Size.

Hoods shall be sized and configured to provide for the capture and removal of grease-laden vapors. (See 16.7.2.2.)

16.4.3 Exhaust Hood Assemblies with Integrated Supply Air Plenums.**16.4.3.1**

The construction and size of exhaust hood assemblies with integrated supply air plenums shall comply with the requirements of 16.4.1 and 16.4.2.

16.4.3.2

The construction of the outer shell or the inner exhaust shell shall comply with 16.4.1.

16.4.3.3

Where the outer shell is welded, the inner shell shall be of greasetight construction.

16.4.4 Listed Hood Assemblies.

Note: Examples of acceptable materials for hoods include steel and stainless steel. Additionally, many health officials prohibit galvanized steel in hoods, as does NSF/ANSI 2.

16.4.4.1

Listed hood assemblies shall be installed in accordance with the terms of their listing and the manufacturer's instructions.

16.4.4.2

Listed hood assemblies shall be tested in accordance with UL 710.

16.5 Grease Removal Devices in Hoods.**16.5.1 Grease Removal Devices.****16.5.1.1**

Listed grease filters or other listed grease removal devices intended for use with commercial cooking operations shall be provided.

16.5.1.2

Listed grease filters and grease removal devices that are removable but not an integral component of a specific listed exhaust hood shall be listed in accordance with UL 1046 and shall be designated on the filter.

16.5.1.3

Mesh filters shall not be used unless evaluated as an integral part of a listed exhaust hood or listed in conjunction with a primary filter in accordance with UL 1046.

16.5.2 Installation.**16.5.2.1 Separation Distance.****16.5.2.1.1**

The distance between the grease removal device and the cooking surface shall be as great as possible but not less than 18 in. (457 mm).

16.5.2.1.2

Where grease removal devices are used in conjunction with solid fuel or solid fuel-type broilers, including gas or electrically heated charbroilers, a minimum vertical distance of 4 ft (1.22 m) shall be maintained between the lower edge of the grease removal device and the cooking surface.

16.5.2.1.3

For cooking equipment without exposed flame and where flue gases bypass grease removal devices, the minimum vertical distance shall be permitted to be reduced to not less than 6 in. (152 mm).

16.5.2.1.4

Where a grease removal device is listed for separation distances less than those required in 16.5.2.1.1 and 16.5.2.1.2, the listing requirements shall be permitted.

16.5.2.1.5

Grease removal devices supplied as part of listed hood assemblies shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

16.5.2.2 Grease Removal Device Protection.**16.5.2.2.1**

Where the distance between the grease removal device and the appliance flue outlet (heat source) is less than 18 in. (457 mm), grease removal devices shall be protected from combustion gas outlets and from direct flame impingement occurring during normal operation of cooking appliances producing high flue gas temperatures.

Note: Appliances that produce high flue gas temperatures include deep-fat fryers, upright or high broilers, and salamander broilers.

16.5.2.2.2

This protection shall be permitted to be accomplished by the installation of a steel or stainless steel baffle plate between the heat source and the grease removal device.

Note: For a typical arrangement of a baffle protecting filters at an appliance vent, see Figure A.6.2.2.2.

16.5.2.2.3

The baffle plate shall be sized and located so that flames or combustion gases travel a distance not less than 18 in. (457 mm) from the heat source to the grease removal device.

16.5.2.2.4

The baffle shall be located not less than 6 in. (152 mm) from the grease removal device.

16.5.2.3 Grease Filters.**16.5.2.3.1**

Grease filters shall be listed.

16.5.2.3.2

Grease filters shall be constructed of noncombustible material.

16.5.2.3.3

Grease filters shall be of rigid construction that will not distort or crush under normal operation, handling, and cleaning conditions.

16.5.2.3.4

Grease filters shall be arranged so that all exhaust air passes through the grease filters.

16.5.2.3.5

Grease filters shall be easily accessible for removal.

16.5.2.3.6

Grease filters shall be installed at an angle not less than 45 degrees from the horizontal.

16.5.2.4 Grease Drip Trays.**16.5.2.4.1**

Grease filters shall be equipped with a grease drip tray beneath their lower edges.

16.5.2.4.2

Grease drip trays shall be kept to the minimum size needed to collect grease.

16.5.2.4.3

Grease drip trays shall be pitched to drain into an enclosed metal container having a capacity not exceeding 1 gal (3.8 L).

16.5.2.5 Grease Filter Orientation.

Grease filters that require a specific orientation to drain grease shall be clearly so designated on the face of the filter as to be visible with the filter installed, or the hood or filter shall be constructed so that filters cannot be installed in the wrong orientation.

16.6 Exhaust Duct Systems.

16.6.1

All ducts shall lead directly to the exterior of the mobile unit or temporary cooking operation, so as not to unduly increase any fire hazard.

Note: Vertical or substantially pitched ducts are preferred over horizontal ducts because of their capacity to drain grease and to transfer heated vapors more rapidly to the exterior of a mobile unit or temporary cooking operation.

16.6.2

All ducts shall be installed with a minimum 2 percent slope on horizontal runs up to 75 ft (22.86 m) and a minimum 8 percent slope on horizontal runs greater than 75 ft (22.86 m).

16.6.2.1

Factory-built grease ducts shall be permitted to be installed at a lesser slope in accordance with the listing and the manufacturer's instructions.

16.6.2.2

All horizontal ducts shall be provided with access in accordance with 16.6.5.1.

16.6.2.3

Drains shall be provided at low points in horizontal ducts.

Note: Typically, ducts that are sloped in accordance with 16.6.2 prevent collection points for residue and eliminate the need for drains. For horizontal ducts greater than 75 ft (22.86 m), low points are difficult to avoid. Where the low points cannot be avoided, access and drains should be considered.

16.6.2.3.1

Where provided, drains shall be continuously welded to the exhaust duct in accordance with the terms of the listing and the manufacturer's installation manual.

16.6.2.4

All ducts shall be installed without forming dips or traps.

16.6.2.5

Openings required for accessibility shall comply with 16.6.4.

16.6.2.6

A sign stating the following shall be placed on all access panels:

ACCESS PANEL — DO NOT OBSTRUCT

16.6.2.7

Listed grease ducts shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

16.6.3 Clearance.

Clearance between ducts and combustible materials shall be provided in accordance with the requirements of Section 16.2.

16.6.3.1

Where single-wall ductwork penetrates a non-fire-rated roof assembly, the penetration point shall be of limited combustible or noncombustible construction unless a field applied grease duct enclosure is installed to the top of the roof curb or the clearances of Section 16.2 are maintained.

16.6.4 Openings.

16.6.4.1

Openings shall be provided at the sides or at the top of the duct, whichever is more accessible, and at changes of direction.

16.6.4.2

Openings shall be protected by approved access constructed and installed in accordance with the requirements of 16.6.5.4.

16.6.4.3

Openings shall not be required in portions of the duct that are accessible from the duct entry or discharge.

16.6.4.4

Access panel openings shall not be required in portions of the common exhaust duct or branch duct that are accessible from the branch duct connection to the exhaust hood.

16.6.4.5

Exhaust fans with ductwork connected to both sides shall have access for cleaning and inspection within 3 ft (0.92 m) of each side of the fan.

16.6.4.6

Wall-mounted exhaust fans shall have access for cleaning and inspection within 3 ft (0.92 m) of the exhaust fan.

16.6.5 Openings in Ducts.

All openings shall comply with the requirements of this section.

16.6.5.1 Horizontal Ducts.**16.6.5.1.1**

On horizontal ducts, at least one 20 in. × 20 in. (508 mm × 508 mm) opening shall be provided for personnel entry.

16.6.5.1.2

Where an opening of the size specified in 16.6.5.1.1 is not possible, openings large enough to permit thorough cleaning shall be provided at 12 ft (3.7 m) intervals.

16.6.5.1.3

Support systems for horizontal grease duct systems 24 in. (609 mm) and larger in any cross-sectional dimension shall be designed for the weight of the ductwork plus 800 lb (363 kg) at any point in the duct systems.

16.6.5.1.4

On nonlisted ductwork, the edge of the opening shall be not less than 1 ½ in. (38.1 mm) from all outside edges of duct or welded seams.

16.6.5.2 Vertical Ducts.**16.6.5.2.1**

On vertical ductwork where personnel entry is possible, access shall be provided at the top of the vertical riser to accommodate descent.

16.6.5.2.2

Where personnel entry is not possible, adequate access for cleaning shall be provided on each floor.

16.6.5.2.3

On nonlisted ductwork, the edge of the opening shall be not less than 1 ½ in. (38.1 mm) from all outside edges of the duct or welded seams.

16.6.5.3 Access Panels.**16.6.5.3.1**

Access panels shall be of the same material and thickness as the duct.

16.6.5.3.2

Access panels shall have a gasket or sealant that is rated for 1500°F (815.6°C) and shall be greasetight.

16.6.5.3.3

Fasteners, such as bolts, weld studs, latches, or wing nuts, used to secure the access panels shall be carbon steel or stainless steel and shall not penetrate duct walls.

16.6.5.3.4

Listed grease duct access door assemblies (access panels) shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

16.6.5.4 Protection of Openings.**16.6.5.4.1**

Openings for installation, servicing, and inspection of listed fire protection system devices and for duct cleaning shall be provided in ducts and enclosures and shall conform to the requirements of 16.6.4.

16.6.5.4.2

Enclosure openings required to reach access panels in the ductwork shall be large enough for removal of the access panel through the enclosure opening.

16.6.6 Other Grease Ducts.

Other grease ducts shall comply with the requirements of this section.

16.6.6.1 Materials.

Note: Examples of acceptable materials for ducts include the following:

- (1) Steel
- (2) Galvanized steel
- (3) Stainless steel

16.6.6.1.1

Ducts shall be constructed of and supported by carbon steel not less than 0.060 in. (1.52 mm) (No. 16 MSG) in thickness or stainless steel not less than 0.048 in. (1.21 mm) (No. 18 MSG) in thickness.

16.6.6.1.2

Factory-built grease ducts listed in accordance with UL 1978 shall be permitted to use materials in accordance with their listing.

16.6.6.2 Installation.**16.6.6.2.1**

All seams, joints, penetrations, and duct-to-hood collar connections shall have a liquidtight continuous external weld.

16.6.6.2.1.1

Factory-built grease ducts listed in accordance with UL 1978 shall be permitted to incorporate nonwelded joint construction in accordance with their listings.

16.6.6.2.1.2

Prior to the use of or concealment of any portion of a grease duct system, a leakage test shall be performed to determine that all welded joints and seams are liquidtight.

Note: The leakage test should consist of a light test, a water pressure test, or an approved equivalent test. The permit holder should be responsible for providing the necessary equipment and for performing the test. Refer to ANSI/ASHRAE 154, *Ventilation for Commercial Cooking Operations*, for specific information on such tests.

16.6.6.2.2

Duct-to-hood collar connections as shown in Figure 7.5.2.2 shall not require a liquidtight continuous external weld.

16.6.6.2.3

Penetrations shall be permitted to be sealed by other listed devices that are tested to be greasetight and are evaluated under the same conditions of fire severity as the hood or enclosure of listed grease extractors and whose presence does not detract from the hood's or duct's structural integrity.

16.6.6.2.4

Internal welding shall be permitted, provided the joint is formed or ground smooth and is readily accessible for inspection.

16.6.6.3

Penetrations shall be sealed with listed devices in accordance with the requirements of 7.5.4.

16.6.6.4

Devices that require penetration of the ductwork, such as pipe and conduit penetration fittings and fasteners, shall be listed in accordance with UL 1978.

16.6.6.5 Welded Duct Connections.**16.6.6.5.1**

Acceptable duct-to-duct connection shall be as follows:

- (1) Telescoping joint, as shown in Figure 7.5.5.1(a)
- (2) Bell-type joint, as shown in Figure 7.5.5.1(b)
- (3) Flange with edge weld, as shown in Figure 7.5.5.1(c)
- (4) Flange with filled weld, as shown in Figure 7.5.5.1(d)

16.6.6.5.2

Butt-welded connections shall not be permitted.

16.6.6.5.3

For telescoping and bell-type connections, the inside duct section shall always be uphill of the outside duct section.

16.6.6.5.4

For telescoping and bell-type connections, the difference between the inside dimensions of overlapping sections shall not exceed $\frac{1}{4}$ in. (6.4 mm).

16.6.6.5.5

For telescoping and bell-type connections, the overlap shall not exceed 2 in. (50.8 mm).

16.6.7 Exterior Installation.**16.6.7.1**

The exterior portion of the ductwork shall be vertical wherever possible and shall be installed and supported on the exterior of a mobile unit or temporary cooking operation.

16.6.7.2

Bolts, screws, rivets, and other mechanical fasteners shall not penetrate duct walls.

16.6.7.3

Clearance of ducts shall comply with Section 16.2.

16.6.7.4

All ducts shall be protected on the exterior by paint or other suitable weather-protective coating.

16.6.7.5

Ducts constructed of stainless steel shall not be required to have additional paint or weather-protective coatings.

16.6.7.6

Ductwork subject to corrosion shall have minimal contact with the mobile unit or temporary cooking operation surface.

16.6.8 Rooftop Terminations.

16.6.8.1

Roof top terminations shall be arranged with or provided with the following:

- (1) The ability to drain grease out of any traps or low points formed in the fan or duct near the termination of the system into a collection container that is noncombustible, closed, rainproof, and structurally sound for the service to which it is applied and that will not sustain combustion
- (2) A grease collection device that is applied to exhaust systems that does not inhibit the performance of any fan
- (3) Listed grease collection systems that meet the requirements of 16.6.8.1(1) and 16.6.8.1(2)
- (4) A listed grease duct complying with Section 16.3 or ductwork complying with 16.3.5
- (5) A hinged upblast fan supplied with flexible weatherproof electrical cable and service hold-open retainer to permit inspection and cleaning that is listed for commercial cooking equipment with the following conditions:
 - (a) Where the fan attaches to the ductwork, the ductwork is a minimum of 18 in. (0.46 m) away from any roof surface, as shown in Figure 7.8.2.1.
 - (b) The fan discharges a minimum of 40 in. (1.02 m) away from any roof surface, as shown in Figure 7.8.2.1.
- (6) Other approved fan, provided it meets all of the following criteria:
 - (a) The fan meets the requirements of 16.7.1.4.
 - (b) Exhaust fan discharge is directed up and away from the roof surface.

16.6.8.2

Fans shall be provided with safe access and a work surface for inspection and cleaning.

16.6.9 Wall Terminations.

Wall terminations shall be arranged with or provided with the following properties:

- (1) The exhaust flow shall be directed perpendicularly outward from the wall face or upward.
- (2) All the ductwork shall be pitched to drain the grease back into the hood(s) or with a drain provided to bring the grease back into a container within the mobile unit or temporary cooking operation or into a remote grease trap.
- (3) A listed grease duct shall comply with 16.6.5; other ducts shall comply with 16.6.6.
- (4) An approved fan shall meet the requirements of 16.6.9(2) and 16.7.1.2 or 16.7.1.4.

16.7 Air Movement.**16.7.1 Exhaust Fans for Commercial Cooking Operations.****16.7.1.1**

Fans used in exhaust systems for commercial cooking shall be listed in accordance with UL 762.

16.7.1.2 Upblast Exhaust Fans.

Note: An upblast exhaust fan is popular due to its low cost and ease of installation and is common in one- or two-story freestanding restaurants. The fan housing typically is made of spun aluminum. The motor and the belt drive are outside the airstream. See Figure A.8.1.2 for an example.

16.7.1.2.1

Upblast fans with motors surrounded by the airstream shall be hinged and supplied with flexible weatherproof electrical cable and service hold-open retainers.

16.7.1.2.2

Installation shall conform to the requirements of 16.6.8 and 16.6.9.

16.7.1.2.3

Upblast fans shall have a drain directed to a readily accessible and visible grease receptacle not to exceed 1 gal (3.8 L).

16.7.1.3 In-Line Exhaust Fans.

16.7.1.3.1

In-line fans shall be of the type with the motor located outside the airstream and with belts and pulleys protected from the airstream by a greasetight housing.

16.7.1.3.2

In-line fans shall be connected to the exhaust duct by flanges securely bolted as shown in Figure 8.1.3.2(a) through Figure 8.1.3.2(d) or by a system specifically listed for such use.

16.7.1.3.3

Flexible connectors shall not be used.

16.7.1.3.4

If the design or positioning of the fan allows grease to be trapped, a drain directed to a readily accessible and visible grease receptacle not exceeding 1 gal (3.8 L) shall be provided.

16.7.1.3.5

In-line exhaust fans shall be located in easily accessible areas of adequate size to allow for service or removal.

16.7.1.3.6

Where the duct system connected to the fan is in an enclosure, the space or room in which the exhaust fan is located shall have the same fire resistance rating as the enclosure.

16.7.1.4 Utility Set Exhaust Fans.

Note: See Figure A.8.1.4 for an example of a utility set fan. This type of fan generally is used for large exhaust systems such as found in hotels, hospitals, and prisons or in restaurants located in high-rise buildings. It typically is mounted on the roof but sometimes is located in a mechanical space or room.

16.7.1.4.1

Utility set exhaust fans, if installed at the rooftop termination point, shall meet the requirements of 16.6.8.2.

16.7.1.4.2

The fan shall be connected to the exhaust duct by flanges securely bolted as shown in Figure 8.1.3.2(a) through Figure 8.1.3.2(d) or by a system specifically listed for such use.

16.7.1.4.3

Flexible connectors shall not be used.

16.7.1.4.4

Exhaust fans shall have a drain directed to a readily accessible and visible grease receptacle not to exceed 1 gal (3.8 L).

16.7.1.5 Exhaust Fan Housings.

Exhaust fan housings shall be constructed of carbon steel not less than 0.060 in. (1.52 mm) (No. 16 MSG) in thickness, of stainless steel not less than 0.048 in. (1.21 mm) (No. 18 MSG) in thickness, or, if listed, in accordance with the terms of the listing.

16.7.1.6 Openings for Cleaning, Servicing, and Inspection.**16.7.1.6.1**

Openings for cleaning, servicing, and inspection shall conform to the requirements of 7.3.7.

16.7.1.6.2

Clearances shall conform to the requirements of Section 16.2.

16.7.1.6.3 Upblast Fans.**16.7.1.6.3.1**

Upblast fans shall be supplied with an access opening of a minimum 3 in. by 5 in. (76 mm by 127 mm) or a circular diameter of 4 in. (101 mm) on the curvature of the outer fan housing to allow for cleaning and inspection of the fan blades.

16.7.1.6.3.2

On existing upblast fans where sufficient access is not available to allow for the removal of grease contamination, an approved hinge mechanism or access panel shall be installed.

16.7.1.7 Wiring and Electrical Equipment.

All wiring and electrical equipment shall comply with *NFPA 70* (see also *Section 16.8*).

16.7.2 Airflow.**16.7.2.1** Air Velocity.**16.7.2.1.1**

The air velocity through any duct shall be not less than 500 ft/min (152.4 m/min).

16.7.2.1.2

Transition duct sections that do not exceed 3 ft (0.92 m) in length and do not contain grease traps shall be permitted to be connected to hoods and exhaust fans that do not meet this velocity.

16.7.2.2 Air Volume.**16.7.2.2.1**

Exhaust air volumes for hoods shall be of a sufficient level to provide for capture and removal of grease-laden cooking vapors.

16.7.2.2.2

Test data, performance tests acceptable to the authority having jurisdiction, or both shall be displayed, provided on request, or both.

Note: Performance tests can include a field test conducted with all appliances under the hood at operating temperatures and with all sources of outside air providing makeup air. Capture and containment should be verified visually by observing smoke or steam by actual or simulated full-load cooking.

16.7.2.2.3

Lower exhaust air volumes shall be permitted during no-load cooking conditions, provided they are sufficient to capture and remove flue gases and residual vapors from cooking equipment.

16.7.2.3 Exhaust Fan Operation.**16.7.2.3.1**

A hood exhaust fan(s) shall continue to operate after the extinguishing system has been activated unless fan shutdown is required by a listed component of the ventilation system or by the design of the extinguishing system.

16.7.2.3.2

The hood exhaust fan shall start upon actuation of the extinguishing system if the exhaust fan and all cooking equipment served by the fan have been shut down, unless fan shutdown is required by a listed component of the ventilation system or by the listing of the extinguishing system.

16.7.2.3.3

The exhaust fan shall be provided with a means so that the fan is activated when any heat-producing cooking appliance under the hood is turned on.

16.7.3 Replacement Air.

Note: It is not advisable to discontinue the use of replacement air systems during cooking operations. Exhaust function, indoor pollution, indoor comfort, and grease removal, for example, will be adversely affected.

16.7.3.1

Replacement air quantity shall be adequate to prevent negative pressures in the commercial cooking area(s) from exceeding 0.02 in. water column (4.98 Pa).

16.7.3.2

When the fire-extinguishing system activates, makeup air supplied internally to a hood shall be shut off.

16.8 Auxiliary Equipment.**16.8.1** Dampers.**16.8.1.1**

Dampers shall not be installed in exhaust ducts or exhaust duct systems.

16.8.1.2

Where specifically listed for such use or where required as part of a listed device or system, dampers in exhaust ducts or exhaust duct systems shall be permitted.

16.8.2 Electrical Equipment.**16.8.2.1**

Wiring systems of any type shall not be installed in ducts.

16.8.2.2

Motors, lights, and other electrical devices shall be permitted to be installed in ducts or hoods or to be located in the path of travel of exhaust products only where specifically listed for such use.

16.8.3 Lighting Units.**16.8.3.1**

Lighting units in hoods shall be listed for use over commercial cooking appliances and installed in accordance with the terms of their listing.

16.8.3.2

Lighting units on hoods shall not be located in concealed spaces except as permitted by 16.8.3.3 and 16.8.3.4.

16.8.3.3

Lighting units shall be permitted in concealed spaces where such units are part of a listed exhaust hood.

16.8.3.4

Listed lighting units specifically listed for such use and installed in accordance with the terms of the listing shall be permitted to be installed in concealed spaces.

16.8.4

All electrical equipment shall be installed in accordance with *NFPA 70*.

Note: All wiring should be designed, specified, and installed with due regard to the effects of heat, vapor, and grease on the equipment.

16.9 Fire-Extinguishing Equipment.**16.9.1 General Requirements.****16.9.1.1**

Fire-extinguishing equipment for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems shall be provided.

16.9.1.2

Cooking equipment that produces grease-laden vapors shall be protected by a fire-extinguishing system for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems.

16.9.1.3

A placard shall be conspicuously placed near each Class K extinguisher that states that the fire protection system shall be activated prior to using the fire extinguisher.

Note: NFPA 10, Annex A, provides recommendations for placards.

16.9.1.3.1

The language and wording for the placard shall be approved by the authority having jurisdiction.

16.9.1.4

Automatic fire-extinguishing systems shall comply with UL 300 or other equivalent standards and shall be installed in accordance with the terms of their listing and NFPA 17A.

Note: UL 300 primarily addresses the method of fire testing for self-contained chemical extinguishing systems commonly referred to as pre-engineered systems. UL 300 has been identified as a baseline for testing fire-extinguishing systems intended for the protection of commercial cooking-related hazards. Additional equivalent testing standards can and have been written for other types of fire-extinguishing systems not considered pre-engineered that demonstrate equivalent fire testing severity to the UL 300 test standard. Current examples include, but are not limited to, UL 199, UL 199B, UL 199E, and UL 710B.

16.9.1.5

Where required, complete drawings of the system installation, including the hood(s), exhaust duct(s), and appliances, along with the interface of the fire-extinguishing system detectors, piping, nozzles, fuel and electric power shutoff devices, agent storage container(s), and manual actuation device(s), shall be submitted to the authority having jurisdiction and located within the mobile cooking operation.

16.9.2 Modifications to Existing Hood Systems.**16.9.2.1**

Any abandoned pipe or conduit from a previous installation shall be removed from within the hood, plenum, and exhaust duct.

16.9.2.2

Penetrations and holes resulting from the removal of conduit or piping shall be sealed with listed or equivalent liquidtight sealing devices.

16.9.2.3

The addition of obstructions to spray patterns from the cooking appliance nozzle(s) such as baffle plates, shelves, or any modification shall not be permitted.

16.9.2.4

Changes or modifications to the hazard after installation of the fire-extinguishing systems shall result in reevaluation of the system design by a properly trained, qualified, and certified person(s).

16.9.3 Fuel and Electric Power Shutoff.**16.9.3.1**

Upon actuation of any fire-extinguishing system for a cooking operation, all sources of fuel and electrical power that produce heat to all equipment requiring protection by that system shall automatically shut off.

16.9.3.2

Any gas appliance not requiring protection but located under ventilating equipment where protected appliances are located shall be automatically shut off upon actuation of the extinguishing system.

16.9.3.3

Shutoff devices shall require manual reset.

16.9.4 Manual Actuation.**16.9.4.1**

All systems shall have both automatic and manual methods of actuation.

16.9.4.1.1

At least one manual actuation device shall be located in a means of egress or at a location acceptable to the AHJ.

16.9.4.1.2

Manual actuation using a cable-operated pull station shall not require more than 40 lb (178 N) of force, with a pull movement not to exceed 14 in. (356 mm) to actuate the automatic fire-extinguishing equipment.

16.9.4.2

The automatic and manual means of system actuation external to the control head or releasing device shall be separate and independent of each other so that failure of one will not impair the operation of the other except as permitted by 16.9.4.3.

16.9.4.3

The manual means of system actuation shall be permitted to be common with the automatic means if the manual actuation device is located between the control head or releasing device and the first fusible link.

16.9.4.4

The means for manual actuation shall be mechanical or rely on electrical power for actuation in accordance with 16.9.4.5.

16.9.4.5

Electrical power shall be permitted to be used for manual actuation if a standby power supply is provided or if supervision is provided in accordance with Section 10.7.

16.9.4.6

Instruction regarding the proper use of portable fire extinguishers and the manual actuation of fire extinguishing equipment shall be provided to employees regarding the proper use of portable fire extinguishers and the manual actuation of fire-extinguishing equipment.

16.9.5 System Annunciation.**16.9.5.1**

Upon actuation of an automatic fire-extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has activated.

16.9.5.2

At least one listed audible and visual notification appliance shall be installed on the exterior surface of the vehicle readily audible and visible to the public.

16.9.6 Installation Requirements.

Note: Although training and qualification might be available elsewhere, the manufacturer of the equipment being installed should be considered an appropriate source of training and qualification.

16.9.6.1

Installation of systems shall be performed only by persons properly trained and qualified to install the specific system being provided.

16.9.6.2

The installer shall provide certification to the authority having jurisdiction that the installation is in agreement with the terms of the listing and the manufacturer's instructions and/or approved design.

16.9.7 Portable Fire Extinguishers.**16.9.7.1 General.****16.9.7.1.1**

Portable fire extinguishers shall be selected and installed in kitchen cooking areas in accordance with NFPA 10 and shall be specifically listed for such use.

Note: The system used to rate extinguishers for Class B fires (flammable liquids in depth) does not take into consideration the special nature of heated grease fires. Cooking-grease fires are a special hazard requiring agents that saponify (make a soap foam layer to seal the top surface of the grease) for this application.

16.9.7.2

Class K fire extinguishers shall be provided for cooking appliance hazards that involve combustible cooking media (vegetable oils and animal oils and fats).

16.9.7.3

Portable fire extinguishers shall be provided for solid fuel cooking operations in accordance with 16.10.6.3.

16.9.7.4

Portable fire extinguishers shall be provided for other hazards in kitchen areas and shall be selected and installed in accordance with NFPA 10.

16.9.7.5

Where internal combustion engine power sources are provided, at least one portable fire extinguisher rated 20-B:C shall be provided.

16.9.7.6

Portable fire extinguishers shall be maintained in accordance with NFPA 10.

16.10 Solid Fuel Cooking Operations.**16.10.1 Venting Application.**

Venting requirements of solid fuel cooking operations shall be determined in accordance with 16.10.1.1 through 16.10.1.4.

16.10.1.1

Where the solid fuel cooking equipment is located in a space with other vented equipment, all vented equipment shall have an exhaust system interlocked with a makeup air system for the space per 16.10.5.

16.10.1.2

Natural draft ventilation systems and power-exhausted ventilation systems shall comply with 16.10.3 and 16.10.5.

16.10.1.3

Where a solid fuel cooking appliance allows effluent to escape from the appliance opening, this opening shall be covered by a hood and an exhaust system that meets the requirements of 16.10.3 and 16.10.5.

16.10.1.4

Solid fuel cooking operations shall have spark arresters to minimize the passage of airborne sparks and embers into plenums and ducts.

16.10.2 Location of Appliances.**16.10.2.1**

Every appliance shall be located with respect to equipment so as to permit access to the appliance.

16.10.2.2

Solid fuel cooking appliances shall not be installed in confined spaces.

Note: The space should be of ample size to permit adequate circulation of heated air.

16.10.2.3

Solid fuel cooking appliances listed for installation in confined spaces such as alcoves shall be installed in accordance with the terms of the listing and the manufacturer's instructions.

16.10.2.4

Solid fuel cooking appliances shall not be installed in any location where gasoline or any other flammable vapors or gases are present.

16.10.3 Hoods for Solid Fuel Cooking.**16.10.3.1**

Hoods shall be sized and located in a manner capable of capturing and containing all the effluent discharging from the appliances.

16.10.3.2

The hood and its exhaust system shall comply with the requirements of Sections 16.4 through 16.9.

16.10.3.3

Exhaust systems serving solid fuel cooking equipment, including gas or electrically operated equipment, shall be separate from all other exhaust systems.

16.10.3.4

Cooking equipment not requiring automatic fire-extinguishing equipment shall be permitted to be installed under a common hood with solid fuel cooking equipment that is served by a duct system separate from all other exhaust systems.

16.10.4 Grease Removal Devices for Solid Fuel Cooking.**16.10.4.1**

Grease removal devices shall be constructed of steel or stainless steel or be approved for solid fuel cooking.

16.10.4.2

If airborne sparks and embers can be generated by the solid fuel cooking operation, spark arrester devices shall be used prior to using the grease removal device, to minimize the entrance of these sparks and embers into the grease removal device and into the hood and the duct system.

16.10.4.3

Filters shall be a minimum of 4 ft (1.2 m) above the appliance cooking surface.

16.10.5 Air Movement for Solid Fuel Cooking.**16.10.5.1**

Exhaust system requirements shall comply with Section 16.7 for hooded operation.

16.10.5.2

A replacement or makeup air system shall be provided to ensure a positive supply of replacement air at all times during cooking operations.

16.10.5.3

Makeup air systems serving solid fuel cooking operations shall be interlocked with the exhaust air system and powered, if necessary, to prevent the space from attaining a negative pressure while the solid fuel appliance is in operation.

16.10.6 Fire-Extinguishing Equipment for Solid Fuel Cooking.**16.10.6.1**

Solid fuel cooking appliances that produce grease-laden vapors shall be protected by listed fire-extinguishing equipment.

16.10.6.2

Listed fire-extinguishing equipment shall be provided for the protection of grease removal devices, hoods, and duct systems.

16.10.6.3

Listed fire-extinguishing equipment for solid fuel-burning cooking appliances, where required, shall comply with Section 16.9 and shall use water-based agents.

16.10.6.4

Fire-extinguishing equipment shall be rated and designed to extinguish solid fuel cooking fires.

16.10.6.5

The fire-extinguishing equipment shall be of sufficient size to totally extinguish fire in the entire hazard area and prevent reignition of the fuel.

16.10.6.6

All solid fuel cooking appliances (whether under a hood or not) with fire boxes of 5 ft³ (0.14 m³) volume or less shall have at least one listed 2-A rated water mist fire extinguisher or at least one 1.6 gal (6 L) wet chemical fire extinguisher listed for Class K fires in accordance with NFPA 10, with a maximum travel distance of 10 ft (3 m) to each solid fuel cooking appliance.

Note: Water-type extinguishers are not allowed in the kitchen cooking area because they do not saponify upon contact with grease. However, water mist fire extinguishers that are rated 2-A are allowed to be used for solid fuel cooking in appliances. The 2-A rated water mist fire extinguisher is equipped with a nozzle that does not produce a straight stream.

16.10.6.7 Hose Protection.**16.10.6.7.1**

Solid fuel appliances with fireboxes exceeding 5 ft³ (0.14 m³) shall be provided with a fixed water pipe system with a hose in the kitchen capable of reaching the firebox.

16.10.6.7.1.1

The hose shall be equipped with an adjustable nozzle capable of producing a fine to medium spray or mist.

16.10.6.7.1.2

The nozzle shall be of the type that cannot produce a straight stream.

16.10.6.7.2

The system shall have a minimum operating pressure of 40 psi (275.8 kPa) and shall provide a minimum of 5 gpm (19 L/min).

16.10.6.7.2.1

The system shall have a minimum water supply of 25 gal (94.6 L) for each firebox exceeding 5 ft³ (0.14 m³).

16.10.6.8

Fire suppression for fuel storage areas shall comply with 16.10.8 of this standard.

16.10.6.9

In addition to the requirements of 16.10.6.6 through 16.10.6.8, where any solid fuel cooking appliance is also provided with auxiliary electric, gas, oil, or other fuel for ignition or supplemental heat and the appliance is also served by any portion of a fire-extinguishing system complying with Section 16.9, such auxiliary fuel shall be shut off on actuation of the fire-extinguishing system.

16.10.7 Procedures for Inspection, Cleaning, and Maintenance for Solid Fuel Cooking.

The combustion chamber shall be scraped clean to its original surface once each week and shall be inspected for deterioration or defects.

16.10.7.1

The combustion chamber shall be scraped clean to its original surface once each week and shall be inspected for deterioration or defects.

16.10.7.2

Any significant deterioration or defect that might weaken the chamber or reduce its insulation capability shall be immediately repaired.

16.10.7.3

The flue or chimney shall be inspected weekly for the following conditions:

- (1) Residue that might begin to restrict the vent or create an additional fuel source
- (2) Corrosion or physical damage that might reduce the flue's capability to contain the effluent

16.10.7.3.1

The flue or chimney shall be cleaned before these conditions exist.

16.10.7.3.2

The flue or chimney shall be repaired or replaced if any unsafe condition is evident.

16.10.7.4

Spark arrester screens located at the entrance of the flue or in the hood assembly shall be cleaned prior to their becoming heavily contaminated and restricted.

16.10.7.5

Filters and filtration devices installed in a hood shall be cleaned per 16.10.7.4.

16.10.8 Minimum Safety Requirements: Fuel Storage, Handling, and Ash Removal for Solid Fuel Cooking.**16.10.8.1** Installation Clearances.**16.10.8.1.1**

Solid fuel cooking appliances shall be installed on floors of noncombustible construction that extend 3 ft (0.92 m) in all directions from the appliance.

16.10.8.1.2

Floors with noncombustible surfaces shall be permitted to be used where they have been approved for such use by the authority having jurisdiction.

16.10.8.1.3

Floor assemblies that have been listed for solid fuel appliance applications shall be permitted to be used.

16.10.8.1.4

Solid fuel cooking appliances that have been listed for zero clearance to combustibles on the bottom and sides and have an approved hearth extending 3 ft (0.92 m) in all directions from the service door(s) shall be permitted to be used on combustible floors.

16.10.8.1.5

Combustible and limited-combustible surfaces or construction with 3 ft (0.92 m) of the sides or 6 ft (1.8 m) above a solid fuel cooking appliance shall be protected in a manner acceptable to the authority having jurisdiction.

16.10.8.1.6

Solid fuel cooking appliances that are specifically listed for less clearance to combustibles shall be permitted to be installed in accordance with the requirements of the listing and the manufacturer's instructions.

16.10.8.2 Solid Fuel Storage.**16.10.8.2.1**

Where storage is in the same space as the solid fuel appliance or in the same space as the fuel-loading or clean-out doors, fuel storage shall not exceed a 1-day supply.

16.10.8.2.2

Fuel shall not be stored above any heat-producing appliance or vent or closer than 3 ft (0.92 m) to any portion of a solid fuel appliance constructed of metal or to any other cooking appliance that could ignite the fuel.

16.10.8.2.3

Fuel shall be permitted to be stored closer than the requirements of 16.10.8.2.2 where a solid fuel appliance or other cooking appliance is listed or approved for less clearance to combustibles.

16.10.8.2.4

Fuel shall not be stored in the path of the ash removal.

16.10.8.2.5

Where stored in the same space as the solid fuel appliance, fuel shall be stored only in an area with walls, floor, and ceiling of noncombustible construction extending at least 3 ft (0.92 m) past the outside dimensions of the storage pile.

16.10.8.2.6

Fuel shall be permitted to be stored in an area with walls, floor, and ceiling of combustible or limited-combustible construction where protected in accordance with 16.2.3.

16.10.8.2.7

Fuel shall be separated from all flammable liquids, all ignition sources, all chemicals, and all food supplies and packaging goods.

16.10.8.2.8

All fuel storage areas larger than 5 ft³ (0.14 m³) shall be provided hose protection as required by 16.10.6.7.

16.10.8.2.8.1

Where acceptable to the authority having jurisdiction, fuel storage areas shall be permitted to be protected with a fixed water pipe system with a hose capable of reaching all parts of the area.

16.10.8.3 Solid Fuel Handling and Ash Removal.**16.10.8.3.1**

Solid fuel shall be ignited with a match, an approved built-in gas flame, or other approved ignition source.

16.10.8.3.2

Combustible or flammable liquids shall not be used to assist ignition.

16.10.8.3.3

Matches and other portable ignition sources shall not be stored in the vicinity of the solid fuel appliance.

16.10.8.3.4

Solid fuel shall be added to the fire as required in a safe manner and in quantities and ways not creating a higher flame than is required.

16.10.8.3.5

Long-handled tongs, hooks, and other required devices shall be provided and used to safely add fuel, adjust the fuel position, and control the fire without the user having to reach into the firebox.

16.10.8.3.6 Ash Protection.

16.10.8.3.6.1

Ash, cinders, and other fire debris shall be removed from the firebox at regular intervals to prevent interference with the draft to the fire and to minimize the length of time the access door is open.

16.10.8.3.6.2

All ash shall be removed from the chamber a minimum of once a day.

16.10.8.3.6.3

The ash shall be sprayed with water before removal to extinguish any hot ash or cinders and to control the dust when the ash is moved.

16.10.8.3.7 Hose Protection.**16.10.8.3.7.1**

For the purposes described in 16.10.8.3.6.3, to cool a fire that has become too hot and to stop all fire before the premises are vacated, a water supply with a flexible hose shall be provided at the solid fuel appliance.

16.10.8.3.7.2

For appliances with fireboxes not exceeding 5 ft³ (0.14 m³), the water source shall be permitted to be a 10 gal (37.9 L) container with a gravity arrangement or a hand pump for pressure.

16.10.8.3.7.3

For appliances with fireboxes over 5 ft³ (0.14 m³), the water source shall be a fixed pipe water system with a hose of adequate length to reach the combustion and cooking chambers of the appliance.

16.10.8.3.7.4

For either application, the nozzle shall be fitted with a manual shutoff device and shall be of the type to provide a fine to medium spray capable of reaching all areas of the combustion and cooking chambers.

16.10.8.3.7.4.1

The nozzle shall be of the type that cannot produce a straight stream.

16.10.8.3.8 Ash Removal Container or Cart.**16.10.8.3.8.1**

A heavy metal container or cart (minimum 16 gauge) with a cover shall be provided for the removal of ash.

16.10.8.3.8.2

The ash removal container or cart shall not exceed a maximum of 20 gal (75.7 L) capacity, shall be assigned for this one purpose, shall be able to be handled easily by any employee assigned the task, and shall pass easily through any passageway to the outside of the vehicle or cooking operation.

16.10.8.3.8.3

The container or cart shall always be covered when it is being moved through the vehicle.

16.10.8.3.8.4

When any hole occurs in a container from corrosion or damage, the container shall be repaired or replaced immediately.

16.10.8.3.9 Ash Removal Process.**16.10.8.3.9.1**

Tools shall be provided so that ash removal can be accomplished without having to reach into the chamber.

16.10.8.3.9.2

The ash shall be spread out gently in small lots on the chamber floor or on a shovel, to be sprayed before it is removed to the metal container or cart.

16.10.8.3.9.3

If the floor of the chamber is of a metal that is subject to rapid corrosion from water, then a noncombustible, corrosion-resistant pan shall be placed just outside the cleanout door for this purpose.

16.10.8.3.9.4

The ash shall be carried to a separate heavy metal container (or dumpster) used exclusively for the purpose.

16.10.9 Other Safety Requirements.**16.10.9.1**

Metal-fabricated solid fuel cooking appliances shall be listed for the application where produced in practical quantities or shall be approved by the authority having jurisdiction.

16.10.9.2

Where listed, metal-fabricated solid fuel cooking appliances shall be installed in accordance with the terms of their listings and with the applicable requirements of this standard.

16.10.9.3 Site-Built Solid Fuel Cooking Appliances.**16.10.9.3.1**

Site-built solid fuel cooking appliances shall be submitted for approval to the authority having jurisdiction before being considered for installation.

16.10.9.3.2

All units submitted to the authority having jurisdiction shall be installed, operated, and maintained in accordance with the approved terms of the manufacturer's instructions and any additional requirements set forth by the authority having jurisdiction.

16.10.9.3.3

Except for the spark arresters required in 16.10.1.4, there shall be no additional devices of any type in any portion of the appliance, flue pipe, and chimney of a natural draft solid fuel operation.

16.10.9.3.4

No solid fuel cooking device of any type shall be permitted for deep fat frying involving more than 1 qt (0.95 L) of liquid shortening, nor shall any solid fuel cooking device be permitted within 3 ft (0.92 m) of any deep fat frying unit.

16.11 Procedures for the Use, Inspection, Testing, and Maintenance of Equipment.**16.11.1 Operating Procedures.****16.11.1.1**

Exhaust systems shall be operated whenever cooking equipment is turned on.

16.11.1.2

Filter-equipped exhaust systems shall not be operated with filters removed.

16.11.1.3

Openings provided for replacing air exhausted through ventilating equipment shall not be restricted by covers, dampers, or any other means that would reduce the operating efficiency of the exhaust system.

16.11.1.4

Instructions for manually operating the fire extinguishing system shall be posted conspicuously in the kitchen and shall be reviewed with employees by the management.

16.11.1.5

Listed exhaust hoods shall be operated in accordance with the terms of their listings and the manufacturer's instructions.

16.11.1.6

Cooking equipment shall not be operated while its fire-extinguishing system or exhaust system is nonoperational or impaired.

16.11.1.6.1

Where the fire-extinguishing system or exhaust system is nonoperational or impaired, the system shall be tagged as noncompliant, the system owner or the owner's representative shall be notified in writing of the impairment, and, where required, the authority having jurisdiction shall be notified.

16.11.1.7

Inspection and maintenance of “other equipment” as allowed in 9.3.1 shall be conducted by properly trained and qualified persons at a frequency determined by the manufacturer’s instructions or the equipment listing.

16.11.2 Inspection, Testing, and Maintenance of Fire-Extinguishing Systems.**16.11.2.1**

All actuation and control components, including remote manual pull stations, mechanical and electrical devices, detectors, and actuators, shall be tested for proper operation during the inspection in accordance with the manufacturer’s procedures.

Note: It is not intended that actual discharge of agent occur to test all components, but where pressure from the discharging agent or from compressed gas actuators is needed to actuate control components, an alternate means for testing those components should be provided and used.

16.11.2.2

The specific inspection and maintenance requirements of the extinguishing system standards as well as the applicable installation and maintenance manuals for the listed system and service bulletins shall be followed.

16.11.2.3

Fusible links of the metal alloy type and automatic sprinklers of the metal alloy type shall be replaced at least semiannually.

Note: The date of manufacture marked on fusible metal alloy sensing elements does not limit when they can be used. These devices have unlimited shelf life. The intent of 16.11.2.3 is to require semiannual replacement of fusible metal alloy sensing elements that have been installed in environments that subject them to contaminant loading, such as grease in restaurant hoods and ducts, that could adversely affect their proper operation.

16.11.2.4

The year of manufacture and the date of installation of the fusible links shall be marked on the system inspection tag.

16.11.2.4.1

The tag shall be signed or initialed by the installer.

16.11.2.4.2

The fusible links shall be destroyed when removed.

16.11.2.5

Fusible links other than the metal alloy type shall be examined and cleaned or replaced annually.

16.11.2.6

Fixed temperature-sensing elements other than the fusible metal alloy type shall be permitted to remain continuously in service, provided they are inspected and cleaned or replaced if necessary in accordance with the manufacturer’s instructions, every 12 months or more frequently to ensure proper operation of the system.

16.11.2.7

Where required, certificates of inspection and maintenance shall be forwarded to the authority having jurisdiction.

16.11.3 Inspection for Grease Buildup.

The entire exhaust system shall be inspected for grease buildup by a properly trained, qualified, and certified person(s) acceptable to the authority having jurisdiction and in accordance with Table 16.11.3.

Table 16.11.3 Schedule of Inspection for Grease Buildup

Type or Volume of Cooking	Inspection Frequency
Systems serving solid fuel cooking operations	Monthly
*Systems serving high-volume cooking operations	Quarterly
Systems serving moderate-volume cooking operations	Semiannually
†Systems serving low-volume cooking operations	Annually

*High-volume cooking operations include 24-hour cooking, charbroiling, and wok cooking.

†Low-volume cooking operations include churches, day camps, seasonal businesses, and senior centers.

Note: The primary focus of an inspection for cleanliness is to establish whether the volume of grease buildup within the exhaust system warrants cleaning and to determine whether adequate access is available throughout the exhaust system to remove the grease buildup.

16.11.4 Cleaning of Exhaust Systems.**16.11.4.1**

If, upon inspection, the exhaust system is found to be contaminated with deposits from grease-laden vapors, the contaminated portions of the exhaust system shall be cleaned by a properly trained, qualified, and certified person(s) acceptable to the authority having jurisdiction.

Note: A good operating practice is for cleaning personnel of commercial kitchen exhaust systems to have personal protective equipment (PPE) and height access equipment. The following items should be considered as a minimum:

- (1) Eye protection
- (2) Hand protection
- (3) Head protection
- (4) Foot protection
- (5) Respiratory protection
- (6) Fall protection
- (7) Ladders
- (8) Lock-out/tag-out kit

Preparation. The fan should be turned off, locked out, and tagged out. Open flames should be extinguished, and switches/breakers serving the appliance and cooking area outlets should be locked out. If the switches/breakers are not capable of being locked out and tagged out, any solid-fuel cooking appliances should be extinguished and the solid fuel removed.

Removal or Covering of Equipment. Food products, cookware, and cooking support equipment that can be removed should be removed from the cleaning area. Equipment that cannot be removed should be covered.

Cleaning Methods. The following methods for cleaning surfaces covered with grease and contaminants have proved to be effective:

- (1) Manual cleaning by scraping, grinding, or scrubbing
- (2) Chemical cleaning with agents and water
- (3) Pressure washing with pressurized water or pressurized water and agents
- (4) Steam cleaning with pressurized steam

Waste Water and Solid Waste. Water and agents used in the cleaning process and solid waste should be collected for disposal.

16.11.4.2

Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned to remove combustible contaminants to a minimum of 0.002 in. (50 µm).

16.11.4.2.1

A measurement system of deposition shall be established to trigger a need to clean when the exhaust system is inspected at the frequencies in Table 16.11.3.

16.11.4.2.2

A grease depth gauge comb as shown in Figure 11.6.1.1.2 shall be placed upon the duct surface to measure grease depth.

16.11.4.2.3

Where a measured depth of 0.078 in. (2000 μm) is observed, the surfaces shall be cleaned in accordance with 16.11.4.1.

16.11.4.3

Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned to remove combustible contaminants prior to surfaces becoming heavily contaminated with grease or oily sludge.

16.11.4.4

At the start of the cleaning process, electrical switches that could be activated accidentally shall be locked out.

16.11.4.5

Components of the fire suppression system shall not be rendered inoperable during the cleaning process.

16.11.4.6

Fire-extinguishing systems shall be permitted to be rendered inoperable during the cleaning process where serviced by properly trained and qualified persons.

16.11.4.7

Flammable solvents or other flammable cleaning aids shall not be used.

16.11.4.8

Cleaning chemicals shall not be applied on fusible links or other detection devices of the automatic extinguishing system.

16.11.4.9

After the exhaust system is cleaned, it shall not be coated with powder or other substance.

16.11.4.10

When cleaning procedures are completed, all access panels (doors) and cover plates shall be restored to their normal operational condition

16.11.4.11

When an access panel is removed, a service company label or tag preprinted with the name of the company and giving the date of inspection or cleaning shall be affixed near the affected access panels.

16.11.4.12

Dampers and diffusers shall be positioned for proper airflow.

16.11.4.13

When cleaning procedures are completed, all electrical switches and system components shall be returned to an operable state.

16.11.4.14

When an exhaust system is inspected or cleaned, a certificate showing the name of the servicing company, the name of the person performing the work, and the date of inspection or cleaning shall be maintained on the premises.

16.11.4.15

After cleaning or inspection is completed, the exhaust cleaning company and the person performing the work at the location shall provide the owner of the system with a written report that also specifies areas that were inaccessible or not cleaned.

16.11.4.16

Where required, certificates of inspection and cleaning and reports of areas not cleaned shall be submitted to the authority having jurisdiction.

16.11.5 Cooking Equipment Maintenance.**16.11.5.1**

Inspection and servicing of the cooking equipment shall be made at least annually by properly trained and qualified persons.

16.11.5.2

Cooking equipment that collects grease below the surface, behind the equipment, or in cooking equipment flue gas exhaust, such as griddles or charbroilers, shall be inspected and, if found with grease accumulation, cleaned by a properly trained, qualified, and certified person(s) acceptable to the authority having jurisdiction.

16.12 Carbon Monoxide Detectors.**16.12.1**

If the heat source is nonelectric and open flames are used, at least one listed carbon monoxide detector shall be installed.

16.13 Location of Mobile and Temporary Cooking Operations.**16.13.1** Relative to Buildings.

Mobile or temporary cooking operations shall be separated from the entrances and other exits of buildings or structures, combustible materials, vehicles and other cooking operations by a clear space distance of 10 ft (3 m).

16.13.2 Relative to Other Mobile or Temporary Cooking.

Mobile or temporary cooking operations shall be separated from other mobile or temporary cooking operations by a clear distance of 10 ft (3 m).

16.13.3

When the mobile unit is parked, the vehicle shall be stabilized so that it will not move, either by jacking the vehicle or placing wheel chocks around the wheels.

16.14 Tents.**16.14.1**

Temporary cooking operations conducted in tents shall comply with NFPA 102.

16.15 Training.**16.15.1**

Prior to performing cooking operations, one worker shall be provided with initial training in emergency response procedures including the following:

- (1) Using portable fire extinguishers and extinguishing systems
- (2) Shutting off fuel sources
- (3) Notifying the local fire department
- (4) Refueling internal combustion engine power sources and LP-Gas container change-out
- (5) Performing leak detection of LP-Gas
- (6) Understanding fuel properties

16.15.2

During the time of cooking operation at least one person in the vehicle shall be trained to provide the functions listed in 16.15.1.

16.15.3

The provision of training shall be the responsibility of the owner, and the training program and materials shall be acceptable to the AHJ.

16.15.4

Refresher training shall be provided annually.

16.15.5

Initial and refresher training shall be documented, and the documentation shall be held in the mobile unit and made available to the AHJ upon request.

16.15.6

The address of the current operational location shall be posted and accessible to all employees.

16.16 Internal Combustion Engine Power Sources.**16.16.1**

An internal combustion engine shall be permitted to be used to operate an electric power generator.

16.16.2

Generator units that are not vehicle-mounted while in use shall meet the requirement of 16.16.2.1 through 16.16.2.3.

16.16.2.1

Internal combustion engine power sources shall be located at least 12 ft (4 m) from mobile or temporary cooking operations.

16.16.2.2

Internal combustion engine power sources shall be isolated from physical contact by the installation of physical guards, fencing, or an enclosure.

16.16.2.3

Internal combustion engine power sources shall be positioned so that the exhaust complies with the following:

- (1) Located at least 12 ft (4 m) from openings, air intakes, and means of egress
- (2) In a position pointed away from any building
- (3) In a position pointed away from any mobile or temporary cooking operations

16.17 Vehicle-Mounted Generators.**16.17.1**

Vehicle-mounted generators shall meet the requirements of 16.17.2 through 16.17.5.

16.17.2

Internal combustion engine-driven generator units (subject to the provisions of NFPA 1192) shall be listed and installed in accordance with the manufacturer's instructions and shall be vapor resistant to the interior of the vehicle. [1192:6.4.5.1]

16.17.3

Where a generator compartment is used to isolate the installed generator from the vehicle's interior, or a compartment is provided for the future installation of a generator and is intended to isolate the future generator from the vehicle interior, the generator compartment shall be lined with galvanized steel not less than 26 MSG thick. [1192:6.4.5.2]

16.17.3.1

Seams and joints shall be lapped, mechanically secured, and made vapor resistant to the interior of the vehicle. [1192:6.4.5.2.1]

16.17.3.2

Alternative materials and methods of construction shall be permitted in accordance with Section 1.5. [1192:6.4.5.2.2]

16.17.4

Liquid fuel lines and exhaust systems shall not penetrate into the area. [1192:6.4.5.2.3]

16.17.5

Holes into the living area shall be sealed. [1192:6.4.5.2.4]

16.18 Electrical Wiring.**16.18.1**

Vehicle-mounted generators shall comply with the provisions of *NFPA 70*, Article 551, Part III.

16.18.2

The manufacturer of an engine generator unit intended for installation in a recreational vehicle shall provide instructions for the safe and effective installation, operation, and servicing of the generator.

16.18.3

Refueling of internal combustion engine power sources shall be permitted only when the electric generators and internal combustion power sources are not in use.

16.18.3.1

Refueling of internal combustion engines shall not be allowed during mobile or temporary cooking operations.

16.18.3.2

Refueling of internal combustion engine power sources from a container shall be permitted when the engine is shut down and the surface temperature of the engine and fuel tank is below the autoignition temperature of the fuel.

16.19 LP-Gas Systems.**16.19.1**

LP-Gas systems for mobile cooking operations shall comply with NFPA 58.

16.19.1.1

LP-Gas cylinders shall be secured in an upright position.

16.19.2 LP-Gas System Leak Detection.**16.19.2.1**

All mobile and temporary cooking operations equipped with a propane appliance and an electrical system shall be equipped with a propane detector listed and marked on the device as being suitable for use in the vehicles under the requirements of UL 1484, and installed according to the terms of its listing.

16.19.2.2

The LP-Gas leak detection system shall be tested monthly.

16.19.2.3

LP-Gas systems shall be inspected prior to each use.

16.19.2.4

LP-Gas leak detection testing shall be performed every time a new LP-Gas connection is made or an LP-Gas cylinder is changed out.

16.19.2.5

LP-Gas leak detection testing shall be documented and the documentation be held in the mobile or temporary unit and made available to the AHJ upon request.

16.19.3 LP-Gas Systems on Vehicles Other Than Engine Fuel Systems.**16.19.3.1 LP-Gas Container Installation Requirements.****16.19.3.1.1**

Only ASME mobile LP-Gas containers in compliance with the following shall be used:

- (1) A maximum allowable working pressure (MAWP) of 2.2 MPag (312 psi) or higher for LP-Gas containers installed in the enclosed spaces of a vehicle
- (2) A maximum allowable working pressure (MAWP) of 1.7 MPag (250 psi) or higher for LP-Gas containers installed on the exterior of a vehicle

16.19.3.1.2

LP-Gas containers installed on vehicles shall not exceed 200 gal (0.8 m³) aggregate water capacity.

16.19.3.2

Disconnected LP-Gas containers and LP-Gas cylinders for purposes other than engine fuel systems shall not be transported or stored inside the vehicle.

16.19.3.3

All other LP-Gas containers and LP-Gas cylinders in storage shall comply with 16.9.5 of this standard.

16.19.3.4

The LP-Gas supply system, including the containers, shall be installed either on the outside of the vehicle or in a recess or cabinet that is vaportight to the inside of the vehicle but accessible from and vented to the outside, with the vents located near the top and bottom of the enclosure and 3 ft (1 m) horizontally away from any opening into the vehicle and below the level of the vents.

16.19.3.5

LP-Gas containers shall be mounted securely on the vehicle or within the enclosing recess or cabinet and shall comply with the following:

- (1) LP-Gas containers shall be installed above the height of the rear bumper and forward of the rear bumper.
- (2) LP-Gas containers shall not be installed on the roof of the vehicle.
- (3) LP-Gas containers shall be mounted to prevent jarring loose and slipping or rotating, and the fastenings shall be designed and constructed to withstand, without permanent visible deformation, static loading in any direction equal to four times the weight of the container filled with fuel.
- (4) Where LP-Gas containers are mounted within the vehicle housing, the housing shall be secured to the vehicle and any removable portions of the housing shall be secured to the housing while in transit.
- (5) Field welding on LP-Gas containers shall be limited to attachments to nonpressure parts such as saddle plates, wear plates, or brackets applied by the container manufacturer.
- (6) All LP-Gas container valves, appurtenances, and connections shall be protected to prevent damage from accidental contact with stationary objects, loose objects, stones, mud, or ice thrown up from the ground or floor, and damage due to overturn or similar vehicular accident.
- (7) LP-Gas cylinders shall have permanent protection for cylinder valves and connections.
- (8) Where LP-Gas cylinders are located on the outside of a vehicle, weather protection shall be provided.

16.19.3.6

Where equipment such as a cargo heater or cooler is designed to be in operation while the vehicle is in transit, means such as an excess-flow valve to stop the flow of gas in the event of a line break shall be installed.

16.19.3.7

Cylinders shall be retested every 5 to 12 years in accordance with the manufacturer's recommendations and 49 CFR 180.205:

- (1) No letter after the requalification date means the cylinder must be retested within 12 years.
- (2) "S" means the cylinder must be retested within 7 years.
- (3) "E" means the cylinder must be retested within 5 years.

16.19.4 Installation of LP-Gas Container Appurtenances.**16.19.4.1**

LP-Gas container appurtenances shall be installed in accordance with the following:

- (1) Pressure relief valve installation on ASME LP-Gas containers installed in the interior of vehicles complying with Section 11.9 of NFPA 58 shall comply with 11.8.5 of NFPA 58.
- (2) Pressure relief valve installations on ASME LP-Gas containers installed on the outside of vehicles shall comply with 11.8.5 of NFPA 58 and 16.19.3.4 of this standard.
- (3) Main shutoff valves on LP-Gas containers for liquid and vapor shall be readily accessible.
- (4) There shall be a quarter-turn manual gas ball valve installed within the LP-Gas piping for emergency shutoff use and shall be installed on the exterior of the vehicle and readily accessible.
- (5) LP-Gas cylinders shall be designed to be filled in either the vertical or horizontal position, or if they are universal-type cylinders, they shall be permitted to be filled in either position.
- (6) All LP-Gas container inlets, outlets, or valves installed in container inlets or outlets, except pressure relief devices and gauging devices, shall be labeled to designate whether they communicate with the vapor or liquid space.
- (7) LP-Gas containers from which only vapor is to be withdrawn shall be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.

16.19.4.2

Propane containers shall be so located that the discharge from their pressure relief valves shall be not less than 3 ft (0.9 m) measured horizontally along the surface of the vehicle from any of the following located below the level of such discharge:

- (1) Openings into the vehicle
- (2) Propane-burning appliance intake and exhaust vents
- (3) All combustion engine and hydronic heating appliance exhaust terminations

16.19.5

Regulators shall be installed in accordance with 6.8.2 of NFPA 58 and the following:

- (1) Regulators shall be installed with the pressure relief vent opening pointing vertically downward to allow for drainage of moisture collected on the diaphragm of the regulator.
- (2) Regulators not installed in compartments shall be equipped with a durable cover designed to protect the regulator vent opening from sleet, snow, freezing rain, ice, mud, and wheel spray.
- (3) If vehicle-mounted regulators are installed at or below the floor level, they shall be installed in a compartment that provides protection against the weather and wheel spray.
- (4) Regulator compartments shall comply with the following:
 - (a) The compartment shall be of sufficient size to allow tool operation for connection to and replacement of the regulator(s).
 - (b) The compartment shall be vaportight to the interior of the vehicle.
 - (c) The compartment shall have a 1 in.² (650 mm²) minimum vent opening to the exterior located within 1 in. (25 mm) of the bottom of the compartment.
 - (d) The compartment shall not contain flame- or spark-producing equipment.
- (5) A regulator vent outlet shall be at least 2 in. (51 mm) above the compartment vent opening.

16.19.6 Gas Piping.

16.19.6.1

Piping shall be installed in accordance with 6.9.3 of NFPA 58 and the following provisions:

- (1) Steel tubing shall have a minimum wall thickness of 0.049 in. (1.2 mm).
- (2) A flexible connector shall be installed between the regulator outlet and the fixed piping system to protect against expansion, contraction, jarring, and vibration strains.
- (3) Flexibility shall be provided in the piping between a cylinder and the gas piping system or regulator.
- (4) Flexible connectors shall be installed in accordance with 6.9.6 of NFPA 58.
- (5) Flexible connectors longer than the length allowed in the code, or fuel lines that incorporate hose, shall be used only where approved.
- (6) The fixed piping system shall be designed, installed, supported, and secured to minimize the possibility of damage due to vibration, strains, or wear and to preclude any loosening while in transit.
- (7) Piping shall be installed in a protected location.
 - (a) Where piping is installed outside the vehicle, piping shall be under the vehicle and below any insulation or false bottom.
 - (b) Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.
 - (c) At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing.
- (8) Gas piping shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance served.
- (9) If a branch line is installed, the tee connection shall be located in the main gas line under the floor and outside the vehicle.
- (10) Exposed parts of the fixed piping system shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion.
- (11) Hydrostatic relief valves shall be installed in isolated sections of liquid piping in accordance with Section 6.13 of NFPA 58.
- (12) Piping systems, including hose, shall be pressure tested and proven free of leaks in accordance with Section 6.14 of NFPA 58.

16.19.6.2

There shall be no fuel connection between a powered vehicle and trailer or other vehicle units.

16.19.6.3 Protection of Valves on LP-Gas Cylinders in Storage.**16.19.6.3.1**

LP-Gas cylinder valves shall be protected as required by 5.2.6.1 and 7.2.2.5 of NFPA 58.

16.19.6.3.2

Screw-on-type caps or collars shall be in place on all cylinders stored, regardless of whether they are full, partially full, or empty, and cylinder outlet valves shall be closed.

16.19.6.3.3

Valve outlets on LP-Gas cylinders less than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] shall be plugged, capped, or sealed in accordance with 7.2.2.5 of NFPA 58.

16.20 Cooking Appliance Installation on Vehicles.**16.20.1**

All cooking appliances installed on vehicles shall be approved.

16.20.2

Gas-fired cooking appliances shall be equipped with shutoffs in accordance with 5.20.7(A) of NFPA 58.

16.20.3

Cooking appliances installed on vehicles shall be readily accessible under all conditions.

16.20.4

To minimize possible damage and impaired operation due to items shifting in transit, cooking appliances shall be constructed and secured in place or otherwise protected.

16.20.5

Cooking appliances shall be located so that a fire at any cooking appliance will not block egress of persons from the vehicle.

16.20.6

A permanent caution plate shall be provided, affixed to either the appliance or the vehicle outside of any enclosure and adjacent to the container(s), and shall include the following items:



CAUTION

- (1) Be sure all appliance valves are closed before opening container valve.
- (2) Connections at the appliances, regulators, and containers shall be checked periodically for leaks with soapy water or its equivalent.
- (3) Never use a match or flame to check for leaks.
- (4) Container valves shall be closed when equipment is not in use.

16.20.7

Gas-fired cooking appliances shall be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished.

16.21 Parking, Servicing, and Repair.**16.21.1**

Where vehicles with LP-Gas fuel systems used for purposes other than propulsion are parked, serviced, or repaired inside buildings, paragraphs 16.21.2 through 16.21.5 shall apply.

16.21.2

The LP-Gas system shall be leak-free, and the LP-Gas container(s) shall not be filled beyond the limits specified in Chapter 7 of NFPA 58.

16.21.3

LP-Gas container shutoff valves shall be closed, except that the container shutoff valve shall not be required to be closed when fuel is required for test or repair.

16.21.4

The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits.

16.21.5

Wheel chocks shall be provided to prevent mobile and temporary cooking units from moving.

16.22 Records.

All record-keeping documents shall be combined in one location on the mobile cooking operation and made available to the AHJ upon request.

Statement of Problem and Substantiation for Public Comment

Remove duplicate language already in chapters 1-15 of this standard. No need for duplicate provision in this code.

Related Item

- FR-9

Submitter Information Verification

Submitter Full Name: Christopher Hiener

Organization: Union Fire District of South Kingstown

Affiliation: IFMA

Street Address:

City:

State:

Zip:**Submittal Date:** Thu Apr 25 11:15:16 EDT 2019**Committee:** VEN-AAA**Committee Statement****Committee Action:** Rejected but see related SR**Action:****Resolution:** [SR-9-NFPA 96-2019](#)**Statement:** The purpose of this global revision is to remove duplicate language already provided in Chapters 1 through 15 of the standard, now that mobile and temporary cooking provisions are provided in the body of the standard. Although there are changes in multiple sections throughout the standard, this needs to be balloted as one revision in order to make sense.