

Comparison of HVAC Standards

Code Sections	Description			Comments
	2009 IRC Changes	2012 IRC Changes	SPS 323	
GENERAL MECHANICAL SYSTEMS REQUIREMENTS				
M1300				
M1301.2	—	Identification. Each length of pipe, tubing, and pipe fitting utilized in a mechanical system must identify the manufacturer.	—	Although they do not require identification, certain SPS provisions are relevant to piping: SPS 323.10(1); SPS 323.15.
M1301.3	—	Installation of Materials. Mechanical system materials must be installed in strict accordance with the standards under which the materials are accepted and approved. Absent other standards, installation shall follow the manufacturer’s instructions. If the industry standard used to approve the materials and the manufacturer’s instructions are less restrictive than the IRC, the IRC standard must be followed.	Installation of Gas-Fueled Appliances. Installation and maintenance of gas-fueled appliances shall comply with the appliance listing and the requirements of NFPA 54, National Fuel Gas Code, except as otherwise required under this chapter. SPS 323.04(1)(b).	—
M1301.4	—	Plastic Pipe, Fittings, and Components. Must be third party certified that plastic pipe, fittings, and components conform to NSF 14.	—	—
M1301.5	—	Third Party Testing and Certification. Piping, tubing, and fittings must comply with IRC 2012. ✓ Piping, tubing, and fittings must be either tested by an approved third party testing agency or certified by an approved third party certification agency. ✓ Third party testing and certification	Types and location of equipment. All heat producing appliances and cooling appliances shall be listed by a testing agency acceptable to the department. SPS 323.04(1)(a). ✓ All solid-fuel-burning appliances must be tested and listed by an accepted testing	<u>2012 changes:</u> “For the most part, the new language applies to the hydronic piping provisions of Chapter 21.” New language is consistent with the International Plumbing Code (Sec. 303,

	<p>agencies must be approved.</p> <p>✓ The definition of a third party certification agency requires that the certification agency have a system that “incorporates initial product testing, assessment, and surveillance of a manufacturer’s quality control system.” (R202).</p> <p>✓ Third-Party Certified means the function and performance of a material have been determined by testing and surveillance by a third party certification agency. Certification is demonstrated by the agency’s chosen identifier. (R202).</p> <p>✓ Third-Party Tested: “Procedure by which an approved testing laboratory provides documentation that a product, material, or system conforms to specified requirements.” (R202).</p>	<p>agency. SPS 323.045(1).</p> <p>✓ A listed residential-type and building heating appliance chimney may be used with solid-fuel-burning appliances if the chimneys have been tested 3 times to a minimum flue gas temperature exposure of 2100 F, under the conditions specified by the listing agency, for at least 10 minutes each time. SPS 323.045(3)(a)1.</p>	<p>2009), International Mechanical Code, and International Fuel Gas Code.</p> <p>Hydronic piping material must conform to the standard in M2101.1.</p>
<p>M1305. Ground Clearance (for Appliances).</p> <p>1.4.1 Supports for ground-based appliances must be in accordance with the manufacturer’s installation instructions.</p> <p>M1308.3 ✓ Deleted M1308.3 which required foundations and support for outdoor mechanical systems to be at least 3 inches above the finished grade.</p>	<p>—</p>	<p>Mounting on Floors. Solid-fuel burning appliances listed specifically for installation on a floor constructed of combustible material may be installed in accordance with the terms of the listing and the manufacturer’s instructions. SPS 323.045(5).</p> <p>✓ Table 323.045–C demonstrates that fireplace stoves and fireplace room heaters must have more than <u>2 inches</u> of ventilated open space beneath them and cannot be placed directly on combustible floors.</p> <p>✓ If the appliance has legs or</p>	

			<p>pedestals providing 2-6 inches of clearance to the floor, the floor must be protected by <u>4 inches</u> of hollowed masonry. The masonry must also be covered with 24 gauge sheet metal.</p> <p>✓ If the appliance has legs or pedestals longer than 6 inches, masonry of <u>2 inches</u> thickness must be underneath and covered with <u>24 gage</u> sheet metal. The masonry and metal covering must extend <u>18 inches</u> on the floor in all directions.</p> <p>✓ A noncombustible floor underneath the appliance must extend <u>18 inches</u> in all directions.</p>	
<p>M1307.3.1 Protection from Impact. Appliances must not be installed in a location subject to vehicle damage except where protected by approved barriers.</p>	<p>—</p>		<p>Garages. Appliances installed in garages must have burners and burner ignition devices located at least <u>18 inches</u> above the floor and must be protected or located so the furnace is not subject to damage from a vehicle. SPS 323.04(6)(b).</p> <p>Installation in Garages. No space heating or water heating appliance may be installed in a garage unless listed for such installation. SPS 323.04(6)(a).</p> <p>✓ Solid-fuel-burning appliances may not be installed in a garage unless listed for that application. SPS 323.045(2)(b).</p>	<p><u>2009 changes:</u> The modification broadens the areas where appliances must have protection from damage caused by vehicles. For example, the area adjacent to a driveway is now included in the areas requiring protection.</p> <p>The change is similar to Section 303.4 of the IMC.</p>

HEATING AND COOLING EQUIPMENT

M1400

M1411.6	—	Refrigerant Locking Access Port Caps. Refrigerant circuit access ports located outdoors must be fitted with locking-type tamper-resistant caps or must be otherwise secured to prevent unauthorized access.	—	—
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EXHAUST SYSTEMS

M1500

M1502.1	General. Clothes Dryers must be exhausted in accordance with the manufacturer's instructions.	—	—	SPS 323.14(2) addresses gas-fired clothes dryers in other respects.
M1502.2	Independent Exhaust Systems. Clothes dryer exhaust systems must be independent of all other systems.	—	—	—
M1502.3	Duct Termination. If the manufacturer's instructions do not specify a termination location, the clothes dryer exhaust ducts must terminate not less than <u>3 ft</u> in any direction from openings into the building.	—	Ventilation – General. All exhaust vents must terminate outside the structure. SPS 323.02(3). Venting System Location. With respect to gas-fired equipment, a venting system must terminate at least <u>3 ft</u> above any forced air inlet located within <u>10 ft</u> horizontally. This provision does not apply to the combustion air intake of a direct-vent appliance. SPS 323.14(3)(a).	—
M1502.4 and M1502.4.1	Dryer Exhaust Ducts. Dryer exhaust ducts must conform to the requirements of Sections M1502.4.1 through M1502.4.6. Material and Size. Clothes dryer exhaust ducts must have:	Material and Size. ✓ Minimum thickness of duct changes from <u>.016</u> to <u>.0157 inches (No. 28 gage)</u> . ✓ Duct must be <u>4 inches</u> nominal in	Dryer Venting. Gas-fired clothes dryers must be provided with metal venting. SPS 323.14(2). Thickness. Sheet metal ducts	<u>2009 changes:</u> With respect to the diameter of the duct, the previous rule (that the manufacturer's instructions determined the diameter)

	<ul style="list-style-type: none"> ✓ A smooth interior finish ✓ Be constructed of metal at least of <u>.016 inch</u> thick ✓ The duct size must be <u>4 inches</u> nominal in diameter. 	diameter.	must conform to the minimum thicknesses listed in Table 323.08–A. SPS 323.08(6). The table sets standards based on whether the duct is round or rectangular and whether the duct is enclosed in a partition or not.	was eliminated and replaced with the 4 inch rule.
M1502.4.2	<p>Duct Installation. Exhaust ducts must be supported at <u>4 ft</u> intervals (maximum) and must be secured in place.</p> <ul style="list-style-type: none"> ✓ The insert end of the duct must extend into the adjoining duct or fitting in the direction of airflow. ✓ Ducts must not be joined with screws or similar fasteners that protrude into the inside of the duct. 	<p>Duct Installation. Maximum support spacing for clothes dryer exhaust ducts increases from <u>4 ft</u> to <u>12 ft</u>.</p> <ul style="list-style-type: none"> ✓ Exhaust duct joints must be sealed according to M1601.4.1 and must be mechanically fastened. ✓ Ducts may be joined by screw fasteners but they cannot penetrate the exhaust duct more than <u>1/8th</u> inch. 	<p>Duct Support. Rigid metal ductwork must be supported in accordance with Table 323.08–B. SPS 323.08(7).</p> <p>Duct Construction. Ductwork must be installed in accordance with any one of the appropriate following standards: ASHRAE, SMACNA HVAC Duct Construction Standards, SMACNA Fibrous Glass Duct Construction Standards, ASHRAE HVAC Applications Handbook, or NAIMA Fibrous Glass Duct Construction Standards. SPS 323.08(5).</p>	<p><u>IRC changes:</u> The IRC provisions are specific to clothes dryers (M1502 is concerned specifically with clothes dryers). The SPS provisions apply to ductwork generally.</p> <p><u>2012 changes:</u> The requirement that screw fasteners may not penetrate more than 1/8th inch into the vent is intended to avoid lint buildup that can create a fire hazard.</p>
M1502.4.3	<p>Clothes Dryer Transition Ducts. The transition ducts that connect the dryer to the exhaust duct system must be a single length.</p> <ul style="list-style-type: none"> ✓ Transition ducts must be listed and labeled in accordance with UL 2158A. ✓ Transition ducts cannot be more than <u>8 ft</u> in length. 	—	—	<p><u>SPS:</u> SPS 323.07(3) addresses transition ducts in other respects.</p>
M1502.4.4 and 4.4.1 and	<p>Duct Length. The maximum length for a clothes dryer exhaust duct may be calculated two ways. First, the maximum length may be <u>25 ft</u> from the connection of the transition duct to the outlet terminal. With respect to the 25 ft</p>	<p>Specified Length. The maximum length for a clothes dryer exhaust duct is increased from <u>25 ft</u> (2009 standard) to <u>35 ft</u>. The maximum length of the exhaust duct does not include the transition duct.</p>	—	<p><u>2009 changes:</u> Manufacturer’s instructions govern maximum length <i>only if</i> the dryer model is known and the instructions are submitted to the code</p>

4.4.2	maximum length, if fittings are used, the maximum length is reduced per Table M1502.4.4.1. Second, the maximum length may be set by the manufacturer's installation instructions. In that case, at the concealment inspection, the code official must be provided with a copy of the manufacturer's installation instructions. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table M1502.4.4.1 must be used.			official.		2012 changes: The changes are consistent with the IMC, IFGC, and IRC fuel-gas. New provisions regarding transition ducts correlate with the SMACNA Duct Construction Manual.
M1502.4.5	Concealed Length Identification. If the clothes dryer exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct must be identified on a <u>permanent</u> label or tag. The label or tag must be within <u>6 ft</u> of the exhaust duct connection.	—		There is no requirement to identify the length of a concealed clothes dryer exhaust duct in the SPS code. However, SPS 323.14(2)(b) addresses concealed dryer vent piping in other respects.		2009 changes: The new requirement intends to alert homeowners installing new dryers to match the specifications for the make and model to the existing exhaust duct installation.
M1502.4.6	Exhaust Duct Required. Where space for a clothes dryer is provided, an exhaust duct system must be installed. ✓ If the clothes dryer is not installed at the time of occupancy the exhaust duct must be capped or plugged in the space in which it originates and identified and marked for "future use." ✓ If a listed condensing clothes dryer is installed prior to occupancy of the structure, no exhaust duct is required.	—			—	2009 changes: Requirement for duct installation during construction is similar to language from G2439.5.2 of the 2006 IRC for gas dryers. The intent of requiring a clothes dryer exhaust duct at construction is "so it may be inspected for compliance with the code" during the initial inspection.
M1502.5	Protection Required. Protective shield plates must be placed where nails or screws from finish or other work are likely to penetrate the clothes dryer exhaust duct. They must be placed on the finished face of all framing members with less than <u>1 ¼ inches</u> between the duct and the finished face of the framing member.	—			—	SPS: Protective shields are mentioned in SPS only with respect to solid fuel-burning appliances, SPS 323.045(7). In that provision, manufacture and installation of a solid-fuel-burning appliance must occur

		Protective shield plates must be made of steel, have a thickness of <u>0.062 inch</u> and extend a minimum of <u>2 inches</u> above sole plates and below top plates.			according to the appliance's listing.
M1503.4		Makeup Air for Kitchen Exhaust Hoods. When a kitchen exhaust hood has a rating greater than <u>400 cfm</u> , the makeup air system must be synchronized with the operation of the exhaust hood. These makeup air systems must also be equipped with a means of closure and be automatically controlled to start and operate simultaneously with the exhaust system.	—	Design – Ventilation (HVAC General). Kitchen range hoods that exhaust air are considered exhaust ventilation for balancing and make-up purposes. SPS 323.02(3)(b)3.a. ✓ Mechanical ventilation systems must be balanced. SPS 323.02(3).	<u>2009 changes:</u> IRC Summary of Changes indicates that high velocity kitchen fans are becoming more common (1300 cfm or greater).
M1506.2		Exhaust Openings. Exhaust openings must be <u>3 ft</u> from property line, <u>3 ft</u> from openings to the building (operable or not), and <u>10 ft</u> from mechanical air intake (unless exhaust opening is <u>3 ft</u> above air intake). ✓ Openings shall comply with Sections R303.5.2 and R303.6. ✓ Relevant addition to M1501.1: “The air removed by every mechanical exhaust system shall be discharged to the outdoors <u>in accordance with Section M1506.2</u> . Air shall not be exhausted into an attic, soffit, ridge vent or crawl space.”	—	Venting System Location. ✓ With respect to gas-fired equipment, the venting system must terminate at least <u>4 ft</u> below, <u>4 ft</u> horizontally from, or <u>1 ft</u> above any door, window, or gravity air inlet into any building. The bottom of the vent must be located at least <u>12 inches</u> above grade. These requirements do not apply to direct vent appliances. SPS 323.14 (3)(b). ✓ The distance between a vent terminal of a direct vent appliance and any air opening into a building is: <u>6 inches</u> for an appliance with an input of 10,000 Btu per hour or less <u>9 inches</u> for an appliance with an input between 10,000 – 50,000 Btu per hour. <u>12 inches</u> if the input is over	<u>2012 changes:</u> Similar changes were made in the IMC. <u>SPS:</u> SPS rule (323.14) only applies to gas vents.

			50,000 Btu per hour. SPS 323.14 (3)(c)-(e). ✓ The bottom of the vent must be at least <u>12 inches</u> above grade. SPS 323.14 (3)(f). An exit terminal of a mechanical draft system must be at least <u>7 ft</u> above grade when located within <u>3 ft</u> of a public walkway. SPS 323.14 (3)(g). ✓ All exhaust vents shall terminate outside the structure. SPS 323.02(3)(a)1.	
M1507.1	—	<p>General. Where local exhaust or whole-house mechanical ventilation is provided, the equipment must be designed in accordance with M1701.</p> <p>Local Exhaust Definition, R202: Local exhaust is defined as the use of one or more fans to exhaust air from a specific room or rooms within a dwelling.</p> <p>Whole-House Mechanical Ventilation System Definition, R202: Whole-House Mechanical Ventilation System is defined as an exhaust system, supply system, or combination of the two that is designed to mechanically exchange indoor air for outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole-house ventilation.</p>	—	<p><u>SPS</u></p> <p>While SPS does not contain similar definitions, certain provisions cover similar topics in SPS 323.02 and SPS 323.14.</p> <p><u>2012 changes:</u> IRC requires whole-house ventilation when the doors and windows do not meet the minimum prescribed openable area or a blower door test reveals the air-infiltration rate is less than 5 air changes per hour.</p> <p>Ventilation rates are based on ASHRAE 62.2</p>
M1507.3 and M1507.3.1 3.2 3.3	—	<p>Whole-House Mechanical Ventilation System. A Whole-House Mechanical Ventilation System must:</p> <p>✓ Have one or more supply <u>or</u> exhaust fans or a combination of associated ducts and controls. Local exhaust or supply fans are permitted to serve as a</p>	<p>Habitable Rooms. Habitable rooms without openable windows must be provided with a balanced mechanical ventilation system producing 1 air change per hour of fresh outside air while the room is</p>	—

		<p>whole-house mechanical ventilation system. Outdoor air ducts connected to the return side of an air handler must be considered to provide supply ventilation.</p> <p>✓ The whole-house mechanical ventilation system must have controls that allow manual override. (3.2)</p> <p>✓ Whole house ventilation must provide outdoor air at a continuous rate. The table in M1507.3.3 (1) sets the minimum rates.</p> <p><i>Exception:</i> The whole house ventilation may operate intermittently if “the system has controls that enable operation for not less than 25% of each 4-hour segment and the ventilation rate in Table M1507.3.3(1) is multiplied by the factor determined in accordance with Table M1507.3.3(2).”</p>	occupied. SPS 323.02(3)(c).
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M1507.4	—	<p>Local Exhaust Rate. Local exhaust systems must be designed to have the capacity to exhaust the minimum air flow rate determined in accordance with Table M1507.4.</p>	—
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DUCT SYSTEMS
M1600

M1601.1 and M1601.1.1	—	<p>Duct Design. Above ground duct systems serving heating, cooling, and ventilation equipment must be installed according to this section <i>and</i> ACCA Manual D or other approved methods. (“Installed” in the preceding sentence was previously “fabricated.”)</p> <p>Above Ground Duct Systems.</p> <p>✓ Metallic ducts must be fabricated in accordance with SMACNA Duct</p>	<p>Ductwork. Ducts designed for the transmission of air may not be used for any other purpose. SPS 323.08 (1).</p> <p>Rules for construction of interior ducts: SPS 323.08 (2), exterior ducts: SPS 323.08 (3), underground ducts: SPS 323.08 (4), and duct construction</p>	<p><u>2012 changes:</u> Although the SPS code does not specifically comment on the 2012 changes listed here, it contains rules regarding ductwork in SPS 323.08.</p>
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Construction Standards Metal and Flexible.

generally: SPS 323.08 (5).

✓ Stud wall cavities and the spaces between solid floor joists to be used as air plenums must comply with the following conditions:

[...] Stud wall cavities in the outside walls of the building envelope assemblies must not be utilized as air plenums.

M1601.3 **Duct Insulation Materials.** Duct insulation materials must conform to the following requirements:

✓ Duct coverings and linings, including adhesives where used, must have a flame spread index not higher than 25 and a smoke-developed index not over 50 when tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231.

✓ *An exception:* spray application of polyurethane foam to the exterior of ducts in attics and crawl spaces must be permitted in the place of other insulators subject to *all* of the following:

1. The flame spread index is not greater than 25 and the smoke-developed index is not greater than 450 at the specified installed thickness.
2. The foam plastic is protected in accordance with the ignition barrier requirements of Sections R316.5.3¹ and R316.5.4.²
3. The foam plastic complies with the requirements of Section 316.

✓ Spray foam manufacturers must provide the same product information and

Air Passageways of Envelope Dwellings. Finishes and insulation exposed to the air passageway must have a flame spread rating of 25 or less and a smoke development rating of 50 or less. SPS 323.08(10)(c).

properties (including name of manufacturer, thermal resistance R-value, flame spread, and smoke-developed indices of the composite materials) to the customer in writing, at the time of foam application. These measurements will refer to the nominal installed thickness.

✓ For spray polyurethane foam, the aged R-value per inch measured in accordance with recognized industry standards must be provided to the customer in writing at the time of foam application. In addition, the total R-value for the nominal application thickness must be provided.

M1601. 4.1 **Joints and Seams.** Closure systems must be installed according to the manufacturer's instructions. *Exceptions:*

1. Application of spray polyurethane foam is permitted without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets must be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification do not require additional closure systems.

✓ "Liquid sealants" were added to the list of materials that can make duct joints substantially airtight (closure systems).

Joints, Seams, and Connections.

✓ All longitudinal and transverse joints, seams, and connections in metallic and nonmetallic ducts must be constructed as specified in SMACNA HVAC Duct Construction Standards- Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards.

✓ Joints, longitudinal and traverse seams, and connections in ductwork must be: securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes.

✓ Closure systems used to seal flexible air ducts and connectors must comply with UL 181B. Pressure-sensitive tape must be marked "181 B-FX" and mastic tape must be marked "181 B-M." Duct connections to flanges of air distribution system equipment must be sealed and mechanically fastened.

✓ Crimp joints for round metallic ducts must have contact lap of not less than

Joints and Seams. All joints and seams must be securely fastened or locked. Round pipe slip joints shall be lapped at least 1 inch. SPS 323.08(8).
✓ Finishes and insulation exposed to the air passageway must have a flame spread rating of 25 or less and a smoke development rating of 50 or less.

2009 changes: UL 723 and ASTM E 84 are both standards that describe the same test method and specify identical test apparatuses and test procedures. The purpose of the tests is to determine the comparative burning characteristics of the tested material.

The flame spread and smoke-developed indices are generally consistent with IRC Ch. 3 and Section 719.7 of the 2006 IBC.

2012 changes: Reduction in minimum crimp overlap was made to follow SMACNA.

1 inch and be mechanically fastened by 3 sheet-metal screws or rivets equally spaced around the joint.

✓ Closure systems used to seal metal ductwork must follow the manufacturer's instructions.

✓ Round metallic ducts must be mechanically fastened by at least 3 sheet metal screws or rivets, equally spaced around the joint. Unlisted duct tape is not allowed as a sealant on any duct.

Exceptions:

1. No additional sealant needed if spray polyurethane foam is used.

2. If duct connection is partially inaccessible, the 3 screws or rivets must be equally spaced on the exposed portion of the duct and placed to prevent a hinge effect.

3. Additional closure systems are not needed if the duct is continuously welded *or* has locking type longitudinal joints and seams that operate at static pressures of less than 2 inches of water column (500 Pa) pressure classification.

M1601. 4.5 **Duct Installation- Vapor Retarders.** A vapor retarder having a maximum permeance of 0.05 perm in accordance with ASTM E 96, or aluminum foil with a minimum thickness of 2 mils (0.05 mm), must be installed on the exterior of insulation on cooling supply ducts that pass through non-conditioned spaces conducive to condensation except where the insulation is spray polyurethane foam with a maximum water vapor permeance of 3 perm per inch at the installed

Air Passageways and Envelope Dwellings. A vapor barrier must be installed on the warm side of insulation which forms a part of the thermal envelope of the dwelling. SPS 323.08(10)(d).
✓ The insulation on the roof side of the air passageway shall be provided with a vapor barrier on the warm side of the insulation.

	thickness.		<ul style="list-style-type: none"> ✓ In the roof-ceiling air passageway, a vapor barrier for the insulation of the ceiling may be omitted if heated air is circulated on both sides of the ceiling insulation. ✓ Any vapor barrier exposed to circulating air shall have a flame spread rating of <u>25</u> or less and a smoke development rating of <u>50</u> or less. 	
M1601.6	Independent Garage HVAC Systems. Furnaces and air-handling systems that supply air to living spaces must not supply air to or return air from a garage.	—	Supply ducts. Supply ducts may not terminate in a garage unless a back draft damper is provided. SPS 323.09.	—
M1602.2	Prohibited Sources of Outdoor and Return Air. Boiler rooms and unconditioned attics were added to the list of places where outdoor and return air may not be taken. Outdoor and return air may not be taken from an unconditioned crawl space by means of direct connection to the return side of a forced air system.	Prohibited Sources. Outdoor or return air may now be taken from a mechanical room. <ul style="list-style-type: none"> ✓ Return air may be taken from a garage for an HVAC system that serves the garage only. ✓ Return air inlets must be <u>10 ft</u> away from a fuel-burning appliance’s draft hood. ✓ Return air inlets must be <u>10 ft</u> away from the combustion chamber of any atmospheric burner appliance. ✓ The 10 ft rule does not include fuel-burning appliances that have a direct vent and sealed combustion chambers. 	Return Air Duct. With respect to supplemental solid-fuel-burning units connected to a furnace: <ul style="list-style-type: none"> ✓ The area of the return air duct shall be at least equal to the area of the warm air supply duct. ✓ The return air duct shall be of the same material as specified for supply air ducts. ✓ Return air grilles must not be located in bathrooms, kitchens, garages, utility spaces or in a confined space defined under s. SPS 323.06 in which a draft diverter or draft regulator is located. SPS 323.045(8)(a). ✓ With respect to supplemental solid-fuel-burning units connected to a furnace, the outside air intake must be connected to the cold air return 	<u>2009 changes:</u> For gas-fired appliances, there are provisions for drawing combustion air from ventilated attics in G2407.6 as well. Mechanical rooms were removed from the list of prohibited air sources because the definition of “mechanical rooms” changed. Now, by definition, a mechanical room cannot have fuel-fired appliance in it.

plenum of the furnace. A volume damper must be placed in the duct for the fresh air intake. SPS 323.045(8)(c).

COMBUSTION AIR M1700

<p>M1701.1 and M1701.2</p> <p>Combustion Air. Solid-fuel-burning appliances must have a source of combustion air compliant with the manufacturer’s instructions.</p> <ul style="list-style-type: none"> ✓ Oil-fired appliances must be provided with combustion air in accordance with NFPA 31. ✓ The methods of providing combustion air in this chapter do not apply to fireplaces, fireplace stoves, and direct-vent appliances. ✓ The requirements for combustion and dilution air for gas-fired appliances must follow IRC Ch. 24. ✓ In areas prone to flooding, the combustion openings must be at or above the elevation required by Section R322.2.1 or R322.3.2. Table R301.2(1) establishes areas prone to flooding. 	<p>—</p>	<p>Combustion Air. HVAC appliances must have a source of combustion air compliant with:</p> <ul style="list-style-type: none"> ✓ The manufacturer’s instructions; ✓ The appliance’s listing; or, ✓ Based on the requirements in SPS 323.06(2)-(7). <p>If the appliance listing and manufacturer’s instructions are more stringent than the provisions of SPS 323.06, the listing and manufacturer’s instructions apply.</p>	<p><u>2009 changes:</u> Large sections of M1701 were deleted without substitution because industry testing revealed that the former categories of confined spaces, unconfined spaces, and unusually tight construction were not significant in determining the need for outdoor combustion air.</p> <p>The changes listed in the first column resulted from recognition of the inherent differences in how heating appliances work based on their fuel type. Thus, different rules apply to solid-fuel, oil-fired, and gas-fired appliances.</p>
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SPECIAL FUEL-BURNING EQUIPMENT M1900

<p>M1901.1 and M1901.2</p> <p>—</p>	<p>Ranges and Ovens - Clearances. The installation of a cooking appliance or microwave overhead from another cooking appliance must follow the clearance requirements in M1504.1.³ The clearance for a domestic open-top broiler unit must follow Section</p>	<p>TABLE 323.04–A indicates that cooking stoves must have clearance above top of the stove of at least 30 inches.</p> <p>TABLE 323.04–A refers to</p>	<p><u>2012 changes:</u> These changes were adopted because commercial cooking appliances operate at higher temperatures and provide fewer safeguards than household appliances.</p>
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M1901.3	<p>M1505.1.⁴ Cooking Appliances. Cooking appliances in dwellings must be listed and labeled for household use. ✓ Electric cooking appliances must be listed in accordance with UL 1026 or UL 858. ✓ Solid-fuel-fired fireplace stoves must comply with UL737. Prohibited Location. Cooking appliances designed, tested, listed and labeled for use in commercial occupancies must not be installed within dwelling units or any area where domestic cooking operations occur.</p>	“residential type” cooking appliances.	The IMC also prohibits the installation of commercial cooking appliances in dwellings.
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HYDRONIC PIPING
M2100

M2103.2 and M2103.2.1 and M2103.2.2	<p>Hydronic Floor Heating Systems. Radiant floor heating systems must be provided with a thermal barrier. ✓ The insulation must be beneath the piping and have a minimum R-value of <u>R-5</u>. ✓ In suspended floor applications, insulation must be installed in the joist bay cavity serving the heating space above and must consist of materials with a minimum R-value of <u>R-11</u>.</p>	—	<p>Pipe Sizes and Arrangement. All steam and hot water supply and return piping, air-line piping and auxiliary equipment must be of appropriate sizes, elevations and arrangements to accomplish the calculated results without stress or other detriment. SPS 323.10(1). Expansion and Contraction. The piping for the heating system must be equipped with anchors, expansion swings or joints, supports or similar devices to relieve stress and strain caused by temperature change of the pipe material. SPS 323.10(2).</p>	<p><u>2009 changes:</u> R5 and R11 values are consistent with IRC Sec. 1102. <u>SPS:</u> These provisions arguably apply to hydronic flooring based on their wording. However, note that other provisions in the same section refer to water temperatures of 180 – 250 degrees. Also note that the provisions became effective in 1979.</p>
M2103.2.3	<p>Thermal Break Required. A thermal break consisting of asphalt expansion</p>	—	—	<p><u>2009 changes:</u> This change was intended to improve</p>

	joint materials or similar insulating materials must be provided where a heated slab meets a foundation wall or other conductive slab.			energy efficiency.
M2103.2.4	<p>Thermal Barrier Material Marking.</p> <p>✓ Insulating materials in thermal barriers must be installed so the manufacturer's R-value mark is readily observable.</p> <p>✓ Exception: insulation is not required in engineered systems where it can be demonstrated that the insulation will decrease the efficiency or have a negative effect on the installation.</p>	—	—	
M2104.3 and Table M2101.1 and M2104.3.1 and M2104.3.2	<p>Hydronic Piping Materials. Joints between raised temperature polyethylene tubing and fittings must conform to Sections M2104.3.1 and M2104.3.2.</p> <p>✓ M2104.3.1: Compression-Type Fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings must be installed with the inserts or ferrules or O-rings.</p> <p>✓ M2104.3.2: PE-RT to Metal Connections. Solder joints in a metal pipe must not occur within <u>18 inches</u> of a transition from such metal pipe to PE-RT pipe.</p> <p>✓ Mechanical joints must be installed according to the manufacturer's instructions.</p>	—	—	<p><u>2009 changes:</u> These changes recognize two polyethylene materials for use in hydronic piping.</p> <p><u>2009 changes:</u> The compression-type fitting provision has the same wording as M2104.4.1. and the difference is this provision relates to raised temperature polyethylene (PE-RT) plastic tubing.</p>
M2104.4	<p>Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Pressure Pipe. Joints between Polyethylene/Aluminum/Polyethylene pressure pipe and fittings must conform to Sections M2104.3.1 and M2104.3.2 (immediately above).</p> <p>✓ Mechanical joints must be installed according to the manufacturer's</p>	—	—	—

	instructions.			
M2104.4.1	Compression-Type Fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings must be installed without omitting the inserts or ferrules or O-rings.	—	—	<u>2009 changes:</u> The same wording appears in M2104.3.1; the difference is this provision relates to polyethylene pressure pipe.
M2104.4.2	PE-AL-PE to Metal Connections. Solder joints in a metal pipe must not occur within <u>18 inches</u> of a transition from such metal pipe to PE-AL-PE pipe.	—	—	—
SOLAR SYSTEMS				
M2300				
M2301.1	Thermal Solar Energy Systems. Thermal is added to the types of solar energy systems covered by M2301.	—	—	—
M2302.2.1	Roof-Mounted Panels and Modules. ✓ Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the load. ✓ If the solar panels serve as a roof covering, they have to meet all the requirements of roof coverings in Ch. 9. ✓ When solar panels are mounted on or above the roof covering, the panels, modules, and supporting structure must be made of noncombustible materials. Wood may be used if it is fire-retardant-treated.	—	—	<u>2012 changes:</u> The provisions regarding photovoltaic (PV) panels are entirely new. PV systems are also covered in NEC Article 690. That Article discusses wiring, grounding, and overcurrent protection, among other things.
M2302.2.2	Roof and Wall Penetrations. Roof and wall penetrations must be flashed and sealed to prevent entry of water, rodents and insects in accordance with Ch.9.	—	—	—
M2302.2.3	Ground-Mounted Panels and Modules. Panels and modules that are mounted to the ground must be installed according to the manufacturer's instructions.	—	—	—

M2302.3	—	Photovoltaic Panels and Modules. Panels and modules must be listed and labeled in accordance with UL 1703.	—	—
M2302.4	—	Inverters. Inverters must be listed and labeled in accordance with UL 1741. Systems connected to the utility grid must use inverters listed for utility interaction.	—	—

¹ R316.5.3: A thermal barrier is not needed in an attic when the attic has an access point and people enter it only for repairs or maintenance. It also requires that the foam plastic be protected against ignition by one of the following: mineral fiber insulation, wood structural insulation, particleboard, hardboard, gypsum board, or corrosion-resistant steel. The ignition barrier is not needed if the foam plastic has been tested per R316.6. SPS code TABLE 323.04–B addresses similar requirements.

² R316.5.4: A thermal barrier is not needed in a crawl space when the attic has an access point and people enter it only for repairs or maintenance. It also requires that the foam plastic be protected against ignition by one of the following: mineral fiber insulation, wood structural insulation, particleboard, hardboard, gypsum board, or corrosion-resistant steel. The ignition barrier is not needed if the foam plastic has been tested per R316.6. SPS code TABLE 323.04–B addresses similar requirements.

³ M1504.1: Both the upper and lower appliance must be listed and labeled. The upper appliance’s listing and labeling control the amount of clearance between the appliances. Usually, the upper appliance is a microwave.

⁴ M1505.1: Domestic open top broiler units must have a metal exhaust hood with a minimum thickness of 0.0157 inch and ¼ inch clearance between the hood and the underside of the combustible material or cabinets. A clearance of at least 24 inches must be maintained between the cooking surface and the combustible material or cabinet. The hood must be at least as wide as the broiler unit, extend over the entire unit, discharge to the outdoors and be equipped with a back draft damper or other means to control infiltration/ exfiltration when not in operation. Broiler units incorporating an integral exhaust system, and listed and labeled for use without an exhaust hood need not have an exhaust hood.