



*Marking and Application Guide*

# **COMMERCIAL COOKING EQUIPMENT**

**JANUARY 2012**

## PREFACE

Americans continue to dine at food service establishments with high frequency resulting in the building of new establishments as well as the remodeling of old establishments at a steady rate. New innovations in products, the focus on a greener kitchen environment and the effort to save on energy costs are spurring new and established restaurateurs to be creative in kitchen design.

Prior to opening for business, the commercial cooking equipment and associated systems that are used in these establishments are required to comply with numerous health, electrical, fire, building, mechanical, and plumbing-related codes and installation requirements. These different codes require compliance with various standards and installation requirements.

For purposes of this document, “commercial cooking equipment and associated systems” is defined as appliances and associated products used in a system for heating or cooking food. Examples of such appliances include the cooking equipment (such as deep fat fryers, steam-jacketed kettles, etc.) and the exhaust and ventilation systems (hoods, duct, grease duct enclosures, and power ventilators among others). There can be over 50 certified products in a single commercial cooking system.

UL has developed this guide for use by contractors, code and inspection authorities, installers, users, system designers and other interested parties to aid in understanding the basic components of commercial cooking equipment and associated systems and the applicable codes and standards in order to facilitate a reasonably safe and code-compliant installation.

UL Marking and Application Guides are updated as necessary due to new product development, changes in the codes, or the need for clarification. To confirm the current status of any UL Application Guide, please consult the Code Authorities page of the UL Web site at <http://www.ul.com/codeauthorities>.

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## INTRODUCTION

### WHO SHOULD USE THIS GUIDE

This guide is intended to assist regulatory authorities and restaurant designers in determining the suitability of specific commercial cooking equipment and associated systems in a particular installation and use, and to address concerns related to sanitation, fire, shock, plumbing, gas, and/or mechanical hazards.

Products are Listed or Classified by UL under an appropriate product category. A four-letter code (shown in parenthesis) following every category title in this guide is the UL product category code designation. A list of commercial cooking equipment and associated system product categories evaluated by UL, along with the applicable standard(s), can be found in Appendix B.

Each UL product category code is linked to Guide Information for the product category. The Guide Information includes the scope of the products covered, information relating to limitations or special conditions applying to the product, the requirements used for the investigation of the products, installation and use information, and information on product markings and the UL Mark to be used on the product. Guide information is available online at [www.ul.com/database](http://www.ul.com/database).

The product markings identified in this guide do not include every possible marking that could be provided either on a product or in its installation or operation instructions. The purpose of these markings is to provide you with an indication of the type of text and location of markings that address features that may be critical in determining if a product is certified and / or if it is installed correctly. Refer to the specific Guide Information for the product category for additional marking information.

Note that the numbering for code sections used in this document may change as the specific code is updated. A list of standards referenced in this document can be found in Appendix A. Additional information can be found at [www.ul.com](http://www.ul.com).

### INFORMATION ON LISTING VERSUS CLASSIFICATION

Most codes and regulations require the certification of this equipment to applicable safety-related standards. They also may require this equipment to be certified to energy performance standards as well. Products that are certified to safety-related standards have been evaluated with regard to all reasonably foreseeable safety-related hazards, including fire, electrical shock and mechanical hazards. Such products are termed “UL Certified” or “UL Listed.” Products that are certified to a limited range of hazards, or for use under specific conditions are termed “UL Classified”.

It is important to distinguish the difference between “UL Certified” or “UL Listed” and “UL Classified” and the relation these terms have with the term “listed,” as used in various codes. The term “listed” in the codes generally indicates that the product is required to be evaluated in accordance with the appropriate standard(s) by an independent third party certification organization such as UL. The term “listed” in the codes should not be confused with the term “UL Listed,” as explained above. It is important to recognize that not all certification agencies make this distinction in their certification service

## **INFORMATION ON UL MARKS**

There are several types of UL Marks that can be found on commercial cooking equipment and their associated systems. General information on each of these Marks is provided below. Each has its own specific meaning and significance. The only way to determine if a product has been certified by UL is to look for the UL Mark on the product itself.

The UL Mark on a product means that UL has tested and evaluated representative samples of that product and determined that they meet the requirements in the applicable standard(s). Under a variety of UL programs, certified products are periodically checked by UL at the manufacturing facility to determine that they continue to comply with the standard(s).

The UL Marks may only be used on, or in connection with products certified by UL, and under the terms of a written agreement between the manufacturer and UL.

### **UL Listing Mark**

This is one of the most common UL Marks. If a product carries this Mark, it means UL found that representative samples of this product met UL's *safety* requirements. These requirements are primarily based on UL's own published Standards for Safety, or other recognized third party standards. The UL Listed Mark includes the UL symbol, the word "Listed," the product or category name, and a control number assigned by UL.



### **UL Classification Mark**

This Mark appears on representative samples of products that UL has evaluated but only with respect to specific properties, a limited range of hazards, or suitability for use under limited or special conditions. The UL Classified Mark includes the UL symbol, the word "Classified," a statement of the scope of evaluation, the product or category name, and a control number assigned by UL.



## Gas-Fired Mark

UL's Gas-Fired Listing Mark is used on gas-fired appliances and equipment. The Gas-Fired Mark indicates a product's compliance to nationally recognized gas standards, including UL Standards for Safety, ANSI Z21/Z83 Series and CSA/CGA standards. The Gas-Fired Mark signals that a product has been evaluated to reasonably foreseeable safety-related gas and electrical hazards. The UL Gas-Fired Mark includes the UL symbol, the word "Gas-Fired" above the UL symbol, the word "Listed" below the UL symbol, the product or category name, and a control number assigned by UL. For gas-fired products certified to ANSI Z21 or Z83 series standards, the Mark must include the UL symbol with the words "Gas-Fired" above the UL symbol, the word "Listed" below the UL symbol, identification of the standard, most recent effective addenda, and a control number assigned by UL.

## GAS-FIRED



## EPH Mark

The UL Environmental and Public Health (EPH) Mark appears on products that have been evaluated to EPH standards ("sanitation standards") for food service equipment. Within UL's EPH program, the "Classified" version of the EPH Mark is used for products complying with NSF standards for commercial cooking equipment. The "Listed" version is typically used for products complying with UL's own published EPH Standards for Safety. These standards include safety requirements as well as sanitation requirements. The UL Mark for products Classified to environmental and public health standards consists of the UL symbol with the letters EPH inside a triangular background, the word "Classified" *above* the UL symbol, the product identity, the standard designation, and a control number assigned by UL. For products that are EPH Listed by UL, the EPH Mark will consist of the UL symbol with the letters EPH inside a triangular background, the word "Listed" *below* the UL symbol, the product identity, the standard designation, and a control number assigned by UL.



## Water Quality Mark

Commercial cooking equipment that is connected to the public water supply must comply with the appropriate standard for drinking water products – NSF.61. The UL Mark for products Classified to this standard is the Water Quality Mark. It consists of the UL symbol, the word “Classified” *above* the UL symbol, the words “water quality” *below* the UL symbol, the product identity, the standard designation, and a control number assigned by UL.

NOTE: Products that are additionally evaluated to lead restriction requirements less than 0.25%, such as to NSF 372, shall be marked on the product. The words "AS TO ≤ 0.25% Pb ONLY" may be used in lieu of "IN ACCORDANCE WITH NSF 372" described above until July 1, 2013. After July 1, 2013, the words "IN ACCORDANCE WITH NSF 372" shall be used.



## Plumbing Mark

Commercial cooking equipment connected to the public water supply must also comply with applicable plumbing code requirements. The UL Listing Mark for plumbing products appears on products that have been evaluated to all applicable nationally recognized standards and have demonstrated compliance with both the International Plumbing Code (IPC) and the Uniform Plumbing Code (UPC). The Plumbing Mark consists of the UL symbol, the word “Plumbing” *above* the UL symbol, the word “Listed” *below* the UL symbol, the product identity, the standard designation, and a control number assigned by UL.



## FIELD EVALUATIONS

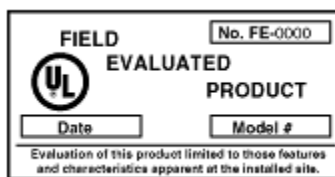
You may encounter situations in which you are unable to determine if a product has been listed by a third-party organization. Or in other situations you might encounter a product bearing a listing label that may have been modified in the field, and now you question whether or not the product still complies with the applicable standard. UL offers a field evaluation service that provides data to assist you in making your decision whether to accept the product and/or approve the installation. Anyone directly involved with a product – including manufacturers, owners, contractors, and regulatory authorities – can request a Field Evaluation.

Through the Field Evaluation Service, experienced UL technical staff members conduct the product evaluations – including construction examination, installation review and testing, if necessary – of products or systems that have already been installed or are to be installed at a specific location. If the product meets the requirements of the applicable standard(s), a Field Evaluated Product Mark is applied on the spot. Only products or systems that can be thoroughly evaluated to the applicable parts of the standard(s) outside of UL's laboratories are eligible for this Mark.

The appropriate regulatory authorities are notified in writing of the project and are given the opportunity to witness all or parts of the evaluation. Following the evaluation, if the product meets the requirements of the applicable standard(s), UL will provide the regulatory authorities with an engineering report that details the result of the evaluation and notice of the application of a Field Evaluated Product Mark. Authorities will also be provided with an engineering report if the product is not in compliance with the requirements of the applicable standard(s), and is not eligible to bear the Mark. This report will detail those items found not to be in compliance and the required corrective action along with the reference from the applicable standard(s).

UL Field Evaluated Product Marks are serially numbered, dated and can include the model designation of the product. These Marks are only applicable for the specific site at which the installation / product was evaluated. To protect their integrity, Field Evaluated Product Marks are tamper-resistant.

Detailed information for this program can be found on UL's Web site at [www.ul.com/field](http://www.ul.com/field).



# COMMERCIAL COOKING EQUIPMENT and ASSOCIATED SYSTEMS

There are several aspects of a commercial cooking equipment system that play an important role in the operation of a commercial food establishment, from both a public health perspective as well as a safety perspective. In the following pages, we will look at important aspects of various commercial cooking equipment and their associated systems, from sanitation, fire, electrical, mechanical, gas, building, and plumbing perspectives

A list of commercial cooking equipment and associated system product categories evaluated by UL, along with the applicable standard(s), and the applicable UL directory, can be found in Appendix A.

A drawing of a typical commercial cooking equipment installation, along with the applicable standard(s) for each portion of the installation can be found in Appendix B.

## 1. SANITATION

Commercial cooking equipment must be constructed of materials that, in general terms, are smooth, non-absorbent and easily cleanable. These criteria are important to ensure that the equipment does not provide a collection area for food debris, which in turn provides for the growth of microorganisms and, ultimately, a potential for foodborne illnesses. Most food service regulations require that equipment meet these three general criteria. To see that these criteria are met, third party testing and certification organizations have developed and use sanitation standards in their evaluations. For commercial cooking equipment, the applicable sanitation standard is NSF 4, *“Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment.”*

Once UL determines that a piece of equipment complies with the requirements in this sanitation standard, UL will allow its EPH Classification Mark to be placed on the equipment. This Mark signals to users and regulatory authorities that the product complies with the applicable standard.

Most state and/or local codes and regulations require the use of commercial cooking equipment that has been certified by a third-party testing and certification organization, such as UL.

Commercial cooking equipment is also often certified by UL for its safety features as well. Therefore, it is not uncommon to see both the UL EPH Classification Mark and a UL Listed Mark on a product.



It is important to remember that these products are to be installed in accordance with the instructions provided with the product. It is critical that all cautionary statements, installation, and operating instructions on the product and in accompanying literature are followed.

Modification of products in the field may produce unwanted effects with respect to cleanability (e.g. gaps, seams) or other health-related issues. Such modifications may affect the validity of the UL certification. Unless UL investigates a modified product, UL cannot indicate that the product will continue to meet the health-related requirements. This is not only true for sanitation requirements, but also for safety requirements as well.

## **2. CODE REQUIREMENTS**

Commercial cooking equipment and associated systems must be installed in accordance with the applicable local codes based on the model codes, such as the:

- International Fire Code (IFC)
- International Mechanical Code (IMC)
- Uniform Mechanical Code (UMC)
- International Plumbing Code (IPC)
- Uniform Plumbing Code (UPC)
- International Building Code (IBC)
- Uniform Fire Code (UFC) (NFPA 1)
- Building Construction and Safety Code (NFPA 5000)
- "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations" (NFPA 96)
- FDA Model Food Code

In addition to the aforementioned codes, gas-fired cooking equipment must be installed in accordance with the International Fuel Gas Code (IFGC) or National Fuel Gas Code (NFGC) (NFPA 54). Existing operations not in compliance with these codes may be permitted to continue in service, subject to approval by the regulatory authority.

## **3. FIRE**

The use of portable cooking equipment that is not flue-connected is permitted in the codes, provided certain precautions are followed. NFPA 1 (Section 20.1.5.2.4) states that the following precautions must be taken into account:

- (1) Equipment fueled by small heat sources that can be readily extinguished by water, such as candles or alcohol-burning equipment, including solid alcohol, shall be permitted to be used, provided that precautions satisfactory to the AHJ are taken to prevent ignition of any combustible materials.
- (2) Candles shall be permitted to be used on tables used for food service where securely supported on substantial noncombustible bases located to avoid danger of ignition of combustible materials and only where approved by the AHJ.
- (3) Candle flames shall be protected.

- (4) “Flaming sword” or other equipment involving open flames and flamed dishes, such as cherries jubilee or crêpes suzette, shall be permitted to be used, provided that precautions subject to the approval of the AHJ are taken permitted to be used where in accordance with Chapter 69.  
[101:12.7.2.4; 101:13.7.2.4]

Section 904 of the IFC and Chapter 50 of NFPA 1 (UFC) list specific requirements with respect to the types of automatic fire-extinguishing systems permitted for commercial cooking systems. These requirements are discussed below.

As one would expect, the automatic fire-extinguishing system for commercial cooking systems must be of a type recognized for protection of commercial cooking equipment and exhaust systems depending on the type and arrangement of equipment that is being protected.

The IBC, IFC and UFC require automatic fire-extinguishing systems to comply with UL 300, (*Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking*), or other equivalent standards. They must also be installed in accordance with the requirements of the listing. Systems installed prior to UL 300, or other systems not addressed in UL 300, must be protected with an automatic fire-extinguishing system that comply with the applicable NFPA standards, building codes, and must be approved by the AHJ. Other types of automatic fire-extinguishing systems shall be listed and labeled for specific use as protection for commercial cooking operations. Any system must be installed in accordance with the fire code, its listing requirements and the manufacturer’s installation instructions.

There are also general system installation requirements, depending upon the type of extinguishing system used. Each type of system must be installed according to a specific standard. The type of system, along with the referenced standard, is indicated below.

1. Carbon dioxide extinguishing systems, NFPA 12
4. Automatic sprinkler systems, NFPA 13.
5. Foam-water sprinkler system or foam-water spray systems, NFPA 16
6. Dry-chemical extinguishing systems, NFPA 17.
7. Wet-chemical extinguishing systems, NFPA 17A.

The IFC requires that commercial kitchen systems required to have a Type 1 hood must be provided with an automatic fire-extinguishing system. These systems must also meet the requirements of UL 300. Like those systems installed under the UFC, other types of automatic fire-extinguishing systems shall be listed and labeled for specific use as protection for commercial cooking operations. The system shall be installed in accordance with the IFC, its listing and the manufacturer’s installation instructions

IFC exception (Section 904.11): Factory-built commercial cooking recirculating systems that are tested in accordance with UL 710B (*“Recirculating Systems”*) and listed, labeled and installed in accordance with Section 304.1 of the IMC can be used.

(NOTE: The requirements in UL 710B are solely based on NFPA 96, which is an installation code. However, there are some construction requirements and one performance requirement in NFPA 96 that affect the appliance itself. The construction

requirements involve interlocks and fire detection devices onboard the appliance and the performance requirement is an emissions test from the appliance).

The IFC requires a manual actuation device that is located at or near a means of egress from the cooking area. This device must also be a minimum of 10 feet and a maximum of 20 feet from the kitchen exhaust system. It must also be located a minimum of 42 inches (3 1/2 feet) and a maximum of 48 inches (4 feet) above the floor. The manual actuation shall require a maximum force of 40 pounds and a maximum movement of 14 inches to actuate the fire suppression system.

Exception: Automatic sprinkler systems shall not be required to be equipped with manual actuation means.

When the fire suppression system is actuated, the fuel or electrical power supply to the cooking equipment must also be shut down. Resetting the fuel and electrical supply must be done manually.

These actuation devices are included under UL 300, and Listed products can be found in UL category GBNZ.

When carbon dioxide systems are used, there must be a nozzle at the top of the ventilating duct. Vertical ducts exceeding 20 feet in length and horizontal ducts exceeding 50 feet in length must also be equipped with additional nozzles that are symmetrically arranged to give uniform distribution of the CO<sub>2</sub>. Dampers are to be installed at either the top or the bottom of the duct and shall be arranged to operate automatically upon activation of the fire-extinguishing system. When the damper is installed at the top of the duct, the top nozzle must be immediately below the damper. Automatic carbon dioxide fire-extinguishing systems must be sufficiently sized to protect all hazards venting through a common duct simultaneously.

Commercial-type cooking equipment protected by an automatic carbon dioxide extinguishing system shall be arranged to shut off the ventilation system upon activation.

(NOTE: Should a fire occur and the extinguishing system activate, it is a good idea to check the fusible link to the hood's air supply fire damper and replace it if necessary to ensure adequate make-up air and ventilation of carbon monoxide).

Automatic sprinkler systems protecting commercial-type cooking equipment must be supplied from a separate, readily accessible indicating-type control valve that is easily identified for this purpose.

Sprinklers used for the protection of fryers shall be listed for that application and installed in accordance with their listing. Automatic sprinklers intended for the protection of fryers shall be tested in accordance with UL 199E, *“Outline for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers.”*

In addition to automatic fire-extinguishing systems, portable fire extinguishers shall be provided within a 30-foot travel distance from commercial-type cooking equipment. For cooking equipment involving vegetable or animal oils and fats, Class K rated portable extinguishers must be provided.

For the hood and fire-extinguishing system to operate as intended, the ventilation system in connection with hoods must be operated at the required rate of air movement. For Type I hoods, the grease filters must always be in place when equipment under these hoods is used.

In hoods with grease extractors, they must also be operated when the cooking equipment is used.

To comply with IFC requirements as well as with health regulations, all hoods, grease-removal devices, fans, ducts and other appurtenances must be cleaned at specific intervals necessary to prevent the accumulation of grease and other debris. Cleanings shall be recorded and records must state the extent, time and date of cleaning and must be maintained on the premises.

(NOTE: Regulatory authorities may ask to see these records, so maintaining them in a location with ready access is a good idea).

For proper operation, all automatic fire-extinguishing systems must be serviced (inspected) at least every six months and after activation of the system. Qualified individuals must conduct the inspections. The owner/operator of the facility is required to forward a copy of the certificate of inspection to the fire code official upon completion.

As with any mechanical system, there are integral parts that must be serviced and/or replaced regularly. Fusible links and automatic sprinkler heads shall be replaced at least annually and other protection devices must be serviced or replaced in accordance with the manufacturer's instructions. However, frangible bulbs are not required to be replaced annually.

#### **4. ELECTRICAL**

The major electrical issues for commercial cooking equipment and associated systems addressed in the National Electrical Code (NEC) deal with Ground-Fault Circuit-Interrupters (GFCIs), overcurrent protection, flexible cords, disconnecting means and lighting.

GFCIs are required for all single-phase, 15- and 20-ampere, 125-volt receptacles in non-dwelling-type kitchens (NEC Section 210.8(B) (2)). Any cooking equipment, whether a floor-mounted or tabletop cord-connected equipment, must be plugged into a GFCI-protected receptacle.

Open coil or exposed sheathed-coil types of surface heating elements in commercial heating appliances (e.g., ovens) must have overcurrent protection devices rated at 50 amperes or less (NEC Section 422.11(D)). Any commercial cooking appliance using sheathed-type heating elements not covered under this requirement is permitted to be subdivided into circuits not exceeding 120 amperes and protected at not more than 150 amperes (NEC Section 422.11(F)(2)), provided one of the following conditions is met:

1. Elements are integral with and enclosed within a cooking surface.
2. Elements are completely contained within an enclosure identified as suitable for this use.

3. Elements are contained within an American Society of Mechanical Engineers (ASME)-rated and stamped vessel.

Flexible cords are permitted for commercial cooking equipment and associated systems to facilitate interchange of equipment, or to facilitate equipment removal or disconnect for cleaning, maintenance or repair. The equipment must obviously be intended or identified for flexible cord connection (NEC Section 422.16(A)). Additionally, wall-mounted ovens and counter-mounted cooking units (e.g., fryers) can be cord-and plug connected only for ease of servicing or installation.

It is also critical that equipment can be disconnected for cleaning and servicing. The NEC provides requirements for disconnecting of permanently connected appliances as well as cord-and-plug connected appliances.

For appliances rated less than 300 volt-amperes or 1/8 horsepower, the branch-circuit overcurrent device shall be permitted to serve as the disconnecting means (NEC Section 422.31(A)).

However, for those devices rated over 300 volt-amperes, the disconnecting means shall be permitted to be the branch-circuit switch or the circuit breaker – provided it is located within sight of the appliance or it is capable of being locked in the “open” position (NEC Section 422.31(B)). If it is a motor operated appliance rated over 1/8 horsepower, the disconnecting means shall be permitted to be the branch-circuit switch or the circuit breaker – provided it is located within sight of the appliance (NEC Section 422.31(C)).

According to NEC Section 422.33(A), for cooking appliances that are cord-and-plug connected, an accessible separable connector or an accessible plug and receptacle shall be permitted to serve as the disconnecting means (i.e., “pull the plug”). In instances where the separable connector or plug and receptacle are not accessible, the appliances in question must meet the requirements of NEC Section 422.31.

It is also important to remember that the rating of a receptacle or of a separable connector must not be less than the rating of any appliance connected to it (NEC Section 422.33(C)).

Lighting fixtures (luminaries) in permanently installed hoods are permitted per Section 410.10 (C) of the NEC provided the following four conditions are met:

1. The luminaire is identified for use in commercial cooking hoods and is installed in such a manner that the temperature limits of the material used in its construction are not exceeded.
2. Luminaire construction shall be such that all grease, exhaust vapors, oil or cooking vapors are excluded from the lamp and wiring compartments. If diffusers are used, they must be resistant to thermal shock.
3. Exposed portions of the luminaire must be corrosion resistant and designed to facilitate cleaning.
4. Wiring methods and materials shall not be exposed within the cooking hood.

## 5. MECHANICAL

Mechanical aspects of commercial cooking equipment and associated systems are, for the most part, related to ventilations systems (hoods) associated with the varying types of food service equipment.

Those types of equipment that cook products that use or produce grease (e.g. fryer), must be provided with hoods that are designed to capture and hold grease. Those types of equipment that produce steam or heat without grease emission (e.g. steam kettle) must be provided with hoods designed to remove the steam or heat.

Section 507 of the IMC lists specific requirements for commercial cooking equipment hoods. These requirements are discussed below.

1. When **any** cooking appliance under a **single** hood requires a Type I hood, then a Type I hood must be installed. Where a Type II hood is required, either a Type I or Type II hood must be installed.
2. Hoods that are designed to capture and hold grease are termed "Type I" hoods, and are designed for use over equipment such as griddles, fryers, broilers, ovens, ranges and wok ranges.
3. Hoods that are designed to remove steam or heat are termed "Type II" hoods and are designed for use over equipment such as steamers, kettles and pasta cookers.

(NOTE: UL does not currently List type II hoods).

Even though commercial exhaust hoods Listed to UL 710 (*Exhaust hoods for Commercial Cooking Equipment*) are exempt from some IMC requirements (Sections 507.4, 507.5, 507.7, 507.11, 507.12, 507.13, 507.14, and 507.15), they still must meet the remainder of the code requirements.

Commercial recirculating hood systems Listed to UL 710B are exempt from some IMC requirements (Sections 507.4, 507.5, 507.7, 507.12, 507.13, 507.14, and 507.15); they still must meet the remainder of the code requirements.

Per Section 507.6 of the IMC, Type I hoods shall be secured in place by noncombustible supports. All Type I and Type II hood supports shall be adequate for the applied load of the hood, the unsupported ductwork, the effluent loading, and the possible weight of personnel working in or on the hood.

In addition to being a requirement of the IFC and of state food service regulations, cleaning of hoods is also a requirement of the IMC. The hood must be designed to provide for thorough cleaning of the entire hood, including gutters and filters. Grease gutters shall drain to an approved collection receptacle that is fabricated, designed and installed to allow access for cleaning. In many instances, this collection receptacle is removable to facilitate cleaning (IMC Section 507.8).

Approved grease filters (or grease extractors) must be provided for all Type I hoods. They must be sized to allow for the required amount of air to pass through the filters at a rate that does not exceed the approved rate. Filters must be installed in frames so that they are easily removed for cleaning. Grease filters are tested and certified under the UL category AKUS in accordance with UL 1046.

Grease filters must be installed at an angle greater than forty-five degrees from horizontal and have a drip tray beneath the lower edge of the filters. Similar grease filter requirements exist for the Uniform Mechanical Code (UMC).

A Type I hood shall be installed with a clearance to combustibles of not less than 18 inches.

Exception: Clearance shall not be required from gypsum wallboard attached to noncombustible structures provided that a smooth, cleanable, nonabsorbent and noncombustible material is installed between the hood and the gypsum wallboard over an area extending not less than 18 inches in all directions from the hood.

If any portion of a Type I hood penetrates a ceiling, wall or furred space, then the penetrating portion of the hood must be enclosed from the point of penetration to the outlet terminal. If the penetration is in a wall, the building code must be consulted to determine if the location of the penetration is an acceptable location.

All grease ducts must be enclosed per building code requirements, including sealing around the duct at the point of penetration and venting to the outside of the building through weather-protected openings. Clearance from the duct to the interior surface of enclosures of combustible construction shall be not less than 18 inches.

In Section 506.3.10 of the IMC, clearance from the grease duct to the interior surface of enclosures of noncombustible construction or gypsum wallboard attached to noncombustible structures shall be not less than 6 inches. Grease Ducts are tested and certified under the category YYGQ.

The duct enclosure shall serve a single grease exhaust duct system and shall not contain any other ducts, piping, wiring or systems. The grease duct enclosure system shall be in accordance with authorized constructions per UL category HNKT in accordance with UL2221 (for factory-built enclosure assemblies) or ASTM E2336 (for field constructed assemblies).

1. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 and having an “F” and “T” rating equal to the fire-resistance rating of the assembly being penetrated and where the surface of the duct is continuously covered on all sides from the point at which the duct penetrates a ceiling, wall or floor to the outlet terminal with a classified and labeled material, system, method of construction or product specifically evaluated for such purpose, in accordance with ASTM E 2336. Exposed ductwrap systems shall be protected where subject to physical damage.
2. The shaft enclosure provisions of this section shall not be required where a duct penetration is protected with a through-penetration firestop system classified in accordance with ASTM E 814 (*Standard Test Method for Fire Tests of Through-Penetration Fire Stops*) and having an “F” and “T” rating equal to the fire resistance rating of the assembly being penetrated and where a prefabricated grease duct enclosure assembly is protected on all sides from the point at which the duct penetrates a ceiling, wall or floor to

the outlet terminal with a classified and labeled prefabricated system specifically evaluated for such purposes in accordance with UL 2221 (*Tests of Fire Resistive Grease Duct Enclosure Assemblies*).

3. A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

Section 508 of the UMC provides requirements for both Type I and Type 2 hoods, any duct enclosure that penetrates a ceiling, wall or floor must be enclosed from. As one would expect, a performance test to verify exhaust airflow and make-up airflow must be conducted upon completion of the hood system and before final approval of the installation. It is the responsibility of the permit holder to furnish the necessary test equipment and devices required to perform the tests. The permit holder is also responsible for verification of the capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures.

Verification of this test is conducted visually by observing smoke or steam produced by actual or simulated cooking, such as with smoke candles, smoke puffers, etc.

The installer should notify the mechanical code official and the fire code official to witness the test.

(NOTE: Although not part of the code, health officials in certain jurisdictions may also wish to witness the performance test. Therefore, it is a good idea to notify them also).

Ductless hoods, (also referred to as recirculation systems) are intended for use with electric commercial cooking appliances. They vent into the room rather than through a duct system to the outside, and are becoming popular because they are easier and more cost effective to install. EPA Method 202, Standard for the "Determination of Condensable Particulate Emissions from Stationary Source" is used to determine the compliance with the requirements for reduced grease emissions. Equipment tested to UL 710B have been determined to comply with the requirements for EPA 202.

UL certifies ductless hoods under two product categories. The first category (KNKG) covers cooking appliances with integral ductless hoods, which includes commercial deep fat fryers, griddles and other appliances that have recirculating (ductless) hoods directly attached as part of the equipment. These systems incorporate an automatic fire extinguishing system. The basic standard used for this category is UL 710B, "*Recirculating Systems.*"

The second category (YZCT) covers separate ductless hoods are intended for installation with specific Listed electric commercial cooking appliances, but are not attached as part of the appliance. They also incorporate an automatic fire extinguishing system. The basic standards used for this category are UL 710B, and UL 197, "*Commercial Electric Cooking Appliances.*"

In general, UL evaluates ductless and ducted hoods in similar ways. However, for ductless hoods, an additional emissions test is performed and the fire extinguishing system is evaluated as an integral part of the hood. UL performs fire tests to verify proper function of the fire extinguishing system. As with all hoods, the operating instructions must be carefully reviewed for information regarding proper maintenance of

the fire extinguishing system, and the building design must provide sufficient ventilation, heating and cooling capacity for the intended occupancy.

Permanently connected units intended for use near combustible surfaces are marked with minimum clearances to these surfaces. Cord connected units or units not intended for use near combustible surfaces are marked as follows: "Intended for use in noncombustible surroundings only."

The IMC allows recirculating hoods, and UL 710B restricts the installation of these hoods to above electrical appliances only. The hoods must be listed and labeled to UL 710B and must meet the performance test requirements as described above. There are also very important maintenance issues that need to be followed in for proper operation of these hoods.

All cooking appliances that are designed for **permanent** installation (such as ranges, ovens, stoves, broilers, grills, fryers, griddles and barbecues) are required to be listed, labeled and installed in accordance with the manufacturer's installation instructions. Oil-burning stoves shall be tested in accordance with UL 896 (*"Oil-Burning Stoves"*). Solid fuel-fired ovens shall be tested in accordance with UL 2162 (*"Outline for Commercial Wood-Fired Baking Ovens – Refractory Type"*).

Gas-Fired cooking appliances are tested in accordance with ANSI Z83.11/CGA 1.8 (*"Gas Food Service Equipment"*), and electrical cooking appliances are tested in accordance with UL 197 (*"Commercial Electric Cooking Appliances"*).

## **6. GAS**

Gas-fired cooking equipment may be either natural gas or liquefied petroleum (LP) gas. Both types of gas are addressed in the codes. The IFGC and NFPA 54 addresses natural gas, and NFPA 58 addresses LP gas. Although these gas sources are covered under different codes, the requirements found in both codes are identical for commercial cooking equipment.

The requirements of the IFGC covering cooking appliances are discussed below.

As with the mechanical codes, all cooking appliances that are designed for permanent installation must be installed in accordance with the manufacturer's instructions. Cooking appliances listed and labeled for use in commercial occupancies are not intended for use in domestic operations and should not be used in such operations. This is normally not an issue with commercial food service equipment. What does happen frequently, however, is that domestic equipment is brought into a commercial establishment for use. Domestic equipment is not constructed to meet the demands of a commercial cooking environment. It does not meet the applicable standard(s), and is prohibited by most state food codes as well as the FDA Model Food Code.

If open-top broilers are used, a minimum clearance of 24 inches shall be maintained between the cooking top and combustible material above the hood. In addition, the hood shall be at least as wide as the open-top broiler unit and be centered over the unit (Section 623.5.1).

Commercial cooking appliances, other than counter appliances (e.g., toasters, microwave ovens) must be vented by connecting the appliance to a vent or chimney in accordance with this code and the appliance manufacturer's instructions. Alternatively, the equipment shall be vented following the criteria below (Section 505.1.1):

1. The exhaust system must be fan powered.
2. The appliances must be interlocked with the exhaust system to prevent operation of the equipment without hood operation.
3. There are to be no dampers in the exhaust system.
4. Where a solenoid valve is installed in the gas piping as part of an interlock system, gas piping shall not be installed to bypass such valve.

NFPA 54 also specifies that Gas-fired food service (commercial cooking) equipment listed for use with casters or otherwise subject to movement for cleaning, and other large and heavy gas utilization equipment that can be moved, shall be connected in accordance with the connector manufacturer's installation instructions using a listed appliance connector complying with ANSI Z21.69, "*Connectors for Movable Gas Appliances.*"

## **7. PLUMBING**

Certain types of cooking equipment such as woks, steam tables and steam cookers (kettles) can be designed to accommodate permanent connection to the water supply and are also equipped with waste disposal lines. Some commercial dishwashing appliances are required to be installed under a Type II hood.

As a general rule of thumb, this equipment must be designed and installed such that the water inlet for the equipment is not submerged below the flood rim of the equipment. There must also be no direct connection between the disposal line from the equipment, and the sanitary sewer system. These are requirements of Section 802.2 of the International Plumbing Code (IPC) and Section 801.2.3 of the Uniform Plumbing Code (UPC).

In any case, it is critical that regulatory authorities are consulted with respect to connection to the water supply and the sanitary sewer.

Plumbing products used in conjunction with these pieces of commercial cooking equipment are limited to those that provide water to the equipment and those that drain equipment.

UL certifies flexible water connectors, which are frequently found in association with commercial cooking equipment. The basic standard used for these UL Listed products is IAPMO PS 14-2002, "*Flexible Metallic Field Fabricated Water Connectors.*"

Depending upon the construction of the product, UL may determine that additional requirements and tests are appropriate.

When used as part of a commercial cooking appliance, flexible water connectors and any other plumbing product in contact with drinking water must also be evaluated in accordance with the requirements of NSF 61, "*Drinking Water System Components – Health Effects.*" Products certified (Classified) to NSF61 by UL will bear the UL Water

Quality Mark. These products are tested and certified under the UL category FDNP. Products which are additionally evaluated to low lead requirements less than 0.25% are tested and certified under the UL Category QNVB. This includes certifications to:

- California Health and Safety Code, Section 116875, "Lead Materials"
- Vermont Act No. 193, "Lead in Consumer Products Law"
- Maryland House Bill 372, "Business Occupations and Professions - Plumbers - Lead-Free Materials"
- Safe Drinking Water Act Amendment, "Reduction of Lead in Drinking Water Act"
- NSF 372, "Drinking Water System Components - Lead Content"

These products are to be installed in accordance with the instructions provided with the product. It is critical that the cautionary statements and installation and operating instructions on the product and in accompanying literature be followed.

## APPENDIX A

### UL COMMERCIAL COOKING EQUIPMENT AND ASSOCIATED SYSTEMS PRODUCT CATEGORIES and STANDARDS

UL lists this type of equipment and continues to develop new product categories to address the safety issues associated with this type of equipment. Below is a list of product categories for Commercial Cooking Equipment and Associated Systems that UL provides certification to.

<b>Category Code</b>	<b>Category Name</b>	<b>Standard Used</b>
AKUS	Filters, Grease	UL1046
DMGR	Commercial Dishwashers	UL 921
GMXH	Water-assisted Wet-chemical-solution Extinguishing System Unit	UL 300, UL 1254
GOAS	Wet-chemical-solution Extinguishing System Units	UL 300, UL 1254
HNKT	Grease Duct Assemblies	UL2221, ASTM E2336
HNOB	Grease Ducts	UL1978, UL2221, ASTM E2336
HYXT	Luminaires and Fittings	NFPA 96, NFPA 70
KNGT	Commercial Cooking Appliances	UL 197
KNJA	Commercial Cooking Appliance Assemblies Classified for Use with Other Manufacturers' Appliances	UL 197
KNKG	Commercial Cooking Appliances With Integral Recirculating Ventilation Systems	UL 197
KNLZ	Commercial Cooking Appliances with Integral Systems For Limiting the Emission Of Grease-laden Air (UL 197, UL1889)	UL 197, UL1889
KNNS	Custom-Built Food Service Equipment (UL 197)	UL 197
KNRF	Filters for Cooking Oil, Commercial	UL1889
LCJX	Cooking Appliance, Wood-Fired	UL2162, UL737
LGQX	Gas-Fired Food Service Equipment	ANSI Z83.11/CSA1.8
LGRC	Gas-Wood-Fire Food Service Equipment	UL 2162, UL737
LVTT	Specialty Heating Appliances	UL795
TSQT	Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment	NSF 4
TSQU	Food Equipment	NSF 2
XHEZ	Through Penetration Firestop Systems	UL 1479
YXZR	Exhaust Hoods With Exhaust Dampers	UL 710

YYCW	Exhaust Hoods Without Exhaust Dampers	UL 710
YYGQ	Grease Ducts for Restaurant Cooking Appliances	UL1978
YYXS	Hood and Duct Accessories	UL 710, UL 1978
YZCT	Hoods/ Recirculating Systems, For Use With Specified Commercial Cooking Appliances	UL 197, UL 710B
YZHW	Power Ventilators for Restaurant Exhaust Appliances	UL 705, UL Subject 762

## APPENDIX B

### REFERENCED DOCUMENTS

ANSI Z21.69	“Connectors for Movable Gas Appliances”
ANSI Z83.11 / CGA 1.8	“Gas Food Service Equipment”
ASTM E 814	“Standard Test Method for Fire Tests of Through-Penetration Fire Stops”
ASTM E 2336	“Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems”
EPA Method 202	“Determination of Condensable Particulate Emissions from Stationary Source”
IAPMO PS 14-2002	“Flexible Metallic Field Fabricated Water Connectors”
IBC	“International Building Code”
IFC	“International Fire Code”
IFGC	“International Fuel Gas Code”
IMC	“International Mechanical Code”
IPC	“International Plumbing Code”
NEC (NFPA 70)	“National Electrical Code”
NFGC (NFPA 54)	“National Fuel Gas Code”
NFPA 1 (UFC)	“Uniform Fire Code”
NFPA 12	“Carbon Dioxide Extinguishing Systems”
NFPA 13	“Standard for the Installation of Sprinkler Systems”
NFPA 16	“Deluge Foam-Water Sprinkler and Foam Water Spray Systems”
NFPA 17	“Dry Chemical Extinguishing Systems”
NFPA 17A	“Wet Chemical Extinguishing Systems”
NFPA 54 (NFGC)	“National Fuel Gas Code”
NFPA 58	“Liquefied Petroleum Gas Code”
NFPA 70 (NEC)	“National Electrical Code”
NFPA 96	“Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations”
NFPA 5000	“Building Construction and Safety Code”
NSF 2	“Food Equipment”
NSF 4	“Commercial Cooking, Rethermalization and Powered Hot Food Holding and Transport Equipment”
NSF 8	“Commercial Powered Food Preparation Equipment”
NSF 61	“Drinking Water System Components – Health Effects”
NSF 372	“Drinking Water System Components – Lead Content”
UL 197	“Commercial Electric Cooking Appliances”
UL 199B	“Outline of Investigation for Control Cabinets for Automatic

	Sprinkler Systems Used for Protection of Commercial Cooking Equipment”
UL 199E	“Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers”
UL 300	“Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment”
UL 710	“Exhaust Hoods for Commercial Cooking Equipment”
UL 710A	“Outline of Investigation for Rooftop Grease/Oil Collection/Containment Systems”
UL 710B	“Recirculating Systems”
UL 762	“Outline of Investigation for Power Roof Ventilators for Restaurant Exhaust Appliances”
UL795	“Commercial-Industrial Gas Heating Equipment”
UL 896	“Oil-Burning Stoves”
UL 1046	“Grease Filters for Exhaust Ducts”
UL 1479	“Fire Tests of Through-Penetration Firestops”
UL 1889	“Commercial Filters for Cooking Oil”
UL 1978	“Grease Ducts”
UL 2162	“Outline of Investigation for Commercial Wood-Fired Baking Ovens - Refractory Type”
UL 2221	“Test of Fire Resistive Grease Duct Enclosure Assemblies”
UL 2728	“Outline of Investigation for Pellet fuel Burning cooking Appliances”
UFC (NFPA 1)	“Uniform Fire Code”
UMC	“Uniform Mechanical Code”
UPC	“Uniform Plumbing Code”

An “Outline of Investigation” is initiated as part of the standards development process. Requirements are typically determined as part of an independent evaluation of the product to cover requirements as indicated in the guide card for the category. An outline of investigation is typically the precursor to a consensus standard.

# Appendix C Commercial Cooking

Standards and  
UL Listing Categories

