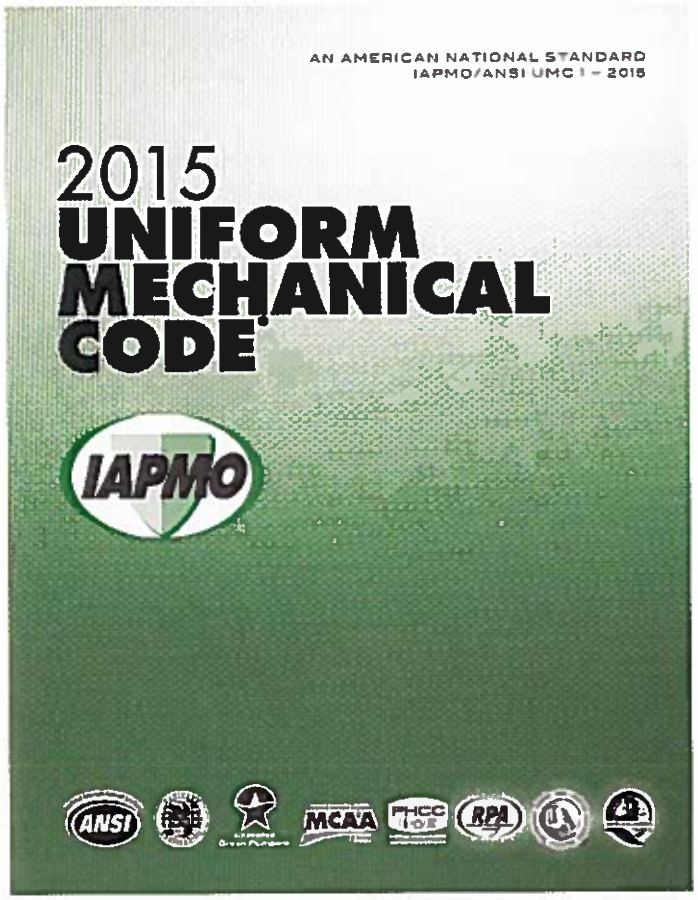


2015 Uniform Mechanical Code®

Guide to Important Code Changes

304.2 Sloped Roof

What Changed

304.2 Sloped Roof. Where equipment or appliances that require service are installed on a roof having a slope of 4 units vertical in 12 units horizontal (33 percent slope) or more, a level platform of not less than 30 inches (762 mm) by 30 inches (762 mm) shall be provided at the service side of the equipment or appliance.

Why It Changed

Section 304.2 requires platforms to be provided where equipment or appliances are installed on a roof with a slope of 4 units vertical in 12 units horizontal (33-percent slope). The previous code did not clarify that equipment or appliances installed on a sloped roof are required to have proper working space and a platform as well. It is critical that the UMC is clear in regards to the installation on a sloped roof due to the hazards of falling.

The 30 x 30 platform is consistent with the 30 x 30 work space that is required for appliance or equipment access that are installed in other locations in and on the building. This platform requirement was present in the 2000 UMC edition, but was removed in the subsequent years. The integration of NFPA 54 into sections of the UMC seems to be coincidental to the removal of this section.

The catwalk to the platform, the location of the platform in respect to the equipment or appliance controls, and the 42" high guard rail at the platform that were required, are not included in the code change.

What It Means To Me

This issue boils down to aesthetics versus worker safety. Building owners are conscious of the look of their property, but roof mounted equipment or appliances on residential buildings require just as much safety for maintenance and repair as any other building uses. Most single family dwellings are constructed with a roof slope of 4 units in 12 or greater. Where prior UMC codes required the platform on slopes greater than 4 in 12, this change includes the 4 in 12 common slope.

If the roof is the only logical place for the appliance or equipment to be located, remember to provide the platform. Additional railings would be required if the appliance or equipment are located within 6' of the edge of the roof. Other applicable building codes may not require the platform. However, similar to section 101.3.1, the most restrictive shall govern as determined by the Authority Having Jurisdiction.

Roof Platform
Image Courtesy of Kitchen Stainless Hoods

What Changed

307.4 Absorption Units. Absorption units shall bear a permanent and legible factory-applied nameplate on which shall appear:
(1) The name or trademark of the manufacturer.
(2) The model number or equivalent.
(3) The serial number.
(4) The amount and type of refrigerant.
(5) Hourly rating in Btu/h (kW).
(6) The type of fuel approved for use with the unit.
(7) Cooling capacity Btu/h (kW).
(8) Required clearances from combustible surfaces on which or adjacent to which it is permitted to be mounted.
(9) The symbol of an approved agency certifying compliance of the equipment with recognized standards.

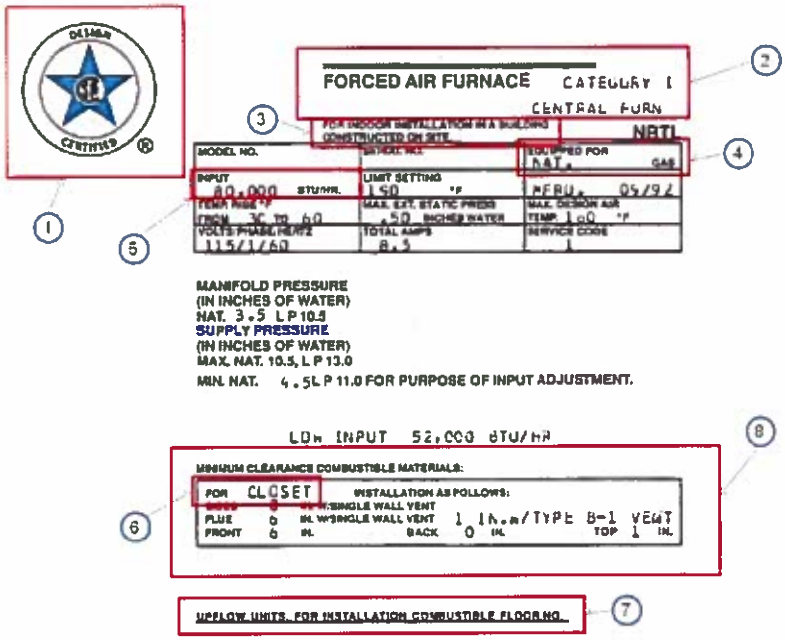
Why It Changed

Section 307.4 requires labeling of absorption units. Unlike vapor compression systems that utilize compressors to operate, absorption equipment requires a source of heat to operate. Therefore, the hourly rating and the type of fuel should be in the nameplate so that the user can have the critical information necessary to safely operate the system.

In addition, Chapter 3 of the UMC, sections 307.0, 307.2, 307.3 and 307.4 require similar labeling of equipment. This addition will bring a more "specific" versus a general regulation to the use, installation and identification of factory assembled refrigeration units.

What It Means To Me

The benefit of the above is to assist in the location of specific information, pertinent to the particular equipment, which will then give the standards to which the equipment was manufactured, designed, to be installed per service requirements, as well as the regulations which apply to the refrigerant used. In addition, and of particular importance to the inspector, the listing of the BTU rating will allow the inspector to verify notable changes or increases to the demand placed on an existing gas system. Furthermore, the inspector will have easy and immediate access to the appliances required clearances without the added delay of locating the manufacturer's installation instructions and finding within those instructions the mandated appliance clearances.



Factory-Applied Nameplate

310.1.1 Condensate Pumps

What Changed

310.1.1 Condensate Pumps. Where approved by the Authority Having Jurisdiction, condensate pumps shall be installed in accordance with the manufacturer's installation instructions. Pump discharge shall rise vertically to a point where it is possible to connect to a gravity condensate drain and discharged to an approved disposal point. Each condensing unit shall be provided with a separate sump and interlocked with the equipment to prevent the equipment from operating during a failure. Separate pumps shall be permitted to connect to a single gravity indirect waste where equipped with check valves and approved by the Authority Having Jurisdiction.

Why It Changed

Inspectors encounter multiple situations where condensate pumps are installed where they are not needed. In the cases where they are needed, they are not addressed by the code and are installed with $^{3}/_{8}$" unlisted clear tubing to the exterior of the building; ignoring other sections which prohibit disposal over the public right of way. In some instances, inspectors have encountered over 100 ft of tubing run horizontally to the exterior or to open drains. Pumps sold as condensate are made to lift water, not to "throw" it multiple feet. This section gives the Authority Having Jurisdiction the authority to cite a specific code section which was previously lacking in the UMC.

What It Means To Me

When retrofitting or installing equipment with the potential to produce condensate, situations arise where the installation location does not have a means for the use of gravity flow condensate disposal. Where all gravity flow options have been reviewed and exhausted, the use of condensate pumps is a common means of achieving efficient condensate disposal. Where condensate pumps are required; the pump must be sized, selected and installed for the required duty and as per the manufacturer's instructions. Interlocks must be installed to ensure equipment operation is halted in the event of condensate pump failure or obstruction of drain lines. Condensate lines leading to and leaving from condensate pump shall be installed as required by applicable code(s) and manufactures installation instructions. Condensate lines leaving the condensate pump should be terminated in accordance with the applicable code(s).

Inspectors should verify these installations will meet or exceed local code requirements and should be able to identify problems that could be considered as non-conformant. Individuals installing such systems shall be qualified to do so. Installers should refer to manufactures' installation instructions and recommendations as well as comply with all local code requirements to ensure a trouble free compliant installation. Non-compliant installations have the potential to cause damage to property by allowing moisture to be introduced into unintended areas Along with property damage, uncontrolled moisture can cause health problems by allowing growth of mold, fungus and mildew within the building envelope.

What Changed

310.2 Condensate Control. Where ~~a cooling coil or cooling unit~~ an equipment or appliance is ~~located~~ installed ~~in an attic or furred~~ in a space where damage is capable of resulting from condensate overflow, a drain line shall be provided and shall be drained in accordance with Section 310.1. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

(1) A water level detecting device that will shut off the equipment or appliance in the event the primary drain is blocked.

(2) A~~a~~n additional watertight pan of corrosion-resistant ~~metal~~ material, ~~shall be~~ with a separate drainline, installed beneath the cooling coil, ~~or~~ unit, or the appliance ~~top~~ to catch the overflow condensate due to a clogged primary condensate drain~~, or one pan with a standing overflow and a separate secondary drain shall be permitted to be provided in lieu of the secondary drain pan~~.

(3) An additional drain line at a level that is higher than the primary drain line connection of the drain pan.

(4) An additional watertight pan of corrosion-resistant material with a water level detection device installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain and to shut off the equipment.

The additional pan or the ~~standing overflow~~ additional drain line connection shall be provided with a drain pipe, of not less than ¾ of an inch (20 mm) nominal pipe size, discharging at a point that is readily observed.

~~This requirement is in addition to the requirements in Section 312.3 and Section 312.4.~~

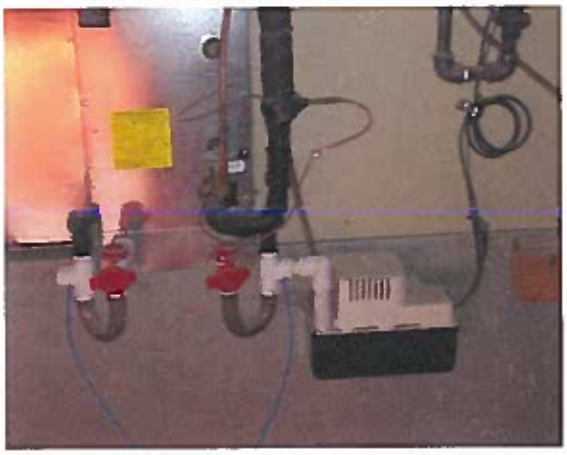
Why It Changed

The modifications in this section clarify the use of primary and secondary condensate drains and requires an additional drain for the removal of condensate.

What It Means To Me

The purpose of this section is to protect the structure from the damage that water from condensation can cause in the short- and long-term. It gives installers options for the removal of condensate and protection of the structure by having an option to shut the equipment down. The sensor makes it easy to install an effective secondary device to control damage from condensate. Installers should also take care to ensure that the installation is serviceable, the controls are hooked up properly, and is in compliance with the code requirements.

Inspectors should understand that this section allows for different options when dealing condensate disposal. During inspection, the inspector should ensure the option used is in compliance with this code section and to also be sure not to fail any installations using an approved mode of condensate control.



Condensate Control Sensor

Condensate Pan Overflow Switch

Image Courtesy of HD Supply Maintenance Solutions

310.3 Condensate Waste Pipe Material and Sizing

What Changed

310.3 Condensate Waste Pipe Material and Sizing. Condensate waste pipes from air-cooling coils shall be sized in accordance with the equipment capacity as specified in Table 310.3. The material of the piping shall comply with the pressure and temperature rating of the appliance or equipment, and shall be approved for use with the liquid being discharged.

Why It Changed

The revisions to Section 310.3 will guide the end user in selecting the correct material for condensate waste piping since the code is silent on such material requirements.

What It Means To Me

This qualification should remove any doubt an installer or inspector has as to the type of material to be used on a condensate system. The end user is now clearly instructed to use material which is rated for pressure types, temperature ratings and liquids discharged by a condensate system.

The designer shall verify the piping meets the listing and standards for condensate waste piping material. The plan reviewer, field inspector and installer need to verify the condensate piping material meets the minimum requirements of the code change.

Also, note that in Section 310.7, the text "PVC" is being replaced with "plastic" since there are other plastic screwed fittings that can be used for condensate drains, as long as they meet the pressure and temperature ratings of the appliance or equipment.

It should also be noted that, if copper tubing is installed for condensate waste piping, the condensate must be verified that is not at a PH factor that is detrimental to the copper tubing which could result in a material failure. If the manufacturer's installation instructions for a 90% condensing furnace require PVC piping for condensate waste piping, that piping should be installed.

TABLE 310.3
MINIMUM CONDENSATE PIPE SIZE

EQUIPMENT CAPACITY IN TONS OF REFRIGERATION	MINIMUM CONDENSATE PIPE DIAMETER (inches)
Up to 20	¾
21 – 40	1
41 – 90	1¼
91 – 125	1½
126 – 250	2

For SI units: 1 ton of refrigeration = 3.52 kW, 1 inch = 25 mm

402.1.3 Ventilation in Healthcare Facilities

What Changed

402.1.3 Ventilation in Healthcare Facilities. Mechanical ventilation for healthcare facilities shall be designed and installed in accordance with this code and ASHRAE 170.

Why It Changed

Ventilation in healthcare facilities is more complex than requiring a certain amount of ventilation in a space. ASHRAE has published a new standard that sets requirements for ventilation in healthcare facilities (ANSI/ASHRAE Standard 170) which has more comprehensive requirements for ventilation, including design parameter requirements. The Facility Guidelines Institute has incorporated ASHRAE Standard 170 into the ventilation design requirements at healthcare facilities.

What It Means To Me

Installers and designers will need to reference ANSI/ASHRE Standard 170 for the requirements at healthcare facilities. This new standard will provide guidance for designing a building that is both energy efficient and will not spread infections and odors throughout the building. Jurisdictions may need to buy a copy as a reference to verify that the minimum requirements of this standard are being followed.

403.7.1 Parking Garages

What Changed

403.7.1 Parking Garages. Exhaust rate for parking garages shall be in accordance with Table 403.7. Exhaust rate shall not be required for enclosed parking garages having a floor area of 1000 square feet (92.9 m^2) or less and used for the storage of 5 or less vehicles.

403.7.2 ~~**Alternative Exhaust Ventilation for**~~ **Enclosed Parking Garages.** Mechanical ventilation systems for enclosed parking garages shall be permitted to operate continuously ~~intermittently where the system is designed to automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.~~

~~**403.7.1.1 Minimum Exhaust Rate.** Ventilation systems shall be capable of providing 14 000 cfm (6607.3 L/s) of exhaust air for each operating vehicle. The number of operating vehicles shall be determined based on 2.5 percent of the parking spaces and not less than one vehicle.~~

Exceptions:

(1) Mechanical ventilation systems shall be permitted to operate intermittently where the system is designed to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.

(2) ~~**403.7.1.2 Automatic Carbon Monoxide Sensing Devices.**~~ Approved automatic carbon monoxide sensing devices shall be permitted to be employed to modulate the ventilation system to ~~maintain~~ not exceed a maximum average concentration of carbon monoxide of 50 parts per million during an eight-hour period, with a concentration of not more than 200 parts per million for a period not exceeding one hour. Automatic carbon monoxide sensing devices installed to modulated parking garage ventilation systems shall be approved in accordance with Section 301.2.

Why It Changed

Section 403.7.1 through Section 403.7.1.2 will allow an alternate design for ventilation systems for enclosed public parking garages. The alternating or modulating is intended to protect the occupants from excess levels of carbon monoxide and as a means of conserving energy. The provisions correlate with language used in the California Mechanical Code.

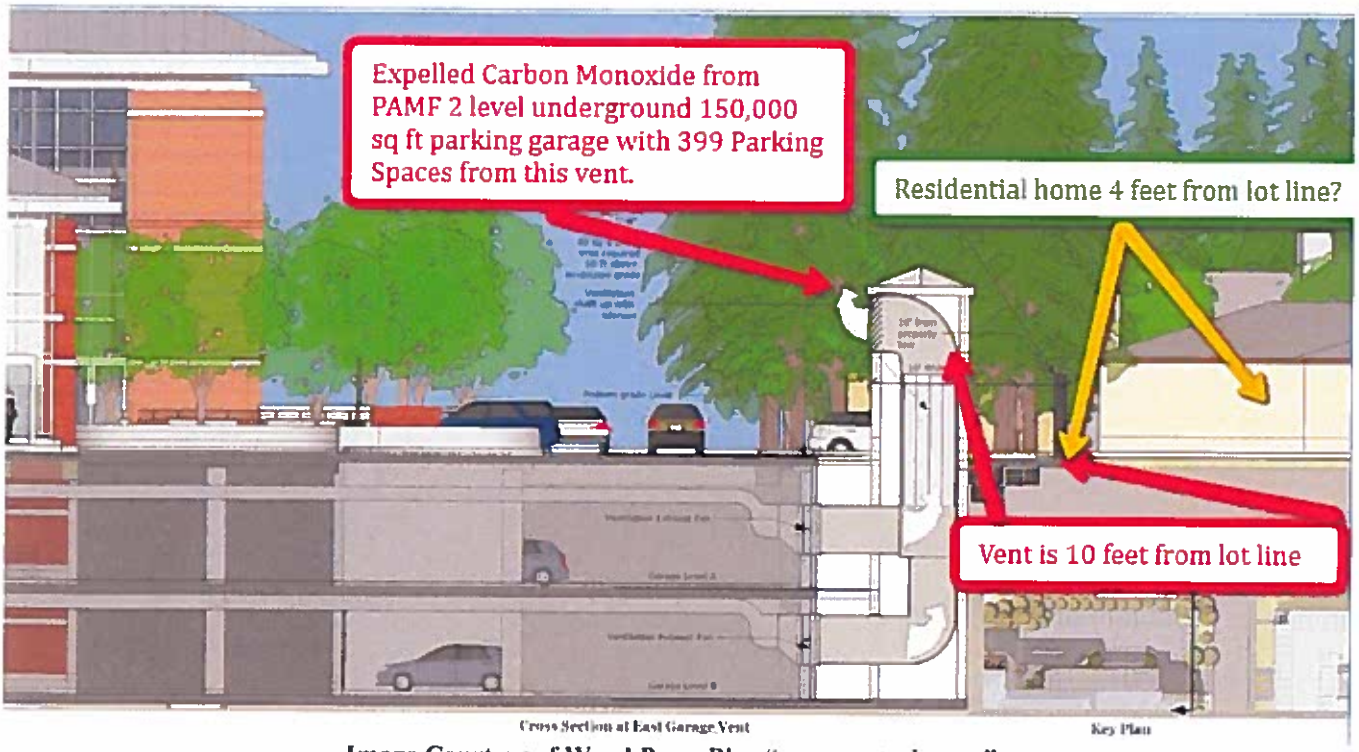


Image Courtesy of Word Press Blog "eyesunnyvale.com"

What It Means To Me

Movement of air (ventilation) comes with its own cost to operate. When the system is in excess of 14,000 cfm and operates continuously, these costs add up quickly. This code change correlates with ASHREA 62.1. It recognizes two options for energy conservation while protecting the public from carbon monoxide produced by operating motor vehicles.

Designers, installers and inspectors need to verify the new requirements in the code changes to reflect the new changes.

Everyone should be aware that Table 403.7 lists several occupancy categories and the corresponding required exhaust rates. The exhaust rates are in the form of cfm/square foot, with few exceptions. The exhaust is to be replaced directly by outdoor air or recirculating air (that includes outdoor air), or indirectly through transfer air from other spaces. One example of indirect replacement of exhaust is when transfer air from an adjacent space is provided to a toilet room to replace the exhausted air. This is a common practice intended to create a slightly negative pressure within the toilet room so that odors are kept within. However, supplying makeup air through an adjacent corridor that happens to be of fire-resistive construction must be avoided as this is prohibited by Section 602.1 of this code.

TABLE 403.7
MINIMUM EXHAUST RATES
[ASHRAE 62.1: TABLE 6.5]

OCCUPANCY CATEGORY[g]	EXHAUST RATE (cfm/unit)	EXHAUST RATE (cfm/ft²)	AIR CLASS
Arenas[2]	–	0.50	1
Art classrooms	–	0.70	2
Auto repair rooms[1]	–	1.50	2
Barber shops	–	0.50	2
Beauty and nail salons	–	0.60	2
Cells with toilet	–	1.00	2
Copy, printing rooms	–	0.50	2
Darkrooms	–	1.00	2
Educational science laboratories	–	1.00	2
Janitor closets, trash rooms, recycling	–	1.00	3
Kitchens – commercial	–	0.70	2
Kitchenettes	–	0.30	2
Locker rooms	–	0.50	2
Locker dressing rooms	–	0.25	2
Paint spray booths	–	–	4
Parking garages[3]	–	0.75	2
Pet shops (animal areas)	–	0.90	2
Refrigerating machinery rooms[6]	–	–	3
Residential – kitchens[7]	50/100	–	2
Soiled laundry storage rooms	–	1.00	3
Storage rooms, chemical	–	1.50	4
Toilets – private[5, 9]	25/50	–	2
Toilets – public[4, 9]	50/70	–	2
Woodwork shop/classrooms	–	0.50	2

For SI units: 1 cubic foot per minute = 0.0283 m³/min, 1 square foot = 0.0929 m²

Notes:

1 Stalls where engines are run shall have exhaust systems that directly connect to the engine exhaust and prevent escape of fumes.

2 Where combustion equipment is intended to be used on the playing surface, additional dilution ventilation, source control, or both shall be provided.

3 Exhaust rate is not required for open parking garages as defined in accordance with the building code.

4 Rate is per water closet, urinal, or both. Provide the higher rate where periods of heavy use are expected to occur, e.g., toilets in theatres, schools, and sports facilities. Otherwise the lower rate shall be permitted to be used.

5 Rate is for a toilet room intended to be occupied by one person at a time. For continuous system operation during normal hours of use, the lower rate shall be permitted to be used. Otherwise the higher rate shall be used.

6 For refrigeration machinery rooms, the exhaust rate shall comply with Chapter 11.

7 For continuous system operation, the lower rates shall be permitted. Otherwise the higher rate shall be used.

8 For unlisted occupancies for a proposed space not listed in the table, the requirements for the listed occupancy that is most similar in terms of occupant density and occupancy type shall be used.

9 Exhaust air that has been cleaned in accordance with the criteria of Class 1 shall be permitted to be recirculated.

504.1 General

What Changed

504.1 General. Where not specified in this chapter, exhaust ducts shall be constructed and installed in accordance with Chapter 6 and shall be airtight as approved by the Authority Having Jurisdiction. Environmental air ducts that have an alternate function as a part of an approved smoke-control system do not require design as Class 1 product-conveying ducts.

Exceptions:

(1) Ductless range hoods where installed in accordance with the manufacturer's installation instructions.

(2) Condensing clothes dryers where installed in accordance with the manufacturer's installation instructions.

~~**504.1 Makeup and Exhaust-Air Ducts.** Environmental air ducts not regulated by other provisions of this code shall be in accordance with this section. Ducts shall be airtight as approved by the Authority Having Jurisdiction, and shall comply with the provisions of Chapter 6. Exhaust ducts under positive pressure shall not extend into or through ducts or plenums. Exhaust ducts shall terminate outside the building and shall be equipped with back draft dampers. Environmental air ducts that have an alternate function as a part of an approved smoke control system do not require design as Class 1 product conveying ducts.~~

504.1.1 Backdraft Protection. Exhaust ducts shall terminate outside the building and shall be equipped with backdraft dampers or with motorized dampers that automatically shut where the system or spaces served are not in use.

Exceptions: Where the exhaust duct does not discharge into a common exhaust plenum and one of the following:

(1) The exhaust fan runs continuously.

(2) The exhaust duct serves space(s) that are not mechanically heated or cooled.

(3) The space served is maintained at positive pressure.

Why It Changed

Makeup air and exhaust air ducts would not create a problem should they be allowed to penetrate other duct systems provided they are of the sealed type. In a simple approach, dryer exhaust are part of the environmental air covered in this application. To allow a lint laden dryer vent which is under positive pressure to run through another duct or plenum could allow the accumulation of lint in said duct or plenum thereby creating a potential for fire, or at best case, enhance or add to a potential fire.

The logic proffered to support motorized dampers can be of use in the proper application. "Stack effect" may or may not be present, and the ducts discussed are "Makeup and Exhaust-Air ducts and are generally under positive pressure. As such, should stack effect be present the positive pressure of the system, (fan intake or exhaust motor), will overcome such effect thereby requiring the need for a motorized damper. Furthermore, the use of a nonmotorized backdraft damper will serve the purpose of preventing backdraft into the duct, will work far more efficiently, **use less energy** and require little if any service. However, the use of either a back draft damper or a motorized damper should not adversely affect the proper functioning of the system.

With regard to ASHRAE 90.-2010, tall buildings are subject to far more infiltration due to high wind velocities.

What It Means To Me

The mechanical inspector will have the final say as to whether or not a sealed system should be allowed to penetrate another duct system. Since all jobs are different, the discretion of the inspector is paramount at the job site.

The installer will need to communicate with the local AHJ in advance of the install or show, on submitted plans, the need and logic of such installation. Should lack of communication prevail between the designer, installer and inspector, the job could be held up until the issue is later resolved.

As for the use of mechanical back draft dampers, the Inspector will again have the discretion to decide either in the field or at the plan review process as to the need for a motorized damper. Considerations should be the location, serviceability and type of system penetrated and type of duct inserted. Again, as stated above, communication is paramount.

The installer will have a duty to substantiate the use of such a system prior to install. Best case is to have the plan review process done early where possible. Should plan review not be required, a phone call to the AHJ prior to the install and/or inspection is appropriate.

Environmental Air Duct

504.4 Clothes Dryers

What Changed

504.4 Clothes Dryers. A clothes dryer exhaust duct shall not be connected to a vent connector, gas vent, chimney, and shall not terminate into a crawl space, attic, or other concealed space. Exhaust ducts shall not be assembled with screws or other fastening means that extend into the duct and that are capable of catching lint, and that reduce the efficiency of the exhaust system. Exhaust ducts shall be constructed of rigid metallic material. Transition ducts used to connect the dryer to the exhaust duct shall be listed for that application or installed in accordance with the clothes dryer manufacturer's installation instructions. ~~Moisture~~ Clothes dryer exhaust ducts shall terminate ~~on~~ to the outside of the building in accordance with Section 504.5 and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. ~~Ducts for exhausting clothes dryers shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the flow. Clothes dryer moisture exhaust ducts shall not be connected to a gas vent connector, gas vent, or chimney and shall serve clothes dryers. Clothes dryer moisture exhaust ducts under positive pressure shall not extend into or through ducts or plenums.~~ Devices, such as fire or smoke dampers, that will obstruct the flow of the exhaust shall not be used. Where joining of ducts, the male end shall be inserted in the direction of airflow.

Why It Changed

Section 905.4 was relocated to Section 504.4 where similar provisions are addressed for ease of use of the code. The text "Clothes dryer moisture exhaust ducts under positive pressure shall not extend into or through ducts or plenums" was deleted since it is already addressed in Section 504.1. For information purposes only, Section 504.1 indicates the following: Exhaust ducts under positive pressure shall not extend into or through ducts or plenums.

The term "moisture" was replaced with "clothes dryer" since a "moisture exhaust duct" is not defined in Chapter 2. A moisture exhaust duct is known throughout the industry as clothes dryer exhaust duct. The language "Devices, such as fire or smoke dampers, that will obstruct the flow of the exhaust shall not be used" was added since devices such as fire dampers, smoke dampers, can impede the flow within an exhaust duct.

Reference to Section 504.5 was added to direct the end user to the appropriate termination requirements.

Provisions for the joining of ducts was added to Section 503.3 to ensure that the male end is not inserted in a manner that will impede the flow since it can be a collection point for lint, and potentially result in a fire hazard or reduce the performance of the clothes dryer. The revision to Section 905.2 clarifies to the user where the exhaust provisions for clothes dryers are addressed.

What It Means To Me

This new code requirement clarifies the installation of dryer exhaust vents. The new section makes it clear that ducts shall be installed to minimize the collection of lint in the exhaust pipe by installing the pipe with the male end inserted in the direction of flow and no screws will be used on the pipe. Care must also be taken in the design of the build to insure that ducts will not penetrate walls that may require a fire damper. The intent of this section is to prevent the buildup of lint in the dryer duct that could eventually lead to a dryer fire. Installers and inspectors will need to ensure that this ductwork is installed in a manner to allow the free flow of air and any lint through the duct system.

504.4.2 Type I Clothes Dryers

What Changed

504.4.2 Domestic Clothes Dryers. Where a compartment or space for a ~~domestic~~ Type 1 clothes dryer is provided, not less than a 4 inch diameter (102 mm) ~~moisture~~ exhaust duct of approved material shall be installed in accordance with ~~this section and~~ Section 504.0.

~~Where a closet is designed for the installation of a clothes dryer, an opening of not less than 100 square inches (0.065 m^2) for makeup air shall be provided in the door or by other approved means.~~

~~**504.3.1.1 Domestic Dryer Vents.** Domestic~~ Type 1 clothes dryer ~~moisture~~ exhaust ducts shall be of rigid metal and shall have smooth interior surfaces. The diameter shall be not less than 4 inches nominal (100 mm) and the thickness shall be not less than 0.016 of an inch (0.406 mm).

~~**Exception:** Listed clothes dryer transition ducts not more than 6 feet (1829 mm) in length shall be permitted to be used in connection with domestic dryer exhausts. Flexible clothes dryer transition ducts shall not be concealed within construction.~~

504.4.2.1 Length Limitation. Unless otherwise permitted or required by the dryer manufacturer's instructions and approved by the Authority Having Jurisdiction, domestic dryer moisture exhaust ducts shall not exceed a total combined horizontal and vertical length of 14 feet (4267 mm), including two 90 degree (1.57 rad) elbows. A length of 2 feet (610 mm) shall be deducted for each 90 degree (1.57 rad) elbow in excess of two.

504.4.2.2 Transition Ducts. Listed clothes dryer transition ducts not more than 6 feet (1829 mm) in length shall be permitted to be used to connect the Type 1 dryer to the exhaust ducts. Transition ducts and flexible clothes dryer transition ducts shall not be concealed within construction, and shall be installed in accordance with the manufacturer's installation instructions.

Why It Changed

The term "domestic" was replaced with "Type 1" in Section 504.4.2 since Type 1 is the terminology used in the industry and throughout the code when referring to domestic clothes dryers. The term "moisture" was deleted in Section 504.4.2 since it is irrelevant language and does not add to the enforceability of the section.

In Section 504.4.2, the language "The diameter shall be not less than 4 inches nominal (102 mm) and the thickness shall be not less than 0.016 inch (0.406 mm)" was added for guidance to the user for correct sizing of clothes dryer exhaust ducts. The 4 inch nominal (102 mm) diameter and the 0.016 of an (0.406 mm) thickness requirements are the industry standard for sizing of clothes dryer exhaust ducts. The code currently provides thickness requirements.

What It Means To Me

These modifications align with industry terminology and reduce redundant and some irrelevant language, which should make understanding and applying these requirements a bit easier.

Inspectors will need to verify that the correct pipe sizing has been used in these installations as well as verifying that the appropriate materials are used. Since the intent of this section is to help prevent fires, failing to meet these requirements can lead to dryer failure or even dryer fires. It is for these reasons that installers will also have to do their part to ensure installations meet these requirements.

504.4.2.2 Transition Ducts

What Changed

504.4.2.2 Transition Ducts. Listed clothes dryer transition ducts not more than 6 feet (1829 mm) in length shall be permitted to be used to connect the domestic dryer to the exhaust ducts. Transition ducts and flexible clothes dryer transition ducts shall not be concealed within construction, and shall be installed in accordance with the manufacturer's installation instructions.

Why It Changed

In the previous edition, this requirement was listed in the exception to Section 504.3.1.1.Now it is a separate provision for Type I dryer exhausts. In addition to the previous language, transition ducts are to be installed in accordance with the manufacturer's installation instructions to ensure that the requirements of the listing are met.

What It Means To Me

Transitions of ducting found in commercial kitchen hoods references the size and shape that the duct may have to go through (within the first three feet).

Transition ducting in this section refers to the transition from the dryer to the exhaust ducting. Ducting may be enclosed within building construction but the transition cannot. It is not necessarily a shape change, just a material change that is allowed within the first 6 (six) feet and not enclosed within the building construction. This transition is allowed to change from the smooth and metal exhaust ducting to something that is flexible or otherwise listed to provide this function for the dryer. This allows the dryer to be moved when necessary for cleaning and repair. Consult the listed installation instructions for both the dryer and any transition ducting being provided. These instructions will specify clearance, distances, minimum radius, frequency of inspection, and other important facts necessary to reduce any hazardous operation.

UL 2158A is a listing standard for dryer transition ducts, however this standard allows the length to be a total of 8 (eight) feet in length. This conflicts with the length allowed by the UMC. Section 101.3.1 requires that the code length of 6 (six) feet be applied in jurisdictions adopting this code.

Image Courtesy of Dundas Jafine

504.4.5 Duct Supports

What Changed

504.4.5 Duct Supports. Ducts shall be supported in accordance with SMACNA HVAC Duct Construction Standard – Metal and Flexible.

Why It Changed

Some clothes dryer exhaust duct systems are lengthy and subject to sagging or stress. Supports should be constructed of non-combustible materials and installed in accordance with related SMACNA tables and standards. The proper installation and support of dryer exhaust ducts is essential to proper air flow (affects appliance operation, efficiency and maintenance) and the prevention of fire hazards.

According to the U.S. Consumer Product Safety Commission, more than 15,000 fires are sparked every year by clothes dryers. Lint and other debris can build up in your dryer vent, reducing air flow to the dryer, backing up dryer exhaust gases, creating a fire hazard. The new language will provide support requirements for clothes dryer exhaust ducts which are currently not addressed in the code.

What It Means To Me

Inspectors should verify the installations of dryer ducts are supported in a manner that will prevent drooping, kinking or strains on connections. Individuals installing dryer ducts should be qualified to do so. Installers should be familiar with the requirements of the local codes and should follow all manufacturer installation instructions.

Non-compliant installations have the potential to cause fires by allowing the unwanted buildup of combustible materials within the exhaust duct and appliance. These installations also reduce the energy efficiency of the appliance, costing owners additional dollars through higher utility bills and increased maintenance.

508.1 Where Required

What Changed

508.1 Where Required. Type I hoods shall be installed at or above commercial-type deep-fat fryers, broilers, fry grills, steam-jacketed kettles, hot-top ranges, ovens, barbecues, rotisseries, dishwashing machines, and similar equipment that ~~produces~~ emits comparable amounts of smoke or grease in a food-processing establishment. For the purpose of this section, a food-processing establishment shall include a building or portion thereof used for the processing of food, but shall not include a dwelling unit. Type II hoods shall be installed above equipment and dishwashers that generate steam, heat, and products of combustion, and where grease or smoke is not present.

Exceptions:

(1) Cooking appliance that ~~has been listed in accordance with EPA 202~~ is in accordance with UL 710B for reduced emissions where the grease discharge does not exceed 2.9 E-09 ounces per cubic inch (oz/in^3) (5.0 E-06 kg/m^3) where operated with a total airflow of 500 cubic feet per minute (cfm) (0.236 m^3/s).

(2) (text unchanged)

(3) Dishwashing machines connected to a Type II duct system and exhausted directly to theoutdoors.

(4) Dishwashing machines with a self-contained condensing system listed in accordance with UL 921 and installed in a space where the HVAC system has been engineered to accommodate the latent and sensible heat load emitted from such appliances as approved by the Authority Having Jurisdiction. Such equipment shall be provided with an interlocking device to prevent premature opening of the appliance prior to completion of its cycle.

Why It Changed

EPA 202 is being deleted from the UMC as it is a government regulation and not a standard as defined in IAPMO's Regulations Governing Committee Projects. Section 508.1 was modified to include UL 710B as it is the applicable standard approved for use within this section, and is referenced in Table 1701.0.

The production of smoke and grease vapors do not comprise the hazard to which the code seeks intervention remedy. Rather, it is the **emission** of smoke and grease vapors beyond 5 mg/m3 of condensable particulates at a nominal exhaust rate of 500CFM, pursuant to EPA 202 as referenced in Chapter 13 of NFPA 96, that drive the requirement for a Type I exhaust system and when a Type I hood is required.

Recirculating hood systems capture and contain whatever effluent a cooking process emits, and then it filters process emissions to ensure that what is emitted via recirculation into the space from the discharge of the recirculating system, is an emission effluent concentration less than the threshold limit value (TLV) for condensable particulates as established in NFPA 96 Chapter 13. The ANSI performance certification test for compliance with NFPA 96 Ch 13 criteria is ANSI UL 710B.

In a similar manner, appliances with integral grease emission limiting devices (eg., integral catalytic combustion chambers) are proven to emit condensable particulates at rates less than the TLV established in NFPA 96 and accordingly, do not fall within the scope of processes where a Type I hood is required. UL KNLZ equipment may produce smoke and grease vapors internally, but those condensable particulates are converted to carbon dioxide (CO2) and water (H2O) in their integral catalytic combustion chambers and PASS to the UL KNLZ PROVES beyond a reasonable doubt that their emissions are less than the NFPA 96 TLV. The amount of water vapor emitted per cycle in less than a gram, roughly 1/8 of that of brewing a single pot of coffee.

What It Means To Me

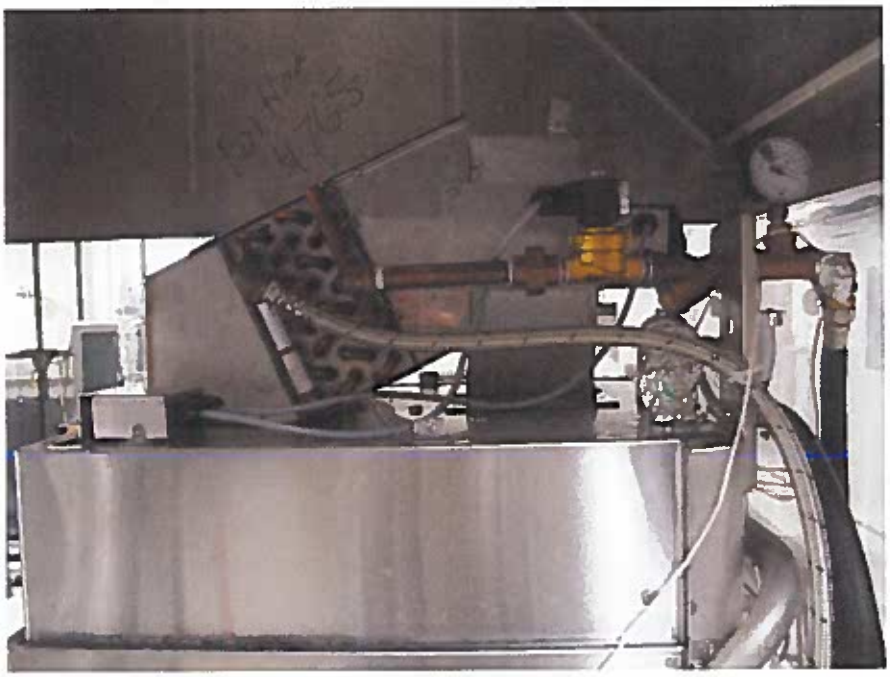
This change leads the way to a fair treatment of newer equipment when compared to more traditional cooking and dishwashing equipment. The correction of the standard (UL 710B) is necessary to this fair treatment. It is only the emission of grease, smoke, heat and steam beyond the value where these emissions can create a hazard that need to be mitigated by an exhaust system. Watch for cooking equipment that is listed to be installed without a separate hood and ventilation system.

Exceptions 3 and 4 deal with dishwashers that can be installed without a hood and/or duct system. Condensing appliances have become more commonly used in multiple applications.
This technology is being introduced into commercial dishwashing. The appliance uses an additional ¾ gallon of cool water and its plumbing drain to discharge condensed water rather than emitting water vapor into the scullery. That process takes a little extra time, therefore the interlock is required to complete the cycle. Studies were sponsored by Pacific Gas and Electric to evaluate if the long term costs of kitchen ventilation (including dishwashing) could be reduced without major increases in installation costs.

A food-processing establishment includes a building or portion thereof used for the processing of food except for a dwelling unit or its kitchen. In general, a Type I hood should be required over grease or smoke-producing commercial-type cooking equipment, such as deep fat fryers, broilers, grills, hot-top ranges, ovens, barbeques, rotisseries, etc., installed in commercial businesses.

Type II hoods should be required over other cooking equipment producing steam, heat, vapors or odors, such as bakery ovens, steam tables, coffee urns, dishwashers, etc. When a residential-type cooking range is installed in locations other than commercial businesses, a Type II hood may be allowed with prior approval from the AHJ. However, when commercial-type cooking equipment is installed in these types of occupancies, the issue is not quite so clear cut, since these occupancies are not usually considered "businesses engaged in processing food." Intensity of use and types of cooking appliances should be a consideration at the time of plan review, and a determination of hood types should be made at that time.

This section also requires that Type II hoods be installed over commercial dishwashing machines, regardless of rinsing temperature. The amount of water vapor released by a tray of drying dishes is exactly the same whether they have been processed in a high- or low-temperature dishwasher. The total amount of moisture released into the air will be the same for the same wetted area of the dishes. When the dishes are hot, the water vapor is not so readily seen, but it is nonetheless being released into the air.



Close-up View of Condensing Unit
Image Courtesy of Food Service Technology Center

508.10.1.1 Capacity of Hoods

What Changed

508.910.1.1 Capacity of Hoods. Canopy-type commercial cooking hoods shall exhaust through the hood with a quantity of air not less than determined by the application ~~of the following formulas.~~ in accordance with Section 508.10.1.2 through Section 508.10.1.6. The exhaust quantity shall be the net exhaust from the hood determined in accordance with Equation 508.10.1.1. The duty level for the hood shall be the duty level of the appliance that has the highest (heaviest) duty level of appliances installed underneath the hood.

Exception: Listed exhaust hoods installed in accordance with the manufacturer's installation instructions.

$$E_{NET} = E_{HOOD} - MA_{ID} \qquad \text{(Equation 508.10.1.1)}$$

Where:

E_{NET} = net hood exhaust,
E_{HOOD} = total hood exhaust,
MA_{ID} = makeup air, internal discharge.

508.4.1.2 Extra-Heavy-Duty Cooking Appliances. The minimum net airflow for hoods used for solid fuel cooking appliances such as charcoal, briquette, and mesquite to provide the heat source for cooking shall be in accordance with Table 508.10.1.2.

TABLE 508.10.1.2
EXTRA-HEAVY-DUTY COOKING APPLIANCE AIRFLOW

TYPE OF HOOD	AIRFLOW (CUBIC FOOT PER MINUTE PER LINEAR FOOT OF HOOD)
Backshelf/pass-over	Not permitted
Double island canopy (per side)	550
Eyebrow	Not permitted
Single island canopy	700
Wall-mounted canopy	550

For SI units: 1 cubic foot per minute = 0.00047 m^3/s, 1 foot = 25.4 mm

508.4.1.3 Heavy-Duty Cooking Appliances. The minimum net airflow for hoods used for cooking appliances such as gas under-fired broilers, gas chain (conveyor) broilers, electric and gas wok ranges, and electric and gas over-fired (upright) broilers shall be in accordance with Table 508.10.1.3.

TABLE 508.10.1.3
HEAVY-DUTY COOKING APPLIANCE AIRFLOW

TYPE OF HOOD	AIRFLOW (CUBIC FOOT PER MINUTE PER LINEAR FOOT OF HOOD)
Backshelf/pass-over	400
Double island canopy (per side)	400
Eyebrow	Not permitted
Single island canopy	600
Wall-mounted canopy	400

For SI units: 1 cubic foot per minute = 0.00047 m^3/s, 1 foot = 25.4 mm

508.4.1.4 Medium-Duty Cooking Appliances. The minimum net airflow for hoods used for cooking appliances such as electric and gas hot-top ranges, gas open-burner ranges (with or without oven), electric and gas flat griddles, electric and gas double sided griddles, electric and gas fryers (including open deep fat fryers, donut fryers, kettle fryers, and pressure fryers), and electric and gas conveyor pizza ovens shall be in accordance with Table 508.4.1.4.

TABLE 508.4.1.4
MEDIUM-DUTY COOKING APPLIANCE AIRFLOW

TYPE OF HOOD	AIRFLOW (CUBIC FOOT PER MINUTE PER LINEAR FOOT OF HOOD)
Backshelf/pass-over	300
Double island canopy (per side)	300
Eyebrow	250
Single island canopy	500
Wall-mounted canopy	300

For SI units: 1 cubic foot per minute = 0.00047 m^3/s, 1 foot = 25.4 mm

508.4.1.5 Light-Duty Cooking Appliances. The minimum net airflow for hoods used for cooking appliances such as gas and electric ovens (including standard, bake, roasting, revolving, retherm, convection, combination convection/steamer, rotisserie, countertop conveyorized baking/finishing, deck, and pastry), discrete element ranges (with or without oven), electric and gas steam-jacketed kettles less than 20 gallons (76 L), electric and gas pasta cookers, electric and gas compartment steamers (both pressure and atmospheric), electric and gas cheesemelters, electric and gas tilting skillets (braising pans) electric and gas rotisseries, and electric and gas salamanders shall be in accordance with Table 508.4.1.5.

TABLE 508.4.1.5
LIGHT-DUTY COOKING APPLIANCE AIRFLOW

TYPE OF HOOD	AIRFLOW (CUBIC FOOT PER MINUTE PER LINEAR FOOT OF HOOD)
Backshelf/pass-over	250
Double island canopy (per side)	250
Eyebrow	250
Single island canopy	400
Wall-mounted canopy	250

For SI units: 1 cubic foot per minute = 0.00047 m^3/s, 1 foot = 25.4 mm

508.4.1.6 Dishwashing Appliances. The net airflow for Type II hoods used for dishwashing equipment shall be not less than 200 cubic feet per minute (0.094 m^3/s) per linear foot (m) of hood length.

Why It Changed

Commercial kitchen hood exhaust airflow rates are mainly determined by the effluent and thermal plume generated by the cooking process. Recent ASHRAE research reports (e.g., RP-1202 Effect of Appliance Diversity and Position on Commercial Kitchen Hood Performance, RP-1362 Revised Heat Gain and Capture and Containment Exhaust Rates from Typical Commercial Cooking Appliances, RP-1480 Island Hood Energy Consumption and Energy Consumption Strategies, etc.)

has found that other factors affect hood performance. They include the introduction of makeup air, appliance positioning under the hood, and the style and size of hood. An increased depth of a hood (front-to-back) has a very beneficial effect on hood performance.

If the appliance line is positioned against the wall of a 4 foot deep or 5 foot deep wall-mounted canopy hood, research has found that the capture and containment rate of the 5 foot deep hood will be approximately 40% less than the 4 foot deep canopy hood. The extra foot of hood front overhang allows the thermal plume to be exhausted more efficiently by allowing it to recirculate and not escape from the front of the hood. In result, the threshold of capture and containment is less than that for larger hoods with more front overhang. The previous formulas in the 2012 Section 508.9.1.1 do not allow for the benefit of increased hood depth. In fact, it penalizes the best-practice design by requiring more airflow for a larger hood by increasing the airflow requirement through Q = CA or Q = PD formulas.

These changes calculate exhaust airflow rate based on cubic foot per minute per linear foot of hood basis and do not penalize larger depths of hoods. It encourages greater hood front overhang that enhances hood performance. Furthermore, the proposal also adds a reference to Type II hoods which is consistent with ASHRAE 154. These airflow calculations have existed in other model codes and design guides for over a decade.

The exception in the 2012 Section 508.4.1.5 (Medium to Low Temperature Appliances) is being relocated to Section 508.10.1.1 since it applies to the capacity of all hoods.

What It Means To Me

Keep in mind that this section only applies to non-listed hoods or hoods that have been modified beyond their listing. However, the changes shown reflect years of study and testing. They may lead the way in changes that can affect listed hoods and efficient design and operation.

The code change language also speaks to compensating or make-up air hoods. Though, with the inclusion of equation 508.10.1.1, it can be confusing The only identifying mark is (MA_{ID} = makeup air, internal discharge). This is what defines a compensating/makeup air hood, but it could be easily missed. The equation comes directly from the Research Reports referenced.

The ASHRAE Research Reports referenced above shows extensive tests for ways of increasing hood performance without increase costs for air movement. The design used should keep in mind the long range costs for horsepower to move the air as well as any costs to condition the temperature of replacement or make-up air. The design needs to optimize the capture and containment of the plume being created by the commercial food cooking equipment. This plume can include heat, moisture, cooking odors and products of combustion.

508.10.2 Noncanopy-Type Hoods

What Changed

508.10.2 Noncanopy-Type Hoods. Noncanopy-type commercial cooking hoods shall be installed and sized in accordance with the manufacturer's installation instructions, and Section 508.4.2.1 and Section 508.4.2.2.
Exception: Listed hood assemblies designed and installed specifically for the intended use.

508.10.2.1 Installation. Noncanopy-type commercial cooking hoods shall be installed with the edge of the hood shall be set back not more than 1 foot (305 mm) from the edge of the cooking surface and the vertical distance between the lip of the hood and the cooking surface shall not exceed 3 feet (914 mm).

508.10.2.2 Capacity ~~for Noncanopy Hoods~~. In addition to other requirements for hoods specified in this section, the volume of air exhausting through a noncanopy-type hood to the duct system shall be not less than 300 cubic feet per minute per lineal foot [$(ft^3/min)/ft$)] [0.464 $(m^3/s)/m$] of cooking equipment. Listed noncanopy exhaust hoods and filters shall be sized and installed in accordance with the terms of their listing and the manufacturer's installation instructions.
~~**Exception:** Listed hood assemblies designed and installed specifically for the intended use.~~

Why It Changed

The code previously only addressed size and locations for canopy-type hoods but not for noncanopy-type hoods. The new language will provide installers and the AHJ the necessary provisions for installing noncanopy-type hoods. The 1 foot and 3 feet required distances are based on industry standards for the installation of noncanopy hoods.

What It Means To Me

This new language will give the code user the basic requirements to install noncanopy hoods and the location of the equipment under them. Installation instructions will need to be available to the inspector to verify that all clearances are followed.

508.10.3 Labeling

What Changed

508.10.3 Labeling. Type I hoods shall bear a label indicating the exhaust flow rate in cubic feet per minute per lineal foot [$(m^3/s)/m$].

Why It Changed

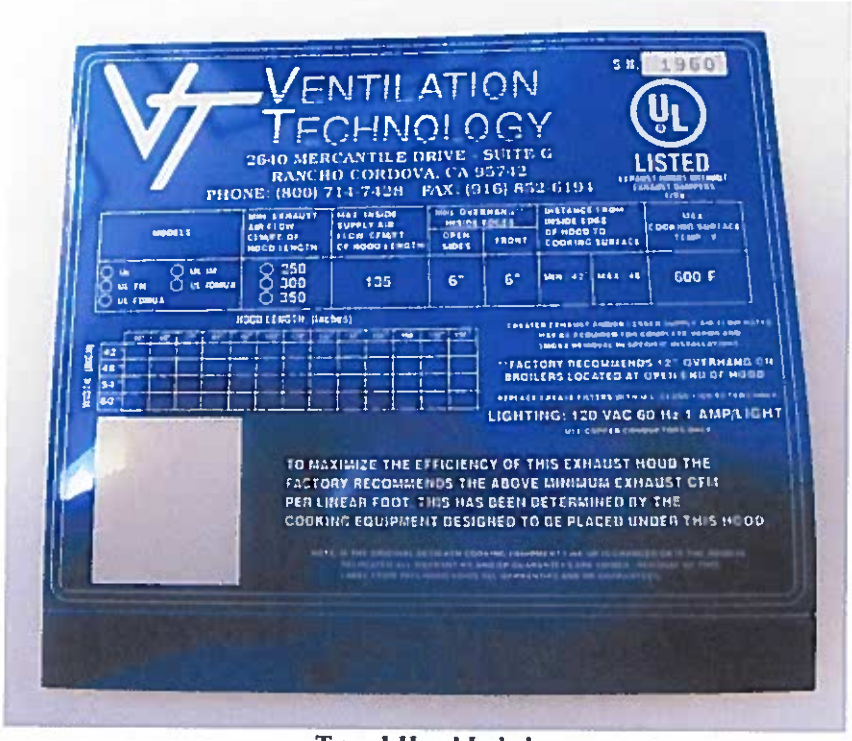
This section requires that all Type I hoods bear a label indicating the capacity. Hoods are designed in accordance with the appliance in which they are installed. The addition of a label will ensure, if the existing appliance is replaced, that the hood is of sufficient capacity to handle the exhaust of the replacement appliance.

What It Means To Me

This is a new requirement for manufacturers to include in their listing. Changes to section 508. 10.1.1 make it necessary to list minimum CFM per lineal foot of type I hoods. The hood itself does not provide the actual airflow. The performance of the exhaust fan and ducting connected have always been required to provide airflow sufficient enough to meet the minimum specified on the listing of the hood.

Airflow that is less than what the minimum specified by this section of the code may not achieve the capture and containment of the effluent produced by the cooking equipment. This could cause a buildup of grease on kitchen surfaces and cause a rise in both temperature and humidity within the kitchen.

With the CFM per foot of hood clearly demonstrated on the hood, subsequent appliance changes will be easy to verify that enough airflow exists for new appliances. Also note that no cooking appliance may be moved or changed without a permit and review that verifies the correct location and type of fire suppression and meets the approval of the local Health Authority.



Type I Hood Label
Image Courtesy of Ventilation Technology

What Changed

509.1 Grease Removal Devices. Listed grease filters, ~~baffles,~~ or other ~~approved~~ listed grease removal devices intended for use with commercial cooking ~~equipment~~ operations shall be provided. Listed grease filters and grease removal devices that are removable, but not an integral component of a specific listed exhaust hood, shall be tested in accordance with UL 1046.

509.1.1 Grease Filters-Mesh Type. 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. [NFPA 96:6.1.3]

Why It Changed

This section was modified for the consistency of terms and assurance of listed products rather than interpretive analysis by inspectors regarding "approved". This code revision will prevent components from being installed without some acceptable form of listing presented to the AHJ. Furthermore, the issue of consistency, which is omnipresent, should be a goal which is of paramount importance throughout the codification process.

What It Means To Me

The opening statement of the section offers that the Hoods are "listed". This is only the case where an installer installs a "Listed Hood Assembly". There are many times when hoods are fabricated in a shop as non-listed hoods and installed with grease removal devices which are listed. For the installer, consistency of terms will greatly simplify selection of pertinent and "listed" devices. As for the Inspector the extent of random code interpretations regarding interpretation of the word "approved" will be removed, thereby causing less confusion through the inspection process.

Exhaust System Grease Filters

510.5.6 Duct Leakage Test

What Changed

510.5.6 Duct Leakage Test. Prior to the use of or concealment of a grease duct system, a leakage test shall be performed to determine that welded joints and seams are liquid tight. The leakage test shall consist of a light test, water pressure test, or an approved equivalent test. The permit holder shall be responsible for providing the necessary equipment and for performing the test. Such test shall be conducted in accordance with ASHRAE 154.

Why It Changed

This section was added to provide users with approved testing options to test for duct leakage. To do so, users are referred to ASHRAE 154.

What It Means To Me

Any ductwork that will be considered to be concealed, i.e. limited access, after installation, must be tested after installation. At a minimum, an internal light test should be conducted to confirm tightness of welds.

Inspectors should verify the installations of grease ducts assembled with welded joints are leak tight prior to being concealed within walls or areas that are intended to be inaccessible. Individuals installing welded seam grease ducts should be qualified to do so. Installers should be familiar with the requirements of the local codes and should, at a minimum, perform an internal light test of the welded area to confirm tightness of welds. Non-compliant installations have the potential to cause fires by allowing the unwanted buildup of combustible materials within the concealed space.

To be in accordance with ASHRAE 154, a light, air, or water test shall be performed on grease ducts to ensure liquid tight seal.

A light test shall consist of passing a minimum 100W lamp through the entire section of ductwork. The lamp shall be open and light shall be emitted equally in all directions perpendicular to the interior duct walls. No light shall be visible from the exterior.

When performing the air test the duct shall be pressurized with 1-inch WC for 20 minutes and hold the initial set pressure.

When performing a water test, a pressure washer operating at a minimum 1500psi shall be used to simulate duct cleaning. No water shall be visible on the exterior surface during the test.

511.2.2 Exhaust-Air Volumes

What Changed

511.2.2 Exhaust-Air Volumes. Exhaust air volumes for hoods shall be of sufficient level to provide for capture and removal of grease-laden cooking vapors. Test data, performance tests approved by the Authority Having Jurisdiction, or both, shall be provided, displayed, or both, upon request. ~~**Exception:**~~ Lower exhaust air volumes shall be permitted during no-load and partial load cooking conditions, provided they are sufficient to capture and remove flue gases and ~~residual vapors~~ cooking effluent from cooking equipment. ~~[NFPA 96:8.2.2]~~

Why It Changed

The revisions to Section 511.2.2 are based on the requirement in ASHRAE 154, Ventilation for Commercial Cooking Operations, when the demand-control ventilation is used. Also, the revised text is consistent with that used in the commercial kitchen ventilation industry and in ASHRAE 154.

What It Means To Me

When demand control grease duct exhaust is approved, replacement air shall be automatically controlled by variable-speed fans, dampers, or equivalent controls to ensure the proper air balance of the building. Prior to approval, the AHJ would review the design plans for a facility with a commercial kitchen ventilation system, which would typically include a table or diagram indicating the design outdoor air balance over the full range of anticipated airflow. The total replacement airflow rate would need to equal the total exhaust airflow rate plus the net exfiltration. It could be permissible to supply replacement air to the kitchen space by using transfer air from areas other than the kitchen.

This section provides installers options and direction for sizing hood exhaust and balancing allowing lower exhaust air volumes to be used during no-load and partial load cooking conditions. Installers should provide testing and engineering for compliance with the code to ensure all products are properly exhausted.

The Inspector should witness testing for capture and containment of the materials to be exhausted. Failing to meet the requirements of this section can lead to condensations that can drip back onto foods being prepared and cause the buildup of grease and other vapor laded materials resulting in a fire hazard.

Designers and operators should consider the effect of the multiple pilot lights and grease vapors emitted from cooking equipment during long periods of non-use or occasional use and adjust ventilation timing or equipment types to compensate.

Example of Hood Exhaust

511.3 Makeup Air

What Changed

511.3 ~~Replacement~~ Makeup Air. ~~Replacement~~ Makeup air quantity shall be sufficient to prevent negative pressures in the commercial cooking area(s) from exceeding 0.02 inch water column (0.005 kPa). Where the fire-extinguishing system activates, makeup air supplied internally to a hood shall be shut off.

~~**Exception:** Compensating hoods shall meet the airflow requirements specified in Section 508.4.1.3 through Section 508.4.1.5. Compensating hoods shall extract not less than 20 percent of their required exhaust airflow from the kitchen area.~~ For compensating hoods, where a Type I or Type II hood has an internal discharge of makeup air, the makeup air flow shall not exceed 10 percent of the exhaust airflow, the exhaust airflow shall be the net exhaust from the hood in accordance with Section 508.10.1.2 through Section 508.10.1.5. The total hood exhaust shall be determined in accordance with Equation 511.3.

$$E_{NET} = E_{HOOD} - MA_{ID} \qquad \text{(Equation 511.3)}$$

Where:

E_{NET} = net hood exhaust

E_{HOOD} = total hood exhaust

MA_{ID} = makeup air, internal discharge

Why It Changed

Industry research has shown that internal makeup air amounts greater than 10 percent prevent the hood from capturing and containing the cooking effluent and thermal plume from the appliance. The compensating hood requirements are consistent with the requirements in ASHRAE Standard 154-2011.

What It Means To Me

It is essential to have compensating hoods, where a Type I or Type II hood has an internal discharge of makeup air designed, sized and balanced to ensure the proper pressures are maintained over the lifetime of the system.

Inspectors should verify the installations of compensating hoods have been installed in compliance with local code requirements and manufacturer's instructions in regards to percentage of internal make up air being provided to the hood to maintain proper pressures. Individuals installing compensating hoods should be qualified to do so. Installers should be familiar with the requirements of the local codes and should verify the percentage of internal make air that is being provided to the hood complies with local codes and the manufactures installation instructions.

Compensating hoods that are not installed, balanced and maintained to the proper percentage of internal make up air may not capture the heat and fumes that were intended to be removed by the hoods exhaust system, thus causing problems with higher building loads and unwanted fumes.

What Changed

518.0 Down Draft Appliances.

518.1 General. A down draft appliance ventilation system containing, or for use with appliances used in processes that produce, smoke or grease-laden vapors shall be equipped with components that are in accordance with the following:
(1) The clearance requirements in accordance with Section 507.3.
(2) The primary collection means designed for collecting cooking vapors and residues in accordance with the requirements of Section 508.0.
(3) Grease removal devices that comply with Section 509.0.
(4) Special-purpose filters as listed in accordance with UL 1046.
(5) Exhaust ducts that comply with Section 510.0.
(6) The air movement requirements in accordance with Section 511.2.1 and Section 511.2.2.
(7) Auxiliary equipment (such as particulate and odor removal devices) are in accordance with Section 512.0.
(8) Fire-extinguishing equipment that is in accordance with the requirements of Section 513.0, and as specified in Section 518.3.
(9) The use and maintenance requirements in accordance with Section 514.0.
(10) The minimum safety requirements in accordance with Section 515.0. [NFPA 96:15.1.1]

518.2 Ventilation System. The ventilation system for a down draft appliance shall be capable of capturing and containing the effluent discharge from the appliance(s) it is serving. [NFPA 96:15.1.2]

518.3 Fire-Extinguishing Equipment. Fire-extinguishing equipment for a down draft appliance ventilation system shall comply with the following:
(1) Cooking surface, duct, and plenum protection shall be provided.
(2) Not less than one fusible link or heat detector shall be installed within the exhaust duct opening in accordance with the manufacturer's listing.
(3) A fusible link or heat detector shall be installed above the protected cooking appliance and in accordance with the extinguishing system manufacturer's listing.
(4) A manual activation device shall be installed as part of the appliance at a height approved by the Authority Having Jurisdiction.
(5) Portable fire extinguishers shall be installed in accordance with Section 513.11. [NFPA 96:15.2]

518.3.1 Integral Fire-Extinguishing System. A listed down draft appliance ventilation system employing an integral fire-extinguishing system including detection systems that has been evaluated for grease and smoke capture, fire extinguishing, and detection shall be considered to be in accordance with Section 518.2. [NFPA 96:15.2.1]

518.3.2 Interlocks. The down draft appliance ventilation system shall be provided with interlocks such that the cooking fuel supply will not be activated unless the exhaust and supply air system have been activated. [NFPA 96:15.2.2]

518.4 Airflow Switch or Transducer. An airflow switch or transducer shall be installed after the last filter component to ensure that a minimum airflow is maintained. [NFPA 96:15.3.1]

518.4.1 Interlocks. The airflow switch or transducer shall open the interlock circuit where the airflow is less than 25 percent the system's normal operating flow or less than 10 percent its listed minimum rating, whichever is less. [NFPA 96:15.3.2]

518.4.2 Manual Reset. The airflow switch or transducer shall be a manual reset device or circuit. [NFPA 96:15.3.3]

518.0 Down Draft Appliances (continued)

518.5 Surface Materials. Surfaces located directly above the cooking appliance shall be of noncombustible or limited-combustible materials. [NFPA 96:15.4]

Why It Changed

The commercial cooking industry is using more "Down Draft" type appliances. Therefore, the code has moved in a direction driven by the industry. These changes to the code are based on the requirements of NFPA and bring the current Uniform Mechanical Code into sync with the latest version of NFPA 96:15.1.2.

Inclusion of the new and language is extremely important as an effort to bring the UMC into the realm of new equipment and its installation. Section 518.1 identifies the type of equipment codified, section 518.2 (1) through (5) handles fire suppression characteristic as necessary, as do sections 518.2.1 through 518.2.2. Sections 518.2.2 through 518.4 detail manufacturing and safe operating requirements for operation of the equipment.

What It Means To Me

Installers now have a codified reference to assist them during the installation of down draft appliances, thereby removing any guess work as to proper installation.

The inspector has a lot to consider with this new sections and must be aware of all of these requirements while inspecting these systems. However, most of the concepts contained in this section are also required in other installations which should make this new language less intimidating.

Product manufacturers also now have a codified set of standards to which said appliance can be manufactured for sale in the states using the UMC.

What Changed

603.12 **Underground Installation.** Ducts installed underground shall be approved for the installation and shall have a slope of not less 1/8 inch per foot (10.4 mm/m). Ducts, plenums, and fittings shall be permitted to be constructed of concrete, clay, or ceramics where installed in the ground or in a concrete slab, provided the joints are tightly sealed. Metal ducts where installed in or under a concrete slab shall be encased in not less than 2 inches (51 mm) of concrete.

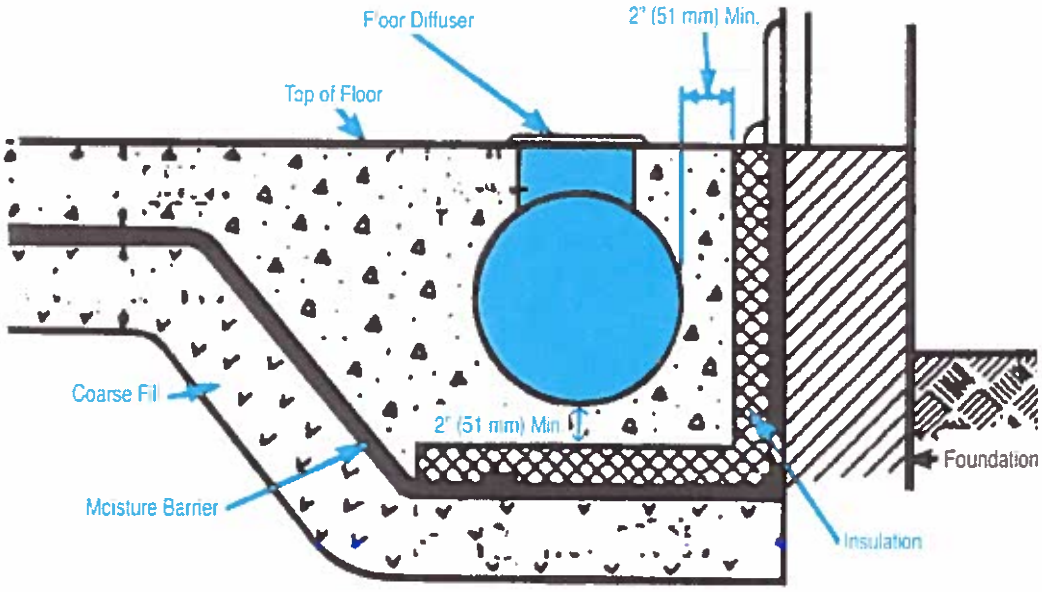
Why It Changed

Language pertaining to underground installations in Section 602.1 and Section 603.2 are being relocated to new Section 603.12 for ease of use of the code. The code previously addressed provisions for underground installations, but such provisions are scattered throughout the chapter which makes it difficult for the end user to locate. Underground ducts must be sloped to drain to an accessible point in the event that water enters the duct through the openings. Furthermore, the slope requirement is consistent with the requirement of SMACNA HVAC Duct Construction Standards.

What It Means To Me

Engineers, designers, inspectors and installers must make sure mechanical plans clearly state installed underground ducts have a slope not less than 1 /8" per foot grade and drain to an accessible point in the event that water enters the duct through the openings. In the field, the inspector will be required to verify that this slope is actually being met.

This requirement is primarily intended to prevent moisture from the ground or moisture from the concrete from entering the duct system. Also, in an effort to control moisture, installers and inspectors should also remember that ducts are required to tightly sealed as defined in Section 603.10. Failure to meet the requirements of this section can potentially lead to corrosion, depending on the materials used, but the larger threat is the development of mold within the ducts.



Detail of Embedded Duct

603.8 Support of Ducts

What Changed

603.8 Support of Ducts. Installers shall provide the manufacturer's field fabrication and installation instructions. ~~In the absence of specific supporting materials and spacing, approved~~

~~f~~Factory-made air ducts that are in accordance with UL 181 shall be ~~permitted to be installed~~ supported in accordance with the manufacturer's installation instructions. Other ducts shall comply ~~in accordance~~ with SMACNA HVAC Duct Construction Standards - Metal and Flexible.

Why It Changed

This section provides requirements for the support of flexible air ducts. The manufacturer's installation instructions must be provided at the time of inspection. For all other duct systems, the SMACNA HVAC Duct Construction Standards - Metal and Flexible would be the guide as a referenced standard.

This modification brings the manufacturer's installation requirements into play during the hanging and general installation of factory made ducts. As is often the case, inspectors must rely on the product manufacturer for the required installation procedure of products in question. As a fallback position, the installer will know he/she is to install, as a minimum standard, to SMACNA specification.

What It Means To Me

The manufacture's installation instructions should be provided at the time of inspection for all factory-made air ducts. For all other duct systems the SMACNA HVAC Duct Construction Standards - Metal and Flexible is the referenced standard for support requirements.

The installer will be able to rely on the manufacturer or SMACNA for concise details on the hanging/strapping of that particular product.

Inspectors will have the benefit of referencing the manufacturer's installation information for the exact manner/fashion which that manufacturer requires their product to be installed. The inspector will also be able to reference SMACNA's requirement as a default in the absence of Manufacturer's Installation Requirements. Thereby making his/her job objective rather than subjective.

802.6.3.2 Vent Offsets

What Changed

~~802.6.1 Installation~~ 802.6.3.2 Vent Offsets. Type B or Type L vents shall extend in a vertical direction with offsets not exceeding 45 degrees (0.79 rad), except that a vent system having not more than one 60 degree (1.05 rad) offset shall be permitted. An angle greater than 45 degrees (0.79 rad) from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft hood-equipped appliances shall not exceed 75 percent of the vertical height of the vent. [NFPA 54:12.7.3.2]

~~Vents serving fan-assisted combustion system appliances, or combinations of fan-assisted combustion system and draft hood-equipped appliances, shall be sized in accordance with Section 803.0 or other approved engineering methods. [NFPA 54:12.7.3.1(2)]~~

Why It Changed

This section changed the heading to correlate with the NFPA update, which better describes the content of the provision. The deleted portion was redundant to Section 802.6.3.1(2).

What It Means To Me

Close study of the difference between "vent offset" and "802.10.6 vent connector slope" is key to understanding the relationship of these offsets. Per 802.10.10, vent connectors are required to be "readily accessible for inspection, cleaning and replacement." This does not allow the vent connector to be enclosed within building construction such as a vent is allowed to be.

- Vent connectors may slope at a minimum ¼" per foot.
- Vent offsets may not be more 45 degrees, except that one offset may be up to 60 degrees from vertical.

Both types of vent or connector are limited in individual and total offset. Venting systems rely on the higher temperature of the flue gases to cause a positive flow to the exterior of the building. It is therefore essential to limit the degree of the offset and the length of the offset to maintain the temperature difference.

Installers are responsible for knowing the difference between a vent and a vent connector. Then they will be able to correctly apply the limitations of the slopes and offsets specific to each section.

The overall effort is to provide an appliance vent that will carry the products of combustion to the exterior of the building. Failing to meet the limitation requirements of slopes and offsets will cause the temperatures to drop within the vent to the point where condensation could affect the longevity of the material. Natural draft appliances could spill products of combustion out of the draft hood if the gravity lift (dependent on maintaining the flue gas temperature) is not maintained.

Inspectors need to verify the overall offsets and slopes have not been exceeded.

Slope of vent connector may be reduced to 1/4" per foot.

701.5 Indoor Opening Size and Location

What Changed

701.5 Indoor Opening Size and Location. Openings used to connect indoor spaces shall be sized and located in accordance with the following:

(1) ~~Combining spaces on the same story.~~ Each opening shall have a free area of not less than 1 square inch per 1000 Btu/h (0.002 m^2/kW) of the total input rating of appliances in the space, but not less than 100 square inches (0.065 m^2). One opening shall commence within 12 inches (305 mm) of the top of the enclosure, and one opening shall commence within 12 inches (305 mm) of the bottom, of the enclosure (See Figure 701.5). The dimension of air openings shall be not less than 3 inches (76 mm).

(2) ~~Combining spaces in different stories.~~ The volumes of spaces in different stories shall be considered as communicating spaces where such spaces are connected by one or more openings in doors or floors having a total free area of not less than 2 square inches per 1000 Btu/h (0.004 m^2/kw) of total input rating of appliances. [NFPA 54:9.3.2.3]

Why It Changed

Bringing Section 701.5 of the 2015 UMC into line with the NFPA is noteworthy. However, most contractors may not be aware of the subtle differences between combining spaces on the "same story" and combining spaces in "different stories" and the air flow characteristics specific to each.

What It Means To Me

This section provides consistency with NFPA which makes it easier for the installer to comply with requirements that could seem to conflict. Inspectors will need to have access to NFPA in order to better understand the requirements. It is extremely important that inspectors and installers have the necessary references to avoid confusion. Without a copy of the NFPA document, this could lead to confusion for both the inspector and installer who does not have access to NFPA or to those who do not possess a clear understanding of air flow characteristics.

What Changed

904.5 Low-Water Cutoff. ~~Hot w~~Water boilers ~~installed above the radiation level~~ and steam boilers shall be provided with an automatic means to shut off the fuel supply to the burner(s) where the boiler water level drops to the lowest safe water line. In lieu of the low-water cutoff, water tube or coil-type boilers that require forced circulation to prevent overheating and failure shall have an approved flow sensing device arranged to shut down the boiler where the flow rate is not capable of protecting the boiler against overheating. [NFPA 54:10.3.5]

Why It Changed

This provision was revised to correlate with NFPA 54-2012.

What It Means To Me

In order to avoid a heating boiler explosion or damage from loss of water, the low water cutoff is a device intended to shut down unsafe heating equipment by turning off electrical power to the oil burner or gas burner should the water level or pressure in the heating system fall below a safe level.

The first control safety device is the low water cut off switch, or, in some forced circulation boilers, it is the flow sensing device. These switches are extremely important because if the boiler water level drops below the lowest permissible water level, or if the flow through the boiler is insufficient for cooling in the case of forced circulation boilers, the boiler could overheat. If left unchecked, the overheating could result in a catastrophic failure of the boiler. This also poses the potential for serious personal injury and/or significant property damage.

936.0 Ductless Mini-Split Systems Installation

What Changed

936.0 Ductless Mini-Split Systems Installation.
936.1 General. A ductless mini-split system installation shall be installed in accordance with the manufacturer's installation instructions and Section 310.2 for condensate control.

Why It Changed

The Technical Committee agreed that the UMC should address ductless mini-split systems since they are already widely used. The UMC had previously been silent on this type of appliance, and this new section requires that such appliances be installed in accordance with the manufacturer's instructions. This modification simply directs the user to the code section that adequately addresses condensate for all types of appliances.

What It Means To Me

Ductless mini-split systems have existed for more than 50 years and have numerous applications in apartments, commercial, and institutional buildings. The most common applications are in multifamily housing or as retrofit add-ons with "non-ducted" heating systems, such as hydronic (hot water heat), radiant (electric resistance), and space heaters (wood, kerosene, propane). They are a commonly used option for room additions and small apartments where extending or installing distribution ductwork (for a central air-conditioner or heating system) is not feasible or where existing equipment cannot handle the additional load.

Unlike an air conditioning window unit; it is a permanently installed mechanical system used in new construction, additions, multi-family (condo/apartment) housing, and to improve comfort in poorly conditioned spaces, and requires a permit to be installed. Therefore, the code must adequately address these types of systems.

Ductless mini-split equipment must follow the same code requirements as other condensate producing equipment due to the potential damage and health risk associated with uncontrolled condensation. Ductless mini-split units also do not have provisions for a secondary drain, or auxiliary drain pans to prevent condensation from overflowing the primary drain pan.

Plan reviewers, inspectors and installers to need to verify the new condensate control requirements are installed correctly to ensure no damage is done to the structure due to a condensate overflow condition pertaining to a ductless mini-split system.

Example Of Mini-Split System
Image Courtesy of carefreeair.com

What Changed

1001.1 Applicability. The requirements of this chapter shall apply to the construction, installation, operation, repair, and alteration of all boilers and pressure vessels. Low-pressure boilers shall comply with this chapter and Section 904.0.

Exceptions:

(1) Listed and approved potable water heaters with a nominal capacity not exceeding 120 gallons (454 L) and having a heat input not exceeding 200 000 British thermal units per hour (Btu/h) (58.6 kW) used for hot water supply at a pressure not exceeding 160 pounds-force per square inch (psi) (1103 kPa) and at temperatures not exceeding 210°F (99°C), ~~as regulated by~~ in accordance with the plumbing code.

(2) Pressure vessels used for unheated water supply, including those containing air that serves as a cushion and is compressed by the introduction of water and tanks connected to sprinkler systems.

(3) Portable unfired pressure vessels and Interstate Commerce Commission (I.C.C.) containers.

(4) Containers for liquefied petroleum gases, bulk oxygen, and medical gas that are regulated by the fire code.

(5) Unfired pressure vessels in ~~Groups B, F, H, M, R, S, and U~~ business, factory, hazardous, mercantile, residential, storage, and utility ~~O~~occupancies having a volume not exceeding 5 cubic feet (0.14 m3) and operating at pressures not exceeding 250 psi (1724 kPa).

(6) Pressure vessels used in refrigeration systems ~~that are regulated by~~ shall comply with Chapter 11 ~~of this code~~.

(7) Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables, and other similar humidity control systems.

(8) A boiler or pressure vessel subject to regular inspection by federal inspectors or licensed by federal authorities.

~~(9) Boilers within the scope of NFPA 85, including associated fuel systems shall be designed and installed in accordance with NFPA 85.~~

Why It Changed

Section 1001.1 was revised by adding a reference to Section 904.0 for low-pressure boilers. Section 904.0 addresses additional provisions for low-pressure boilers that might otherwise be missed by the end user. The occupancy classification letters B, F, H, M, R, S, and U have been replaced in this Chapter with the occupancy terms that can be defined by the building code. The reference to NFPA 85 was removed since Section 1002.1 indicates that boilers shall be constructed and designed in accordance NFPA 85. All other revisions are were done to comply with the IAPMO Manual of Style.

What It Means To Me

The new code language directs the code user to section 904.0 for additional requirements for installing boilers. Section 904 will address the location and clearances. The addition of the occupancy classification instead of just the letters will help the user to understand what the letters mean. This should prove useful in applying the correct requirements to a given occupancy.

1004.0 Expansion Tanks

What Changed

1004.1 General. An expansion tank shall be installed in a hot-water-heating systems as a means for controlling increased pressure caused by thermal expansion. Expansion tanks shall be ~~provided with an air~~ of the closed or open type ~~expansion tank~~ and securely fastened to the structure. Tanks shall be rated for the pressure of the system. Supports shall be ~~approved to carry~~ capable of carrying twice the weight of the tank filled with water without placing a strain on connecting piping.

~~A h~~Hot-water-heating systems incorporating hot water tanks or fluid relief columns shall be installed as to prevent freezing under normal operating conditions.

1004.2 Open-Type Expansion Tanks. ~~Systems equipped with an open expansion tank to satisfy thermal water expansion shall be provided with an indoor overflow from the upper portion of the expansion tank in addition to an open vent. The indoor overflow shall be carried within the building to a plumbing fixture or to the basement.~~ Open type expansion tanks shall be located not less than 3 feet (914 mm) above the highest point of the system. Such tanks shall be sized based on the capacity of the system. An overflow with a diameter of not less than one-half the size of the supply or not less than 1 inch (25 mm) in diameter shall be installed at the top of the tank. The overflow shall discharge through an air gap into the drainage system.

1004.3 Closed-Type Systems. ~~Systems of the c~~Closed-type systems shall have an airtight tank or other approved air cushion that will be consistent with the volume and capacity of the system, and shall be designed for a hydrostatic test pressure of two and one-half times the allowable working pressure of the system. Expansion tanks for systems designed to operate at ~~or above~~ more than 30 pounds-force per square inch ~~gauge~~ (psig) (207 kPa) shall comply with ASME BPVC Section VIII ~~be constructed in accordance with nationally recognized standards approved by and the Authority Having Jurisdiction~~. Provisions shall be made for draining the tank without emptying the system, except for ~~pressurized~~ tanks with membranes such as diaphragm-type tanks.

1004.4 Minimum Capacity of Closed-Type Tank. The minimum capacity for a gravity-type hot water system expansion tank shall be in accordance with Table 1004.4(1). The minimum capacity ~~of the closed-type~~ for a forced-type hot water system expansion tank shall be ~~permitted to be determined from~~ in accordance with ~~Table 1005.4(1) and~~ Table 1005.4(2), or ~~from the following formula:~~ Equation 1005.4. Equation 1005.4 shall not be used for diaphragm-type expansion tanks.

Why It Changed

Section 1005.1 was revised to correlate with Section 604.1 of the Uniform Solar Energy Code (USEC). For informational purposes only, Section 604.1 of the USEC is shown as follows:

> 604.1 Where Required. An expansion tank shall be installed in a solar thermal system where a pressure reducing valve, backflow prevention device, check valve or other device is installed on a water supply system utilizing storage or tankless water heating equipment as a means for controlling increased pressure caused by thermal expansion. Expansion tanks shall be of the closed or open type and securely fastened to the structure. Tanks shall be rated for the pressure of the system. Supports shall be capable of carrying twice the weight of the tank filled with water without placing strain on the connecting piping.
> Solar thermal systems incorporating hot water tanks or fluid relief columns shall be installed to prevent freezing under normal operating conditions.

Section 1005.2 was revised to correlate with Section 604.2 of the Uniform Solar Energy Code (USEC). For informational purposes only, Section 604.2 of the USEC is shown as follows:

> 604.2 Systems with Open Type Expansion Tanks. Open type expansion tanks shall be located not less than 3 feet (914 mm) above the highest point of the system. Such tanks shall be sized based on the capacity of the system. An overflow with a diameter of not less than one-half the size of the water supply or not less than 1 inch (25 mm) in diameter shall be installed at the top of the tank. The overflow shall discharge through an air gap into the drainage system.

Section 1005.3 was revised to correlate with Section 604.3 of the Uniform Solar Energy Code (USEC). For informational purposes only, Section 604.3 of the USEC is shown as follows:

> 604.3 Closed-Type Systems. Closed-type systems shall have an airtight tank or other approved air cushion that will be consistent with the volume and capacity of the system, and shall be designed for a hydrostatic test pressure of two and one-half times the allowable working pressure of the system. Expansion tanks for systems designed to operate at or above 30 pounds-force per square inch (psi) (207 kPa) shall be constructed in accordance with nationally recognized standards and the Authority Having Jurisdiction. Provisions shall be made for draining the tank without emptying the system, except for pressurized tanks.

Section 1005.4 was revised to correlate the UMC with the 2012 Uniform Solar Energy Code (USEC) pertaining to the minimum capacity of closed-type tanks. For informational purposes only, Section 604.4 of the USEC is shown as follows:

> 604.4 Minimum Capacity of Closed-Type Tank. The minimum capacity of a closed-type expansion tank shall be in accordance with Table 604.4(1) and Table 604.4(2) or from the following formula

$$Vt = \frac{(0.00041t - 0.0466)\,Vs}{\left(\frac{Pa}{Pf} - \frac{Pa}{Po}\right)}$$

What It Means To Me

This section stream lines the use of expansion tanks and correlates with the solar code and provides the requirements to meet the need to control thermal expansion. Inspectors and installers now are given specific language and prescriptive requires for location and sizing of thermal expansion tanks. Everyone should ensure that the appropriate equipment is provided and correctly installed to avoid the damage and stress that thermal expansion can have on a system.

Installed Thermal Expansion Tank

1005.0 Safety or Relief Valve Discharge

What Changed

1005.1 General. Pressurized vessels or boilers shall be provided with overpressure protection by means of a listed pressure relief valve installed in accordance with the manufacturer's installation instructions.

1005.2 Discharge Piping. The ~~relief valve~~ discharge ~~pipe~~ piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and provided with the following:

(1) Equal to the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing downward. ~~shall be of approved material that is rated for the temperature of the system. The discharge pipe shall be of the same diameter as the safety or relief valve outlet.~~

(2) Materials shall be rated at not less than the operating temperature of the system and approved for such use.

(3) D~~d~~ischarge pipe shall discharge by gravity through an air gap into the drainage system or outside of the building with the end of the pipe not exceeding 2 feet (610 mm) and not less than 6 inches (152 mm) above the ground and pointing down- wards.

(4) Discharge in such a manner that does not cause personal injury or structural damage.

(5) No part of such discharge pipe shall be trapped or subject to freezing.

(6) The terminal end of the pipe shall not be threaded.

(7) Discharge from a relief valve into a water heater pan shall be prohibited.

Why It Changed

Section 1005.1 was revised to correlate with Section 315.1 of the Uniform Solar Energy Code (USEC) in regards to the discharge requirements for pressure relief valves. The 18 inch requirement is being deleted since it is in conflict with the 6 inch requirement that was added to Section 1005.1 due to the correlation between the UMC and the USEC. All other revisions were done to comply with the IAPMO Manual of Style.

Section 1005.2 was modified to correlate with Section 315.2 of the Uniform Solar Energy Code (USEC).

Vacuum relief valves should be installed in hot-water systems that are subjected to a vacuum. Vacuum relief valves are installed where a method of freeze protection is employed that drains the liquid from components exposed to freezing, in which the draining will cause a significant partial vacuum in the system. They are typically mounted to pipe that connects to the vapor space (space within the boiler that is above the liquid surface). The pressure in the vapor space increases or decreases as liquid is pumped into or out of the boiler. Furthermore, atmospheric temperature changes can cause an expansion or contraction of the vapors in this space, again resulting in pressure increases or decreases. Requiring a vacuum relief valve where a system is subjected to a vacuum will ensure that the space is always maintained within the safe range of its pressure and vacuum operating design limits.

What It Means To Me

Installers, inspectors and others need to verify the installations meet the minimum requirements of the new code sections. With a change in the size requirement, it will be very easy for those used to always providing for an 18 inch air gap to remember that an air gap as small as 6 inches is now allowed. Everyone should also note that the definitions for "relief valve, vacuum" and "vacuum" were added to correlate with the USEC since the terms are used in the Section 1005.2 without being defined. The new definitions assist the end user in applying and enforcing this term.

The pressure relief valve is the final means of protection in a situation where everything else has failed to limit heat production. The opening pressure of the valve and the maximum heating capacity of the equipment the valve can support are stamped onto a permanent tag attached to the valve. During inspections, this should be checked to ensure that the capacity of the relief valve is equal to or greater than the maximum rating of the equipment.

What Changed

1201.0 General.

1201.1 Applicability. This chapter shall apply to hydronic piping systems that are part of heating, cooling, ventilation, and air conditioning systems. Such piping systems include steam, hot water, chilled water, steam condensate, and ground source heat pump systems. The regulations of this chapter shall govern the construction, location, and installation of hydronic piping systems.

1201.2 Insulation. The temperature of surfaces within reach of building occupants shall not exceed 140°F (60°C) unless they are protected by insulation. Where sleeves are installed, the insulation shall continue full size through them.

Coverings and insulation used for piping shall be of material approved for the operating temperature of the system and the installation environment. Where installed in a plenum, the insulation, jackets, and lap-seal adhesives, including pipe coverings and linings, shall have a flame-spread index not to exceed 25 and a smoke developed index not to exceed 50 where tested in accordance with ASTM E84 or UL 723.

1201.3 Water Hammer. The flow of the hydronic piping system shall be controlled to prevent water hammer.

Why It Changed

Chapter 12 was revised for the 2015 edition of the UMC to specifically address hydronic systems including piping systems that are part of heating, ventilation and air conditioning systems. Such piping system shall include steam, hot water, chilled water, steam condensate and ground source heat pump systems.

The purpose of testing building materials using ASTM E84 is to minimize the smoke and flame spread during a fire, giving occupants of the building a better chance to escape, allow firefighters more time to control the fire, and to minimize building damage. Flame spread index is a measure of the material's ability to resist flames over its surface. The standard calls for not greater than 25 on a scale of 0-100, where untreated red oak lumber has a value of 100 and noncombustible cement-asbestos board has a value of 0.

Smoke-developed index is a measure of the concentration of smoke emitted by a material as it burns. The standard calls for not greater than 50 on the same relative scale (0-100) as the flame spread index.

What It Means To Me

Precautions must be taken in the design and installation of hydronic systems to compensate for the potential of water hammer within these systems.

Image Courtesy of Supplyhouse.com

1202.0 Protection of Potable Water Supply

What Changed

1202.0 Protection of Potable Water Supply.

1202.1 Prohibited Sources. Hydronic systems or parts thereof, shall be constructed in such a manner that polluted, contaminated water, or substances shall not enter a portion of the potable water system either during normal use or where the system is subject to pressure that exceeds the operating pressure in the potable water system. Piping, components, and devices in contact with the potable water shall be approved for such use and where an additive is used it shall not affect the performance of the system.

1202.2 Chemical Injection. Where systems include an additive, chemical injection or provisions for such injection, the potable water supply shall be protected by a reduced-pressure principle backflow prevention assembly listed or labeled in accordance with ASSE 1013. Such additive or chemical shall be compatible with system components.

1202.3 Compatibility. Where materials in the hydronic system are not suitable for use in a potable water system, such potable water shall not be used. Where a heat exchanger is installed with a dual purpose water heater, such application shall comply with the requirements for a single wall heat exchanger in Section 1218.1

Why It Changed

Any fluid having the potential of imposing more than a minor or moderate hazard to the potable water supply must be separated by a double wall heat exchanger. Typically, two kinds of antifreeze are used in hydronic systems, ethylene or propylene which is toxic; therefore the potable water must be protected. In addition, the materials used to construct the system must be compatible with the chemicals used. There must be an acceptable method of protecting the potable water systems that interface with these systems. The method of protection is relative to the hazard imposed by the chemicals. Employing these considerations is in the best interest of public health and safety.

What It Means To Me

Inspectors and installers need to be aware of the potential for any cross connections that may arise from the installation of hydronic systems. The installation of heat exchangers will need to be determined by the toxicity and pressure of the systems. Education of maintenance staff and labeling of the system may be required to assure that the correct antifreeze will be added to the system in the future. The responsibility for providing this education belongs to the owner. Using the wrong chemicals in this application could potentially lead to material failure and contamination of the potable water system. The requirement to install an RPZ will also require future maintenance and testing on the RPZ. The authority having jurisidiction and the jurisdiction's cross connection control and backflow protection program will be tasked with enforcing the maintenance and testing of the RPZ.

1204.0 Identification of a Potable and Nonpotable Water System

What Changed

1204.0 Identification of a Potable and Nonpotable Water System.

1204.1 General. In buildings where potable water and nonpotable water systems are installed, each system shall be clearly identified in accordance with Section 1204.2 through Section 1204.5.

1204.2 Color and Information. Each system shall be identified with a colored pipe or band and coded with paint, wraps, and materials compatible with the piping.

1204.3 Potable Water. Potable water systems shall be identified with a green background with white lettering. The minimum size of letters and length of the color field shall be in accordance with Table 1204.3.

1204.4 Nonpotable Water. Nonpotable water systems shall have a yellow background with black uppercase lettering, with the words "CAUTION: NONPOTABLE WATER, DO NOT DRINK." Each nonpotable system shall be identified to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and length of the color field shall comply with Table 1204.3.

1204.5 Location of Piping Identification. The background color and required information shall be indicated every 20 feet (6096 mm) but not less than once per room, and shall be visible from the floor level.

1204.6 Flow Directions. Flow directions shall be indicated on the system.

TABLE 1204.3
MINIMUM LENGTH OF COLOR FIELD AND SIZE OF LETTERS

OUTSIDE DIAMETER OF PIPE OR COVERING (INCHES)	MINIMUM LENGTH OF COLOR FIELD (INCHES)	MINIMUM SIZE OF LETTERS (INCHES)
½ to 1¼	8	½
1½ to 2	8	¾
2½ to 6	12	1¼
8 to 10	24	2½
over 10	32	3½

For SI units: 1 inch = 25.4 mm

Why It Changed

Identification of the water supply system is critical to the safe functioning of the building and the protection of the occupants of that building. The system cannot be compromised in any fashion. The first step in the protection of the water supply is the correct labeling of various water systems in the building. This is important during construction, but also especially after the building is occupied when it is subject to maintenance or additions. The requirements above must be adhered to on every installation where potable and non-potable water systems are present.

What It Means To Me

Care must be taken to ensure all water piping systems are properly identified, especially where more than one type of system exist and accessible to building occupants. Most jurisdictions have cross connection and backflow Divisions. There must be some kind of training for the inspectors to identify the potential of hazardous cross connection. Estimators and installers must know the requirements and should seek or be provided with training to ensure they can apply this provision correctly. Failure to do so can lead to serious illness or, in some cases, even death.

1205.0 Installation, Testing, and Inspection

What Changed

1205.0 Installation, Testing, and Inspection.

1205.1 Operating Instructions. Operating and maintenance information shall be provided to the building owner.

1205.2 Pressure Testing. System piping and components shall be tested with a pressure of not less than one and one-half times the operating pressure but not less than 100 psi (689 kPa). Piping shall be tested with water or air except that plastic pipe shall not be tested with air. Test pressures shall be held for a period of not less than 30 minutes with no perceptible drop in pressure. These tests shall be made in the presence of the Authority Having Jurisdiction.

1205.3 Flushing. Heat sources, system piping and tubing shall be flushed after installation with water or a cleaning solution. Cleaning of the heat source shall comply with the manufacturer's instructions. The cleaning solution shall be compatible with all system components and shall be used in accordance with the manufacturer's instructions. The heat source shall be disconnected from the piping system or protected with a fine mesh strainer during flushing to prevent debris from being deposited into the heat source.

1205.4 Oxygen Diffusion Corrosion. PEX, PE-RT, and PB tubing in closed hydronic systems shall contain an oxygen barrier.

~~**1201.3.9 Pressure Testing.** The equipment, material, and labor necessary for inspection or test shall be furnished by the person to whom the permit is issued or by whom inspection is requested.~~

~~**1201.3.9.1 Media.** The piping shall be tested with water.~~

~~**1201.3.9.2 Pressure Test.** Piping shall be tested with a hydrostatic pressure of not less than 100 psig (689 kPa), and 50 psig (345 kPa) more than the operating pressure. This pressure shall be maintained for not less than 30 minutes. Required tests shall be conducted by the owner or contractor in the presence of an authorized inspector. The piping being tested shall remain exposed to the inspector and shall not leak during the test.~~

~~**1201.3.9.3 Moved Structures.** Piping systems of a building and parts thereof that are moved from one foundation to another shall be completely tested as prescribed elsewhere in this section for new work, except that walls or floors need not be removed during such test where equivalent means of inspection are provided.~~

~~**1201.3.9.4 Test Waived.** No test or inspection shall be required where a system, or part thereof, is set up for exhibition purposes and has no connection with a water system.~~

~~**1201.3.9.5 Exceptions.** In cases where it is impractical to provide the aforementioned tests, or for minor installations and repairs, the Authority Having Jurisdiction shall have the authority to make such inspection as it deems necessary.~~

Why It Changed

It is imperative that operating and maintenance manuals are provided to the building owner in order to properly operate and maintain the system for future reference. System piping must be tested in order to verify there are no leaks before placing into service and capable of withstanding system operating pressures.

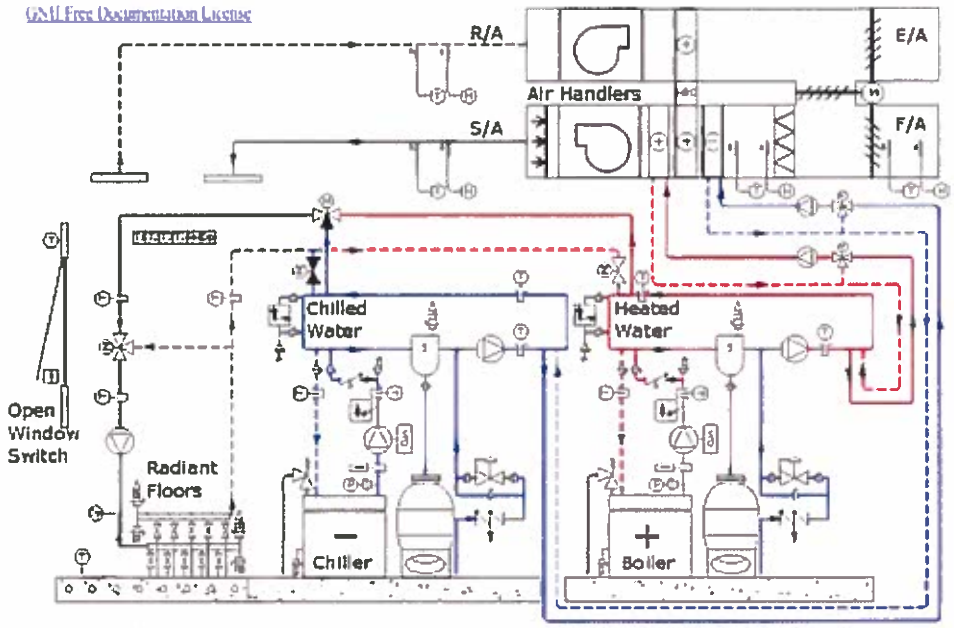
System flushing after installation will eliminate debris from the piping. The cleaning or flushing solution specifically designed for the system will remove fluxes and oils that are still in the system.

Tubing made from thermoplastics allows oxygen molecules to slowly pass through the tube wall and enter the water in the system. This process is called oxygen diffusion. Oxygen corrosion is a very serious corrosion problem in hydronic systems. The dissolved oxygen present in the water when the system is first filled quickly reacts with any iron or steel components. The rate of oxygen

diffusion varies for different materials and higher temperatures. The solution to this problem is to create an oxygen diffusion barrier in or on the tubing. One such barrier is a thin layer of a special compound called EVOH (ethylene vinyl alcohol) that is bonded to the tubing during manufacturing. Another type of oxygen barrier is a thin layer of aluminum sandwiched between layers of PEX-AL-PEX. The use of oxygen barrier-equipped tubing does not guarantee that oxygen-related corrosion will not occur. There are several other ways for oxygen to enter a hydronic system such as improperly sized or placed expansion tank, leaky valve seals or pump gaskets, and improperly located air vents. See Code Review Task Group Report 1, Item 5 where sections are deleted based on duplication of text in the UMC.

What It Means To Me

Installers, inspectors and others in the construction process must verify the operating and maintenance manuals are provided to the building owner in order to properly operate and maintain the system for future reference. The system piping should be tested in order to verify there are no leaks before placing the system into service and capable of withstanding system operating pressures. It should also be verified that systems are flushed after installation and the cleaning solution is designed for the system to remove fluxes and oils. If any plastic tubing is used, it must be verified the tubing has an approved oxygen barrier.



Example of Hydronic Heating and Cooling System
Image Courtesy of Wikipedia

1207.0 Heating Appliances and Equipment

What Changed

1207.0 Heating Appliances and Equipment.

1207.1 General. Heating appliances, equipment, safety and operational controls shall be listed for its intended use in a hydronic heating system and installed in accordance with the manufacturer's installation instructions.

1207.2 Boilers. Boilers and their control systems shall comply with Section 1002.0.

1207.2.1 Condensing Boilers. A condensing boiler, in which the heat exchanger and venting system are designed to operate with condensing flue gases, shall be permitted to be connected directly to the panel heating system without a protective mixing device.

1207.2.2 Noncondensing Boilers. Where the heat exchanger and venting system are not designed to operate with condensed flue gases, the boiler shall be permitted to connect directly to the panel heating system where protected from flue gas condensation. The operating temperature of the boiler shall be more than the fluid temperature in accordance with the manufacturer's instructions.

1207.3 Dual-Purpose Water Heaters. Water heatersused for combined space- and water-heating applications shall be in accordance with the standards referenced in Table 1203.2, and shall be installed in accordance with the manufacturer's installation instructions. The total heating capacity of a dual purpose water heater shall be based on the sum of the potable hot water requirements and the space heating design requirements corrected for hot water first hour draw recovery.

1207.3.1 Temperature Limitations. Where a combined space- and water-heating application requires water for space heating at temperatures exceeding 140°F (60°C), a thermostatic mixing valve that is listed or labeled in accordance with ASSE 1017 shall be installed to temper the water supplied to the potable water distribution system to a temperature of 140°F (60°C) or less.

Why It Changed

One of the major challenges facing both the hydronics industry and the thermal solar industry is the lack of "listed and approved" products. Section 1207.1 clearly states that all such systems and their controls and ancillary components will have said listings.
Section 1207.2 is parallel with 1207.1 and creates a consistent means of understanding and enforcement for the installer and inspector.

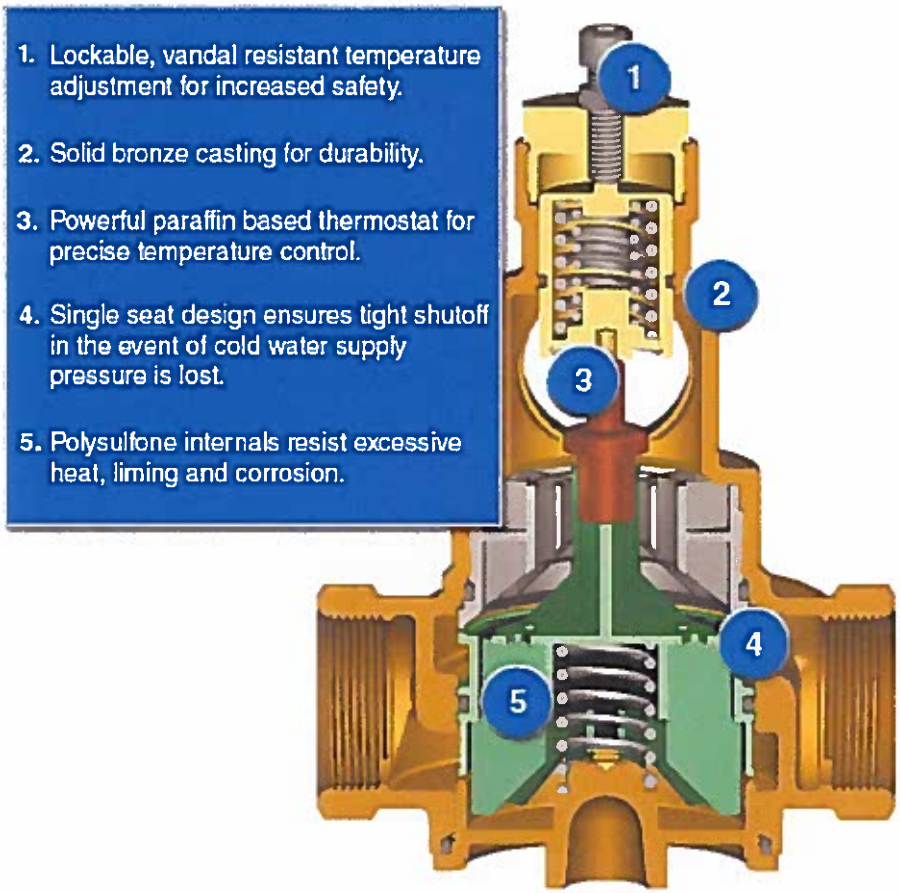
Section 1207.3 Dual Purpose Water Heaters: Listing to specific standards assures manufacturing compliance to National Standards on various levels. These standards, CSA Z21.10.1 CSA Z21.10.3 "applies to newly produced, large automatic storage water heaters having input ratings of 75000 Btu/hr and respectively, above 75,000 Btu/hr (21 980 W), instantaneous water heaters, circulating water heaters including booster water heaters (see Clause 3), hereinafter referred to as water heaters or appliances, constructed entirely of new, unused parts and materials…" both are basic standards for safe operation of water heating equipment.

Section 1207.3.1 Temperature Limitations brings to hand an ongoing problem within the industry. With this change all involved parties can be assured of scald protection where a combined space and water heating system is installed and will produce water temperatures in excess of 140°F. ASSE 1017, 2003 is designed to protect temperature activated mixing valves in a tempered water distribution application, which is the correct match for combined systems as compared to the ASSE 1070 which is applied to "point of use" applications.

What It Means To Me

The impact on installers should be positive. The installer will now have specific codified information as to the standard necessary for correct selection of tempering devices per the particular installation. The inspector's job will be simplified by knowing which valves and standards must be applied to a particular installation. For all involved parties, the use of the proper valve will no longer be questionable on either side.

Scalding accidents can easily occur when the potable hot water exceeds a temperature of 140°F (60°C). A temperature actuated mixing valve is required to limit the temperature of hot water to be used for bathing and other domestic purposes to 140°F (60°C) or less when the water heater is used for both potable hot water and hot water for space heating. Regardless of the water supply demand downstream from the valve or supply pressure fluctuations upstream from the valve, the user will be provided some protection from scalding injury because the temperature of the water supplied will not exceed 140°F.



Thermostatic Mixing Valve
Image Courtesy of Watts

1208.0 Circulators

What Changed

1208.0 Circulators.

1208.1 General. Circulators shall be listed for its intended use based on the heat transfer medium. Circulators shall be installed to allow for service and maintenance. The manufacturer's installation instructions shall be followed for correct orientation and installation.

1208.2 Mounting. The circulator shall be installed in such a way that strain from the piping is not transferred to the circulatorhousing. The circulator shall be permitted to be directly connected to the piping, provided the piping is supported on each side of the circulator. Where the installation of a circulator will cause strain on the piping, the circulator shall be installed on a mounting bracket or base plate. Where means for controlling vibration of a circulator is required, an approved means for support and restraint shall be provided.

1208.3 Sizing. The selection and sizing of a circulator shall be based on all of the following:

(1) Loop or system head pressure
(2) Capacity, gallons per minute (L/s)
(3) Maximum velocity, feet per second (m/s)
(4) Maximum temperature, °F (°C)
(5) Maximum working pressure, pounds per square inch (kPa)
(6) Fluid type

205.0

Circulators (Circulating Pump). A device that circulates liquids or gases within a closed circuit for an intended purpose.

Why It Changed

Circulators, when properly sized, overcome the friction loss of the piping to provide the necessary volume of fluid flow required by the circuits they serve. The circulator is the heart of any hydronic heating system as it moves the water or other fluid through pipes from the heat source to the heat emitters and back again. Circulators move liquids around a closed-loop circuit by creating low pressure on the inlet side of the circulator and must be properly sized to accomplish this efficiently.

The head pressure required to overcome the friction loss of the network of piping the circulator serves may be a single loop, zone or the entire system. The maximum desired velocity of the system fluid as it moves through the system must meet system design specifications. The designer must also take into consideration the maximum temperature and working pressure the circulator will be exposed to during system operation. Lastly, the type of fluid used as the heating medium must be taken into consideration as various mix ratios all have different densities and resulting friction loss.

What It Means To Me

Hydronic circulators are not a requirement in all systems, however heating medium fluid does need to flow to areas of the building that are experiencing heat loss. Proper sizing of pumps or circulators will keep the costs of conditioning the building as low as possible. Designers and installers need to consider the friction losses, velocity and pressures to efficiently size circulators. An incorrectly sized circulator will cause either a high cost of system operation or areas that cannot adequately achieve the desired heat on colder outdoor conditions.

What Changed

1209.0 Expansion Tanks.

1209.1 Where Required. An expansion tank shall be installed in every hydronic system to control thermal expansion. Secondary hot water systems, that are isolated from the primary system by a heat exchanger shall install a separate expansion tank and pressure relief valve. Expansion tanks shall be of the closed or open type. Expansion tanks used in hydronic systems shall comply with the requirements of ASME Boiler and Pressure Vessel Code Section VIII where the system is designed to operate at more than 30 pounds-force per square inch (psi) (207 kPa. Tanks shall be rated for the pressure of the system. Expansion tanks shall be accessible for maintenance and shall be installed in accordance with the manufacturer's installation instructions.

1209.2 Systems with Closed Expansion Tanks. A closed expansion tank shall be sized based on the capacity of the system. The minimum size of the tank shall be determined in accordance with Section 1004.4 and shall be equipped with an airtight tank or other air cushion that is consistent with the volume and capacity of the system. Tanks shall be equipped with a drain valve and a manual air vent. Tanks shall be located in accordance with the manufacturer's instructions unless otherwise specified by the system design. Each tank shall be equipped with a shutoff device that will remain open during operation of the heating system. Valve handles shall be locked open or removed to prevent from being inadvertently shut off.

1209.3 Systems with Open Expansion Tanks. An open expansion tank shall be located not less than 36 inches (914 mm) above the highest point in the system and shall be sized based on the capacity of the system. An overflow with a diameter of not less than one-half the size of the water supply or not less than 1 inch (25 mm) in diameter shall be installed at the top of the tank. The overflow shall discharge through an air gap into the drainage system. Isolation valves shall not be installed in the piping between the heat-distribution system and the expansion tank. Tanks shall be located in accordance with the manufacturer's instructions unless otherwise specified by the system design. Each tank shall be equipped with a shutoff device that will remain open during operation of the heating system. Valve handles shall be locked open or removed to prevent from being inadvertently shut off.

Why It Changed

All hydronic systems must account for the thermal expansion of the heating fluid. Hydronic systems are found in two categories, open and closed systems. Expansion tanks provide a reservoir for the volumetric change to occur.

Open systems use a "feed and expansion" tank (cistern). As the name suggests, the tank is used to feed the supply and to accommodate any water expansion that is generated by the heating process. The "feed and expansion" tank is placed at the highest point in the system. An open-vented system typically uses a small-bore two pipe network, where one pipe is used to feed the system and the other allows the cooled water to return to the heat source (boiler). When the fluid in such a closed system is heated, it will expand and, because it is a closed system, quickly cause hydrostatic pressure that can be relieved only by system failure or the opening of the safety relief valve. Relief valves are intended to open only in the event of an emergency, the continuous opening of a relief valve to accommodate expansion is not acceptable. Expansion tanks are used to absorb the additional system water volume caused by expansion, thus avoiding relief valve opening and preventing wide variations in system pressure.

Expansion tanks are either sealed vessels or open tank reservoirs. Open tank reservoirs are, of course, not pressurized except for the static elevation head they impose on the heat source. Closed expansion tanks, however, are pressurized vessels. Because they are subjected to the same pressures as the system, closed expansion tanks must have a pressure rating greater than or equal to the maximum system operating pressure. All sections correlate with Chapter 10.

What It Means To Me

This new code language will help both the inspector and the installer better understand when and where expansion tanks are required for boilers. Installation instructions for expansion tanks must be available to determine how the tanks will be installed. All hydronics systems must account for the thermal expansion of the heating fluid. Expansion tanks provide a reservoir for the volumetric change to occur. Without allowing for this expansion, failure of the piping and/or boiler could occur.

What Changed

1211.0 Joints and Connections.
1211.1 General. Joints and connections shall be of an approved type. Joints shall be gas and watertight and designed for the pressure of the hydronic system. Changes in direction shall be made by the use of fittings or with pipe bends. Joints between pipe and fittings shall be installed in accordance with the manufacturer's installation instructions.

Why It Changed

This section and its subsections have gone under such extensive revisions it is not practical to show them all in this format. These changes were made largely to make the language consistenet with other codes and easier to understand and apply. Please see the 2015 UMC for all of the new language for Section 1211.0.

Approval of joints and connections must consider the compatibility of the joint or connection with the working fluid of the system and the pipe materials being joined. Joints and connections must be able to withstand the maximum operating conditions of the system. The same format for joining methods and materials is in the UPC, USEC, and USPSHTC. Redundant language for each material is not necessary. No need to restate marking requirements, hanger and sleeve requirements over and over.

What It Means To Me

The same format for joining methods and materials is in the UPC, USEC, and USPSHTC. Keeping the joining methods consistent with other sections of this code and other codes makes it easier for installers to keep in mind compatibility of piping and how to connect them.

Incompatibility between fluid and piping is specified elsewhere in the code. Corrosion and degradation of the piping and joints are a cause of concern dealt with in those sections. Thankfully, the more consistent the code is made for installers, the easier job inspectors will have as well.

1212.0 Valves

What Changed

1212.0 Valves.

1212.1 General. Valves shall be rated for the operating temperature and pressure of the system. Valves shall be compatible with the type of heat transfer medium and piping material.

~~**1201.3.2.2 Valves.** Valves no more than 2 inches (50 mm) in size shall be brass, malleable iron, or steel bodies. Each gate valve shall be a full-way type with working parts of noncorrosive metal.~~

1212.2 Where Required. Valves shall be installed in hydronic piping systems in accordance with Section 1212.3 through Section 1212.11.

1212.3 Heat Exchanger. Isolation valves shall be installed on the supply and return side of the heat exchanger.

1212.4 Pressure Vessels. Isolation valves shall be installed on connections to pressure vessels.

1212.5 Pressure Reducing Valves. Isolation valves shall be installed on both sides of a pressure reducing valve.

1212.6 Equipment, Components, and Appliances. Serviceable equipment, components, and appliances within the system shall have isolation valves installed upstream and downstream of such devices.

1212.7 Expansion Tank. Isolation valves shall be installed at connections to non-diaphragm-type expansion tanks.

1212.8 Flow Balancing Valves. Where flow balancing valves are installed, such valves shall be capable of increasing or decreasing the amount of flow by means of adjustment.

1212.9 Mixing or Temperature Control Valves. Where mixing or temperature control valves are installed, such valves shall be capable of obtaining the design water temperature and design flow requirements.

1212.10 Thermosiphoning. An approved type check valve shall be installed on liquid heat transfer piping to control thermosiphoning of heated liquids.

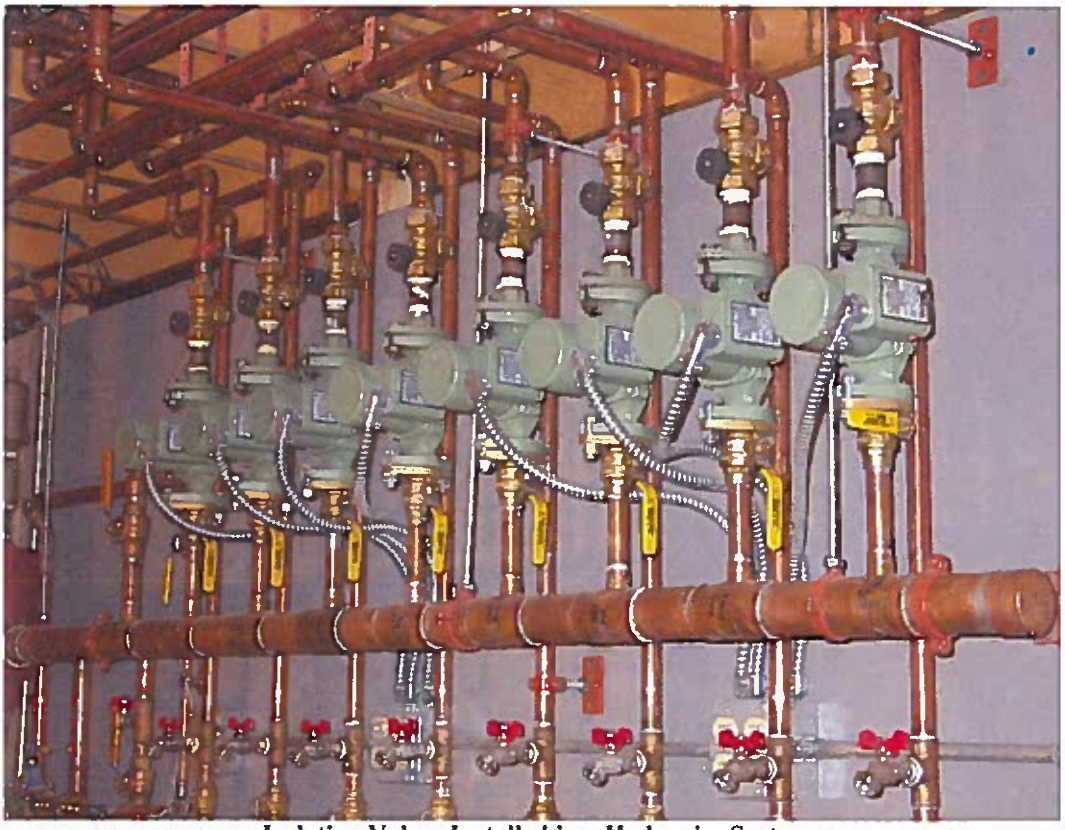
1212.11 Air Removal Device or Air Vents. Isolation valves shall be installed where air removal devices or automatic air vents are utilized to permit cleaning, inspection, or repair without shutting the system down.

Why It Changed

Isolation valves are necessary in hydronic systems so that major components can be isolated from the system to accommodate servicing as well as protecting the components when required pressure testing. Valves must be located on the supply and return piping so that the component or group of components may be separated from the rest of the system when servicing is required. Valves are also used to take system components out of service temporarily. Isolation valves should be installed to allow the isolation of any device or component that will require servicing, repair, or replacement at regular intervals. Draining a water hydronic system causes air to enter the system, and will require that fresh water be introduced to refill the system. The time-consuming process of purging and bleeding air from the system and the corrosion problems associated with new water make it desirable to avoid system draining whenever possible. In order to change the tank air charge pressure it is necessary to isolate the tank circuit from the main system piping. A high quality, gate type, lock-shield valve (isolation valve) must be used for this purpose.

What It Means To Me

The provisions in this section make it easier to isolate various components of a heating system and to change out various components and purge the systems. Beyond just complying with the code, installers should respect that this section should make servicing this equipment much easier for individual required to service the system. Noncompliance will make servicing and purging the system much more difficult. Inspectors will need to verify that isolation valves are installed in the right locations.



Isolation Valves Installed in a Hydronics System

1213.0 System Controls

What Changed

1213.0 System Controls.

1213.1 Water Temperature Controls. A heat source or system of commonly connected heat sources shall be protected by a water-temperature-activated operating control to stop heat output of the heat source where the system water reaches a pre-set operating temperature.

1213.2 Radiant Floor Heating Panels. Radiant floor heating panels shall be protected with a high-limit control set 20°F (-6.7°C) above the maximum design water temperature for the panel to prevent the introduction of heat into the panel. The high-limit setting shall not exceed the temperature rating for the pipe and shall be equipped with a manual reset.

1213.3 Operating Steam Controls. A steam heat source or system of commonly connected steam heat sources shall be protected by a pressure-actuated control to shut off the fuel supply where the system pressure reaches a pre-set operating pressure.

1213.3.1 Water-Level Controls. A primary water-level control shall be installed on a steam heat source to control the water level in the heat source. The control shall be installed in accordance with the manufacturer's installation instructions.

1213.4 Occupied Spaces. An air-temperature-sensing device shall be installed in the occupied space to regulate the operation of the heat-distribution system.

1213.5 Return-Water Low-Temperature Protection. Where a minimum return-water temperature to the heat source is specified, the heating system shall be designed and installed to ensure that the minimum return-water temperature is maintained during the normal operation of the heat source.

Why It Changed

System controls are used to ensure the safe operation of the heat source by preventing operation of the appliance when an unsafe condition is present. Continued appliance operation during an unsafe condition presents a life safety hazard and potential for property damage and must be avoided.

What It Means To Me

While an appliance may have factory installed control system for the proper operation of the appliance, the system and the area it serves must also be monitored for unsafe conditions. In the event of an unsafe condition the appliance can be safely shutdown by means of the system controls. Inspectors and installers should possess the requisite knowledge to understand these systems and their controls and should seek the proper training if they do not possess this expertise. Without the correct knowledge and understanding, a situation allowing for equipment failure, property damage, or even personal injury can occur.

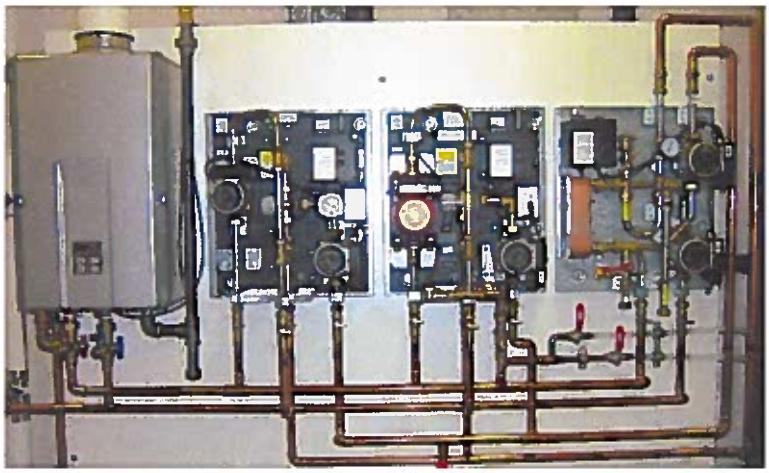


Image Courtesy of Wikimedia