IRC — Mechanical

2021 GROUP A PROPOSED CHANGES TO THE I-CODES

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Virtual Committee Action Hearings

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2021 GROUP A – PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE – PLUMBING/ MECHANICAL

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TENTATIVE ORDER OF DISCUSSION
2021 PROPOSED CHANGES TO THE INTERNATIONAL RESIDENTIAL CODE – MECHANICAL

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some RM code change proposals may not be included on this list, as they are being heard by another committee.

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RM1-21

IRC: M1305.1.2.2 (New)

Proponents: David C Bixby, ACCA, representing ACCA (bixster1953@yahoo.com)

2021 International Residential Code

Add new text as follows:

M1305.1.2.2 Permanent service access. Where equipment or appliances requiring routine service (including, but not limited to, the changeout of filters) are located in an Attic, a permanent means of access shall be provided. Attic access shall be provided by pulldown stairs or other permanent steps to allow for removal of the largest appliance. Such service access shall not require the use of portable ladders.

Exception: Attics that already have existing appliances installed and maintained.

Reason Statement: Section M1305.1.2 provides specifications for the size of the minimum clear and unobstructed opening and passageway to allow removal of the largest appliance. However, the need for a safe and secure energy efficient access is not specified, and should be added for the safety of personnel and consumers. For consumers, replacement of filters is recommended maintenance and access to the attic should be as safe as possible. Attic stairs often include proven energy savings through verifiable factory energy performance ratings. The proposal also reflects the intent of Section M1202.3, Maintenance, which requires mechanical systems, both existing and new, to be maintained in proper operating condition and in a safe condition. The proposal is also consistent with Section 306.5 in the International Mechanical Code which requires providing safe and reasonable access for servicing appliances. It should be noted that the proposal is similar to an amendment to the Georgia building code that became effective January 1, 2020.

Cost Impact: The code change proposal will increase the cost of construction
This proposal will increase the cost of construction. ACCA estimates the cost will be about $700 for new construction. Although the proposal exempts attics that already have existing appliances installed and maintained, ACCA estimates the cost to move appliances into an existing home's attic (appliances not previously there) could be about $1,900.

RM2-21

IRC: M1307.8 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Add new text as follows:

M1307.8 Garage HVAC systems. Where private garages are required to be conditioned, HVAC systems shall be dedicated to the garage and serve no other space. Return air from forced air systems shall be in accordance with Section G2442.

Reason Statement: The IRC is silent when it comes to co-mingling HVAC systems with a private garage. The garage must not share supply or return air with the residence for obvious fire safety reasons. This language simply spells out if the garage is to be conditioned it must be accomplished with its own dedicated system. Regardless of the fuel source the return air requirements are the same.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
There will be no increase in cost of construction if this change is approved. It's a well-known fact that a garage and a residence cannot share an HVAC system with co-mingling supply and return air. This dedicated system is how it has always been accomplished and there are no new requirements to trigger an increase in cost. Merely a clarification.

RM3-21

IRC: M1401.1, ASHRAE Chapter 44 (New)

Proponents: Emily Toto, ASHRAE, representing ASHRAE (etoto@ashrae.org)

2021 International Residential Code

Revise as follows:

M1401.1 Installation. Heating and cooling *equipment* and *appliances* shall be installed in accordance with the manufacturer's instructions, ~~and~~ the requirements of this code, and ASHRAE 15.2.

Add new standard(s) as follows:

ASHRAE

ASHRAE
1791 Tullie Circle NE
Atlanta GA 30329

15.2—2020: Safety Standard for Refrigeration Systems in Residential Applications

Staff Analysis: A review of the standards proposed for inclusion in the code, ASHRAE 15.2—2020: Safety Standard for Refrigeration Systems in Residential Applications, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: ASHRAE is developing a new standard, ASHRAE 15.2, which will cover the application requirements for residential air conditioning and heat pump systems. This standard has completed a second Publication Public Review (PPR2) and expected to be completed in first quarter of 2021. This proposal adds a reference to the anticipated newly published standard into the IRC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides new safety requirements for use of new systems with flammable refrigerants but does not introduce additional requirements that would impact cost to existing air conditioners or heat pumps.

RM4-21

IRC: M1402.1, M1403.1, M1412.1, M2006.1

Proponents: Jonathan Roberts, representing UL LLC (jonathan.roberts@ul.com)

2021 International Residential Code

Revise as follows:

M1402.1 General. Oil-fired central furnaces shall ~~conform to~~ be *listed* and *labeled* in accordance with ~~ANSI /~~UL 727. Electric furnaces shall ~~conform to~~ be *listed* and *labeled* in accordance with UL 1995 or UL/CSA~~/ANCE~~ 60335-2-40.

M1403.1 Heat pumps. Electric heat pumps shall be *listed* and *labeled* in accordance with UL 1995 or UL/CSA~~/ANCE~~ 60335-2-40.

M1412.1 ~~Approval of~~ Listed equipment. Absorption systems shall be installed in accordance with the manufacturer's instructions. Absorption *equipment* shall ~~comply~~ be *listed* and *labeled* in accordance with UL 1995 or UL/CSA~~/ANCE~~ 60335-2-40.

M2006.1 General. Pool and spa heaters shall be installed in accordance with the manufacturer's installation instructions. Oil-fired pool heaters shall ~~comply~~ be *listed* and *labeled* in accordance with UL 726. Electric pool and spa heaters shall ~~comply~~ be *listed* and *labeled* in accordance with UL 1261. Pool and spa heat pump water heaters shall ~~comply~~ be *listed* and *labeled* in accordance with UL 1995, or UL/CSA~~/ANCE~~ 60335-2-40 ~~or CSA C22.2 No. 236~~.

Exception: Portable residential spas and portable residential exercise spas shall ~~comply~~ be *listed* and *labeled* in accordance with UL 1563 or CSA C22.2 No. 218.1.

Update standard(s) as follows:

UL/CSA/~~ANCE~~ 60335-2-40—~~2012~~ 2019: Standard for Household and Similar Electrical Appliances, Safety - Part 2 -40: ~~Particular Requirements for Motor-compressors~~ Particular requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers

Staff Analysis: A review of the standard proposed for inclusion in the code, UL/CSA 60335-2-40-2019: Standard for Household and Similar Electrical Appliances, Safety - Part 2-40: Particular requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.
UL/CSA 60335-2-40-2019: Standard for Household and Similar Electrical Appliances, Safety - Part 2-40: Particular requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers is also being considered in RM5-21.

Reason Statement: This proposal clarifies that these various types of equipment shall be "listed and labeled", which are defined terms in the code, and is consistent with the style used in other sections of the code, such as M1403.1.
The first edition of the UL/CSA 60335-2-40 was jointly published with ANCE, but subsequent editions have not. The designation used for UL 727 should be shown without the prefix "ANSI/" for consistency with how all other UL standards are referenced in the I-codes.

CSA C22.2 No. 236 has been withdrawn due to the publication of UL/CSA 60335-2-40. The referenced standard of "C22.2 No. 218.1" in the exception for M2006.1 needs to be clearly identified as a CSA standard.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Clarifies the requirements and corrects the references of existing standards.

RM5-21

IRC: SECTION M1404, M1404.1, UL Chapter 44 (New), UL Chapter 44

Proponents: Helen Walter-Terrinoni, AHRI, representing AHRI; Julius Ballanco, representing Daikin US (JBENGINEER@aol.com); Andrew Klein, representing The Chemours Company (andrew@asklein.com); Joe Nebbia, Newport Partners, representing Natural Resources Defense Council (jnebbia@newportpartnersllc.com)

2021 International Residential Code

SECTION M1404 REFRIGERATION COOLING EQUIPMENT.

Revise as follows:

M1404.1 Compliance. Refrigeration cooling *equipment* shall comply with UL 474, UL 484, UL 1995, or UL/CSA 60335-2-40 ~~Section M1411~~.

Add new text as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062

UL 474-2015: Standard for Safety Dehumidifiers

Revise as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062

UL/CSA~~/ANCE~~ 60335-2-40~~—2012~~ 2019: Standard for Household and Similar Electrical Appliances, Safety - Part 2 -40: ~~Particular Requirements for Motor-compressors~~ Particular requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers

Add new text as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062

UL 484-2019: Standard for Room Air Conditioners

Staff Analysis: A review of the standards proposed for inclusion in the code, UL/CSA 60335-2-40-2019: Standard for Household and Similar Electrical Appliances, Safety - Part 2-40: Particular requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers, UL 474-2015: Standard for Safety Dehumidifiers and UL 484-2019: Standard for Room Air Conditioners, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: This code change removes the reference to Section 1411 and adds the appropriate standards that regulate refrigeration cooling equipment. UL 484, UL 1995, and UL/CSA 60335-2-40 are the three standards that regulate all residential air conditioning and refrigerant cooling equipment. UL 474 and UL 484 is a new standard being introduced to the code. UL 474 regulates dehumidifiers. UL 484 regulates room air conditioners such as window units and package terminal air conditioners (PTACs). UL 474, UL 484, and UL 1995 will eventually sunset with UL/CSA 60335-2-40 as the replacement standard. However, these three standards are still being used for listing of equipment.
Currently, Section M1403.1 references UL 1995 and UL/CSA/ANCE 60335-2-40 for heat pumps. Similarly, Section M1412.1 references these two standards for absorption cooling equipment. The modification will compliment these two sections and their corresponding references to the standards. In addition, a revision to the IMC added these standards to Table 1101.2. This will keep the IRC consistent with the IMC regarding appropriate standards referenced for refrigeration equipment.

UL/CSA 60335-2-40 has been updated to the current edition since a significant number of new safety requirements were added to the standard.While Section 1411 is removed from a reference, the section still applies. It is not necessary to reference the section.

(Joe Nebbia,)
The current language in the 2021 IRC in section M1404 does not contain needed reference to UL 484, UL 1995, or UL/CSA 60335-2-40, the appropriate safety standards that establish requirements for this equipment. Rather the section points to M1411 unnecessarily. M1411 applies to both heating and cooling equipment regardless of the current statement in M1404. This code change replaces the unnecessary reference to M1411, without removing the requirements of M1411, while adding the necessary reference to equipment safety standards. This change is consistent with how other sections in Chapter 14 (M1402, M1403, M1412, M1413) reference equipment safety standards and mirrors the structure of M1403 (Heat

Pump Equipment). It also allows the reference to the most up to date UL/CSA 60335-2-40 which includes safety requirements specific to A2L refrigerants.

These changes are especially important in the case of A2L refrigerants, which are expected to increase in use as a substitute for hydrofluorocarbon (HFC) refrigerants. HFCs are extremely potent greenhouse gases and in December 2020 the U.S. Congress passed a new law that will require an 85% economy-wide phasedown of HFC refrigerants over the next 15 years. The phasedown is expected to avoid HFC emissions of 900 million metric tons of CO2-equivalent by 2035. In addition, 9 states - 8 of which adopt the ICC codes - have already prohibited the use of HFC refrigerants in several high volume applications.1 Human comfort systems account for more HFC use than any other end-use application in the U.S., so a large portion of the HFC reductions are expected to come from them. A2L refrigerants have significantly lower global warming potential than A1-class HFCs, so A2L use is a key part of the HFC reduction plan.

These restrictions on the supply of HFC refrigerant will drive up consumption of A2L substitutes. Permitting use of alternative refrigerants, including A2L refrigerants, in high probability systems for human comfort will enable states and local jurisdictions to meet their heating and cooling needs while also complying with applicable HFC regulations. Without this change, jurisdictions adopting the code will be forced to enact their own amendments to the code in order to support their HFC reduction goals. This code change allows the ICC to provide an off the shelf solution to those jurisdictions.

Residential equipment represents a large portion of HFC emissions. Residential and light commercial air-conditioning make up 22% of nationwide refrigerant emissions,2 making this change an important piece to addressing the residential use of HFC refrigerants. Without this change, jurisdictions adopting the code will be forced to enact their own amendments to the code in order to support their HFC reduction goals. This change allows the ICC to provide an off the shelf solution to those jurisdictions.

1 https://www.nrdc.org/experts/christina-theodoridi/states-keep-steady-course-hfc-regulations2 https://www.epa.gov/sites/production/files/2015-09/documents/epa_hfc_residential_light_commercial_ac.pdfThe current language in the 2021 IRC in section M1404 does not contain needed reference to UL 484, UL 1995, or UL/CSA 60335-2-40, the appropriate safety standards that establish requirements for this equipment. Rather the section points to M1411 unnecessarily. M1411 applies to both heating and cooling equipment regardless of the current statement in M1404. This code change replaces the unnecessary reference to M1411, without removing the requirements of M1411, while adding the necessary reference to equipment safety standards. This change is consistent with how other sections in Chapter 14 (M1402, M1403, M1412, M1413) reference equipment safety standards and mirrors the structure of M1403 (Heat Pump Equipment). It also allows the reference to the most up to date UL/CSA 60335-2-40 which includes safety requirements specific to A2L refrigerants.

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Bibliography: [1] https://www.nrdc.org/experts/christina-theodoridi/states-keep-steady-course-hfc-regulations
[2] https://www.epa.gov/sites/production/files/2015-09/documents/epa_hfc_residential_light_commercial_ac.pdf

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change only adds the appropriate standards that are used for testing and listing refrigeration cooling equipment. The code already requires such equipment to be listed.

RM6-21

IRC: M1411.1, M1411.2 (New), M1411.3 (New), M1411.4 (New), M1411.5 (New), M1411.6 (New), M1411.7 (New), ANCE Chapter 44, CSA Chapter 44, UL Chapter 44

Proponents: Helen Walter-Terrinoni, AHRI, representing AHRI (helen.a.walter-terrinoni@outlook.com); Julius Ballanco, representing Daikin US (JBEngineer@aol.com)

2021 International Residential Code

M1411.1 Approved refrigerants. Refrigerants used in direct refrigerating systems shall conform to the applicable provisions of ANSI/ASHRAE 34.

Add new text as follows:

M1411.2 Refrigeration system listing. Refrigeration systems using Group A2L refrigerants shall be listed and labeled to UL 60335-2-40/CAN/CSA C22.2 No. 60335-2-40. Refrigeration systems using Group A1 refrigerants shall be listed to UL 60335-2-40/CAN/CSA C22.2 No. 6-335-2-40 or UL 1995/CSA C22.2 No. 236. The equipment shall be installed in accordance with the listing.

M1411.3 Refrigeration system installation. Refrigeration systems shall be installed in accordance with the manufacturer's installation instructions. After installation, the manufacturer's installation instructions, owner's manuals, service manuals, and any other product literature provided with the equipment shall be attached to the indoor unit or left with the homeowner.

M1411.4 Field installed accessories. All Field installed accessories shall be installed in accordance with the accessory and equipment manufacturer's installation instructions. Accessories installed in the ductwork of Group A2L refrigeration systems shall not contain electric heating elements, open flames, or devices switching electrical loads greater than 2.5 kVA.

M1411.5 Signs and identification. Each refrigeration system using Group A2L refrigerant shall have the following information legibly and permanently indicated on a markable label provided by the equipment manufacturer.

1. Contact information of the responsible company that installed the refrigeration system, and
2. The system refrigerant charge and the refrigerant number.

M1411.6 Refrigerant charge. All refrigeration systems shall have refrigerant charge in compliance with the equipment manufacturer's installation instructions and the requirements of the listing. Group A2L refrigerant charge for an individual refrigeration system shall not exceed 34.5 lbs (15.7 kg).

M1411.7 Group A2L refrigerant piping testing. The piping system containing Group A2L refrigerant shall be tested in accordance with the manufacturer's installation instructions and the requirements of the listing.

Delete without substitution:

ANCE

Association of Standardization and Certification
Av. Lázaro Cárdenas No. 869 Fraccion 3
Col. Nva. Industrial Vallejo Deleg. Gustavo A. Madero México, D.F.

~~**NMX-J-521/2-40-ANCE—2014/CAN/CSA-22.2 No. 60335-2-40—12/UL 60335-2-40: Safety of Household and Similar Electric Appliances, Part 2-40: Particular Requirements for Heat Pumps, Air-Conditioners and Dehumidifiers**~~

Revise as follows:

CSA

CSA Group
8501 East Pleasant Valley Road
Cleveland OH 44131-5516

UL 60335-2-40-2019/CAN/CSA/C22.2 No. 60335-2-40—~~2012~~ 19: Standard for Safety of Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers

UL

UL LLC
333 Pfingsten Road
Northbrook IL 60062

UL~~/CSA/ANCE~~ 60335-2-40—~~2012~~ 2019/CAN/CSA C22.2 No. 60335-2-40-19: Standard for Safety Household and Similar Electrical Appliances~~,~~ - Safety - Part 2 -40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers ~~Motor-compressors~~

Staff Analysis: A review of the standards proposed for inclusion in the code, UL 60335-2-40-2019/CAN/CSA/C22.2 No. 60335-2-40-19: Standard for Safety of Household and Similar Electrical Appliances, Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before March 20, 2021.

Reason Statement: ASHRAE has developed a new standard, ASHRAE 15.2, that addresses requirements for residential refrigeration systems and air conditioners. This proposed change adds requirements consistent with the provisions in ASHRAE 15.2. This code change was developed through the cooperation of ASHRAE SSPC 15 members, ASHRAE SPC 15.2 members, AHRI, and NAHB.
The general requirements list the specific standards that regulate refrigeration equipment. The change will mandate a listing to UL 60335-2-40/CAN/CSA C22.2 No. 60335-2-40 for any equipment using A2L refrigerant. The same standard will apply for systems using A1 refrigerants. Additionally UL 1995 is included for equipment using A1 refrigerants. UL 60335-2-40/CAN/CSA C22.2 No. 60335-2-40 has been updated to the 2019 edition which is the latest edition. In the latest edition, ANCE (from Mexico) withdrew their sponsorship. Hence, the ANCE listing is shown deleted. The standard is only bi-national between the United States and Canada.

The field marking of new equipment is required by the product standard. This requirement has been added to the code to keep the code consistent with the listing requirements.

The manufacturer specifies the charge limitation in the installation instructions for equipment using Group A2L refrigerant. This is also required by the product standard and assures the safe amount of charge based on room volume. The manufacturers also specify the testing requirements for refrigerant piping for residential equipment. Testing of the refrigerant piping is important to identify to allow the code official to observe that the piping can me the pressure requirements of the equipment.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The installation of air conditioning equipment is optional. Therefore there is no increase or decrease in cost. This change emphasizes the requirements currently in the code regarding general listing and installation of mechanical equipment.

RM6-21

RM7-21

IRC: M1411.3 (New)

Proponents: Helen Walter-Terrinoni, AHRI, representing AHRI (helen.a.walter-terrinoni@outlook.com); Julius Ballanco, representing Daikin US (JBEngineer@aol.com)

2021 International Residential Code

Add new text as follows:

M1411.3 Refrigerant detection system. Refrigeration systems using Group A2L refrigerant with a charge exceeding 4 lbs. (1.8 kg) shall have an integral refrigerant detection systems.

Reason Statement: This change is consistent with the change to add the provisions consistent with ASHRAE 15.2. It was decided to separate the requirements for refrigerant detection systems since some believe this requirement is unnecessary since the listing to the standard will already mandate refrigerant detection systems over a certain charge. Whether this code change is accepted or not, refrigerant detection systems will be provided because of the listing requirements.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The use of Group A2L refrigerants is optional. As such, there is no cost impact to this code change. If Group A2L refrigerant is selected for the equipment, there will be a higher cost associated with a refrigerant detection system.

RM8-21

IRC: 1502.6 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Add new text as follows:

1502.6 Makeup air. Installations exhausting more than 200 cfm (0.09 3/s) shall be provided with make up air. Where a closet is designated for the installation of a clothes dryer, an opening having a area of not less than 100 sq. inches (0.o645 m2) for make up air shall be provided in the closet enclosure, or make up air shall be provided by other approved means.

Reason Statement: This language does not appear in Section M1502 for dryer exhaust and is a logical location for the makeup air requirements for residential clothes dryers. This is the same language found in the IMC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
IRC-1502.6……..This IMC extraction should not increase the cost of construction as no new materials are required to provide and opening in a wall. A louvered door is over and above what the code calls for but would be an option and not a requirement possibly increasing cost.

RM9-21

IRC: M1503.3

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Revise as follows:

M1503.3 Exhaust discharge. Domestic cooking exhaust equipment shall discharge to the outdoors through a duct. The duct shall have a smooth interior surface, shall be airtight, shall be equipped with a backdraft damper and shall be independent of all other exhaust systems. Ducts serving domestic cooking exhaust equipment shall not terminate in an attic or *crawl space* or areas inside the building.

Exception: ~~Where installed in accordance with the manufacturer's instructions, and where mechanical or natural *ventilation* is otherwise provided, *l Listed* and *labeled* ductless range hoods shall not be required to discharge to the outdoors.~~ ,provided that the installation complies with all of the following:

1. The equipment is installed in accordance with the manufacturer's instructions.
2. Mechanical or natural ventilation is otherwise provided in the cooking area.
3. The equipment is installed in an existing kitchen not having an existing range hood exhaust duct to the outdoors.

Reason Statement: Cooking is typically the largest source of indoor air pollution in homes, with concentrations of key pollutants frequently exceeding U.S. National Ambient Air Quality Standards. Over time, exposure to these pollutants has been shown to reduce duration and quality of life. Research has demonstrated that provision of kitchen ventilation is needed to comply with the Section 101.3 purpose of the IRC to "establish minimum requirements to safeguard the public safety, health and general welfare through ...ventilation." Unless captured at the source and exhausted to the exterior, cooking pollutants spread rapidly through a home and deposit on surfaces, only to be released again into the breathing zone when disturbed at a later time. This proposal adds one more condition to the two conditions within this section that are required to approve ductless range hoods: the installation of the ductless range hood must be in an existing kitchen that does not have an existing range hood exhaust duct to the outdoors. This will ensure that where installed within new construction, range hoods will be exhausted to the exterior. The exception permitting ductless range hoods for existing construction is provided in recognition of the high costs that could otherwise be associated with retrofitting a duct to the exterior. Within new construction, requiring a range hood to be ducted can be a very low-cost item with high returns in terms of occupant health. Please see the cost statement for more information.

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Cost Impact: The code change proposal will increase the cost of construction

There is no increase in construction costs for existing homes.

Where homes of new construction are already provided with range hoods ducts, there will not be any increase in construction cost.

Where new construction homes are not currently provided with ducts for their range hoods, this proposal would increase the cost of construction. Installed duct costs can be estimated at ~ $7.10 per linear foot for 6" diameter galvanized steel duct (Mechanical Costs with RS Means Data. 2020. Section 23 31 13.16.5420), and a damper would cost about $25 retail.

RM10-21

IRC: M1503.6

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Revise as follows:

M1503.6 Makeup air required. Where one or more gas, liquid or solid fuel-burning *appliance* that is neither direct-vent nor uses a mechanical draft venting system is located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cubic feet per minute (0.19 m^3/s) shall be mechanically or passively provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with not fewer than one damper complying with Section M1503.6.2.

Exception: Makeup air is not required for whole house fan exhaust systems installed for the exclusive purpose of space cooling and intended to be operated only when windows or other air inlets are open.

Reason Statement: This new exception made a simple point overly complicated. Everyone knows what a whole house fan is and how to use it. As worded, its leaves one wondering, what are we talking about here, a whole house fan? This language simply explains the obvious and clears up the question.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is a descriptor of what the text is attempting to impart. The text refers to a "whole house fan" system without coming out and saying it. There will be no cost impact because of this change.

RM11-21

IRC: M1504.3

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Revise as follows:

M1504.3 Exhaust openings. Openings shall comply with Sections R303.5.2 and R303.6. Air exhaust openings shall terminate as follows:

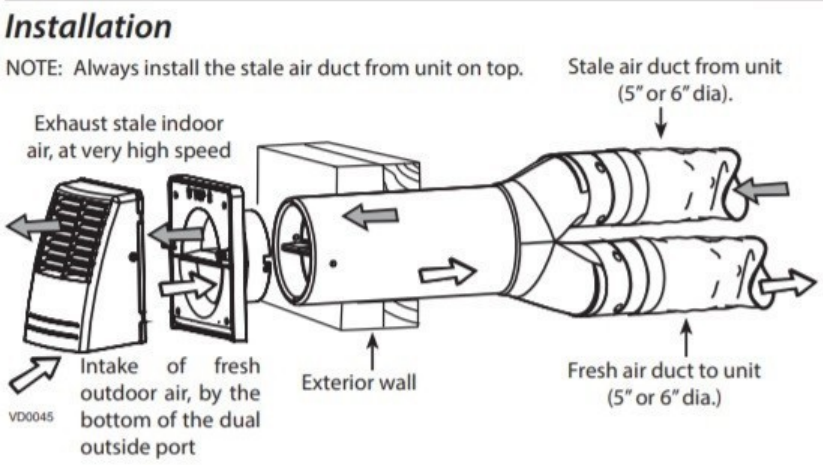
1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where either of the following apply:

   3.1 ~~the~~ The exhaust opening is located not less than 3 feet (914 mm) above the air intake opening.

   3.2 The exhaust opening is part of a factory-built intake/exhaust combination termination fitting installed in accordance with the appliance manufacturer's instructions, and the exhaust air is drawn from a living space within the dwelling unit served by the mechanical air intake opening.

   ~~Openings shall comply with Sections R303.5.2 and R303.6.~~

Reason Statement: Factory-built intake/exhaust combination termination fittings are regularly provided by manufacturers and installed by builders to separate mechanical air intakes from mechanical exhaust serving whole-house mechanical ventilation systems. The following image from a ventilation system manufacturer's installation instructions provides an example of a typical fitting serving this purpose.



IMC Sections 401.4 and 501.3.1 approve the use of "approved factory-built intake/exhaust combination termination fittings" to separate the air streams associated with mechanical intake air openings and living space exhaust air, when the fitting is provided in accordance with manufacturer's instructions. Similarly, Section G2407.1 of the Fuel Gas Code (see below for reference) approves the use of concentric vent termination fittings to separate combustion air from flue gases provided that such fittings are installed "in accordance with the appliance manufacturer's instructions". Like the IMC, the IRC should approve the use of factory-built intake/exhaust combination termination fittings when installed in accordance with appliance manufacturer's instructions; and, like the Fuel Gas Code's approval of concentric vent termination fittings, no special approval should be required for factory-built intake/exhaust combination termination fittings when installed in accordance with appliance manufacturer's instructions. For reference, a separate proposal will be submitted to the IMC to remove the requirement for special approval when factory-built intake-exhaust combination termination fittings are installed in accordance with the appliance manufacturer's instructions.

Fuel Gas Code reference: "G2407.1 (304.1) General. ...Direct-vent appliances, gas appliances of other than natural draft design, vented gas appliances not designated as Category I and appliances equipped with power burners, shall be provided with combustion, ventilation and dilution air in accordance with the appliance manufacturer's instructions."

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal provides additional installation options for builders which may reduce the cost of construction if selected.

RM12-21

IRC: M1504.3

Proponents: Joseph Summers, representing Chair of PMGCAC (PMGCAC@iccsafe.org)

2021 International Residential Code

Revise as follows:

M1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where the either of the following apply:

   3.1. The exhaust opening is located not less than 3 feet (914 mm) above the air intake opening.

   3.2 The exhaust opening is part of an approved factory-built intake/exhaust combination termination fitting installed in accordance with the manufacturer's instructions, and the exhaust air is drawn from a living space.

4. Openings shall comply with Sections R303.5.2 and R303.6.

Reason Statement: Intake/exhaust combination terminations are regularly installed with heating and energy recovery ventilators (H/ERVs) used for dwelling units. Their use reduces building penetrations, labor, and associated system costs. By reducing the number of penetrations, air leakage can also be reduced, resulting in space conditioning energy savings. Further, the durability of the structure can be improved through reducing entry pathways for bulk water. Manufacturer tests conducted by Natural Resources Canada (NRC) have demonstrated that use of intake/exhaust combination terminations results in minimum cross-contamination of airflows(i.e., not exceeding 4%; see NRC report A1- 007793). These results are aligned with ASHRAE 62.2 approval of such devices, which limits cross-contamination to 10%, as verified by the manufacturer. If approved, this proposed modification to the IRC would limit application of intake/exhaust combination terminations to “approved”, “factory-built” units. Approval of this proposed modification is expected to result in more affordable and architecturally flexible terminations. Note: The IRC defines living space as, “space within a dwelling unit utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes”.
This proposal is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMG CAC). The PMG CAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2020, the PMG CAC has held several virtual meetings open to any interested party. Numerous interested parties attended the committee meetings and offered their input. Related documentation and reports are posted on the PMG CAC website at: https://www.iccsafe.org/products-and-services/i-codes/code-development-process/pmg-code-action-committee-pmgcac/ Reference PMGCAC Working Document Item 7.

Bibliography: Ouazia, B. 2016. Evaluation of a dual hood performance in term of contaminant re-entrainment from exhaust to supply. A1-007793. National Research Council Canada. For a copy of the report, please contact the proponent at the email address provided. Additional reports are available from the proponent upon request.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal will not increase the cost of construction because no additional labor, materials, equipment, appliances or devices are mandated beyond what is currently required by the code.

RM13-21

IRC: M1504.3

Proponents: Brent Ursenbach, representing Utah Governor's Office of Energy Development (brentu@wc-3.com)

2021 International Residential Code

Revise as follows:

M1504.3 Exhaust openings. Air exhaust openings shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from gravity air intake openings, operable windows and doors <u>except where the exhaust opening is located not less than 1 foot (305 mm) above the gravity air intake opening, operable windows and doors</u>.
3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where the exhaust opening is located not less than 3 feet (914 mm) above the air intake opening. Openings shall comply with Sections R303.5.2 and R303.6.

Reason Statement: With the increased popularity of townhouses, many times with limited wall areas on the front and back of these dwellings, quite often it's difficult to find sufficient wall area to locate terminations compliant with the exhaust opening 3' clearance requirements in this section. The exhaust from dryers, bath fans and domestic ranges is not considered noxious or hazardous, and poses little if any health risk.
The following paragraph #3, allows a 70% reduction from 10' above to 3' above for mechanical air intakes. It's reasonable to allow a 66% reduce from 3' above to 1" above for the gravity intakes, doors and operable windows in paragraph #2.

Imagine the simplification of the exhaust duct installations if terminations were allowed above windows, with this 1' clearance requirement.

In IRC Chapter 24 clearance requirements for direct vent gas appliance from these openings are in many cases less than these requirements for these environment exhausts. These gas vents exhaust hazardous productions of combustion to outside.

Meeting the current requirements often adds extra elbows and pipe to the exhaust duct system, reducing the airflow through the duct.

Cost Impact: The code change proposal will decrease the cost of construction
This proposal reduces materials and labor expense required to offset exhaust duct terminations away from windows.

RM14-21

IRC: M1505.3

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Revise as follows:

M1505.3 Exhaust equipment. Exhaust fans and whole-house mechanical ventilation fansshall be *listed* and *labeled* as providing the minimum required airflow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 and HVI 916.

Reason Statement: IRC Table N1103.6.1 (R403.6.1) requires exhaust fan airflow to be determined in accordance with HVI 916, which is a test procedure that references ANSI/AMCA 210-ANSI/ASHRAE 51. This change provides editorial clarification and consistency across sections of the IRC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial; therefore, it will not increase or decrease the cost of construction.

RM15-21

IRC: M1505.4.3, TABLE M1505.4.3(1), TABLE M1505.4.3(3) (New)

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Revise as follows:

M1505.4.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate not less than that determined in accordance with Table M1505.4.3(1) or not less than that determined by Equation 15-1.

Ventilation rate in cubic feet per minute = {air leakage factor x [(0.01 × total square foot area of house) + [7.5 × (number of bedrooms + 1)]} **(Equation 15-1)**

where the air leakage factor is determined in accordance with Table M1505.4.3(3)

Exceptions:

1. Ventilation rate credit. The minimum mechanical ventilation rate determined in accordance with Table M1505.4.3(1) or Equation 15-1 shall be reduced by 30 percent, provided that both of the following conditions apply:

   1.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

      1.1.1. Living room.

      1.1.2. Dining room.

      1.1.3. Kitchen.

   1.2. The whole-house ventilation system is a balanced ventilation system.

2. Programmed intermittent operation. The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1), by Equation 15-1 or by Exception 1 is multiplied by the factor determined in accordance with Table M1505.4.3(2).

TABLE M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0–1	2–3	4–5	6–7	> 7
	Airflow in CFM				
	Dwelling Unit Design Air Leakage Rate (ACH50)[a]				
~~< 1,500~~	~~30~~	~~45~~	~~60~~	~~75~~	~~90~~
~~1,501–3,000~~	~~45~~	~~60~~	~~75~~	~~90~~	~~105~~
~~3,001–4,500~~	~~60~~	~~75~~	~~90~~	~~105~~	~~120~~
~~4,501–6,000~~	~~75~~	~~90~~	~~105~~	~~120~~	~~135~~
~~6,001–7,500~~	~~90~~	~~105~~	~~120~~	~~135~~	~~150~~
~~> 7,500~~	~~105~~	~~120~~	~~135~~	~~150~~	~~165~~
5 ACH50					
< 1500	35	50	70	85	105
1,501-2,500	40	55	75	90	110
2,501-3,500	45	60	85	105	120
3,501-4,500	50	70	90	115	135
4,501-5,500	60	75	100	120	140
5,501-6,500	65	85	110	130	150
6,501-7,500	75	90	115	140	160
> 7,500	80	100	120	145	170
4 ACH50					
< 1500	45	55	75	90	110
1,501-2,500	50	65	85	100	120
2,501-3,500	65	80	100	120	135
3,501-4,500	80	95	115	135	155
4,501-5,500	95	115	135	150	170
5,501-6,500	110	130	150	170	185
6,501-7,500	130	145	165	185	205
> 7,500	145	160	180	200	220
3 ACH50					
< 1500	50	65	80	95	110
1,501-2,500	60	75	90	110	125
2,501-3,500	85	95	115	130	145
3,501-4,500	105	120	135	155	170
4,501-5,500	125	140	160	175	195
5,501-6,500	150	160	180	200	215
6,501-7,500	170	185	200	220	235
> 7,500	190	205	225	240	260
2 ACH50					
< 1500	55	70	85	100	115
1,501-2,500	70	80	95	110	130
2,501-3,500	95	110	125	140	155
3,501-4,500	120	135	150	165	180
4,501-5,500	150	160	175	195	210
5,501-6,500	175	185	205	220	235
6,501-7,500	200	215	230	245	260

> 7,500	225	240	255	270	290
1 ACH50					
< 1500	60	70	85	100	115
1,501-2,500	75	85	100	115	130
2,501-3,500	105	115	130	145	160
3,501-4,500	130	145	160	175	190
4,501-5,500	160	170	190	205	220
5,501-6,500	190	200	215	230	245
6,501-7,500	220	230	245	260	275
> 7,500	250	260	275	290	305

a. ACH50 = dwelling unit design air leakage rate at 50 Pascals of pressure, found as the lesser of the value specified by the builder or design professional, where applicable, and the maximum air leakage permitted by Section N1102.4.1.2.

For SI: 1 square foot = 0.0929 m^2, 1 cubic foot per minute = 0.0004719 m^3/s.

Add new text as follows:

TABLE M1505.4.3(3)
WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIR LEAKAGE FACTOR

ACH50[a]	5	4	3	2	1
Air Leakage Factor	1	1.3	1.7	1.7	1.8

a. ACH50 = dwelling unit design air leakage rate at 50 Pascals of pressure, found as the lesser of the value specified by the builder or design professional, where applicable, and the maximum air leakage permitted by Section N1102.4.1.2.

Reason Statement: Requirements for whole-house mechanical ventilation are developed with the objective of achieving an annual average number of air changes per hour, where fresh, outdoor air replaces indoor air. In practice, ventilation is achieved by a combination of natural (via leakage through the building envelope) and mechanical means. The leakier a home is, the more natural ventilation is available. The tighter a home is, the more mechanical ventilation is needed to achieve the same number of air changes. To support access to acceptable indoor air quality in any home, regardless of how tightly it is constructed, the IRC's whole-house mechanical ventilation rates should be determined as a function of the air leakage rate of the home -- with tighter homes requiring more mechanical ventilation than leaky homes. Currently, the IRC requires the same whole-house mechanical ventilation rate for a home, regardless of whether its leakage rate is 5 ACH50 or 1 ACH50; this is not reasonable and results in far fewer air changes (and likely poorer IAQ) for the tight, energy-efficient home with a 1 ACH50 leakage rate.
ASHRAE Standard 62.2 provides a method for determining a home's mechanical ventilation rate as a function of its natural ventilation rate. Within 62.2, the natural ventilation rate is determined as a function of the measured leakage rate of a home (i.e., air changes per hour at 50 Pascals, aka "ACH50"), the weather shielding factor (varies by the severity of the local climate with respect to wind and annual ambient temperature), the height of the home, and the percent of the building envelope surface area that is not attached to garages or other dwelling units. The 62.2 method can be fairly complicated for builders; so this proposal offers a simplified and more prescriptive method for achieving reasonably comparable results by using a simple table or equation. The net effect of this proposal is to provide the same annual average fresh air changes for a home - regardless of whether its air leakage rate of is 1 ACH50 or 5 ACH50. For reasons of practicality, the mechanical ventilation rate is proposed to be determined based on the design air leakage rate and not the tested air leakage rate. Where there is no design air leakage rate, the leakage rate is assumed to be equal to the leakage limit permitted by IRC Section N1102.4.1.2.

Method and assumptions used in deriving the table and equation:

The contribution of natural ventilation to the total annual average ventilation rate was calculated using ASHRAE 62.2-2019 Equation 4-3. The average weather and shielding factor selected was 0.56, which is the average across all weather stations listed in ASHRAE 62.2-2019. Home height is a function of number of stories, with each story contributing 9 feet to the height above grade and the number of stories determined by 10-year average U.S. Census data weightings (i.e., 44% for one-story, 51% for two-story, and 5% for three-story). One hundred percent of the building envelope area is assumed to be adjacent to the exterior (maximizing the natural ventilation credit). The mechanical ventilation rate provided in Table M1505.4.3(1) is calculated using the average floor area and average number of bedrooms of the corresponding range (for example, for a home with a floor area of 2500-3500 sqft and 4-5 bedrooms, the ventilation rate was calculated assuming a floor area of 3000 sqft and 4.5 bedrooms). The "air leakage factor" was determined empirically by recording, for each building envelope air leakage rate, the multiple of the existing Equation 15-1 that was associated with the most typical combinations of rooms and floor area.

Cost Impact: The code change proposal will increase the cost of construction
For dwelling units that have a design leakage rate of 5 ACH50 or higher, there may be no increase in construction costs, as the mechanical ventilation rates proposed are very close to those that are currently required by this section for many cases. For other dwelling units, this proposal may increase the cost of construction, but this is not always the case. For example, builders specifying an exhaust or supply fan for the outdoor air ventilation system could use a multi- or variable speed fan that will accommodate multiple flow rate settings (e.g., 50/80/110 cfm are typical for exhaust fans; supply fans typically have even higher flow rate settings), with no additional construction costs for selecting a higher speed and airflow rate.

For the typical case of a 3 ACH50, 2500 ft2 home with 4-5 bedrooms, the ventilation rate required by this proposal's modification to Table M1505.4.3(1) would be 90 cfm, which is 15 cfm higher than the 75 cfm currently required by the IRC for this same home. If the builder is already using a nominal, single-speed 110 cfm exhaust fan or multi-speed exhaust fan to provide WHMV, there is no additional cost. If the builder previously used a single-speed 80 cfm exhaust fan and transitioned to a single-speed 110 cfm exhaust fan, the additional cost would be about $10-$20 retail.

RM15-21

RM16-21

IRC: SECTION 202, M1505.4.3

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Delete without substitution:

~~**[MP] BALANCED VENTILATION.** Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent of the total mechanical supply airflow rate.~~

Revise as follows:

[MP] BALANCED VENTILATION SYSTEM. A ventilation system where the total mechanical supply airflow and total mechanical exhaust airflow are simultaneously within 10 percent of their average~~s~~. The balanced ventilation system airflow is the average of the mechanical supply and mechanical exhaust airflows.

M1505.4.3 Mechanical ventilation rate. The whole-house mechanical ventilation system shall provide outdoor air at a continuous rate not less than that determined in accordance with Table M1505.4.3(1) or not less than that determined by Equation 15-1.

Ventilation rate in cubic feet per minute = (0.01 × total square foot area of house) + [7.5 × (number of bedrooms + 1)] **(Equation 15-1)**

Exceptions:

1. Ventilation rate credit. The minimum mechanical ventilation rate determined in accordance with Table M1505.4.3(1) or Equation 15-1 shall be reduced by 30 percent, provided that both of the following conditions apply:

   1.1. A ducted system supplies ventilation air directly to each bedroom and to one or more of the following rooms:

      1.1.1. Living room.

      1.1.2. Dining room.

      1.1.3. Kitchen.

   1.2. The whole-house ventilation system is a *balanced ventilation system*.

2. Programmed intermittent operation. The whole-house mechanical ventilation system is permitted to operate intermittently where the system has controls that enable operation for not less than 25 percent of each 4-hour segment and the ventilation rate prescribed in Table M1505.4.3(1), by Equation 15-1 or by Exception 1 is multiplied by the factor determined in accordance with Table M1505.4.3(2).

Reason Statement: The 2021 versions of the IMC and IRC introduced a 30% ventilation rate credit for dwelling units with systems providing balanced ventilation. Because these changes were based on the approval of multiple proposals, their approval resulted in different definitions for *balanced ventilation* and *balanced ventilation system* across the IRC and IMC. This proposal and its companion proposal to the IMC are correlation proposals that will align the terminology, definitions, and their application across both codes. This proposal deletes the term "*balanced ventilation*", which is not used within the IRC, and modifies the term "*balanced ventilation system*" to incorporate the relevant components of "*balanced ventilation*". The proposed definition for "balanced ventilation system" is also proposed within the companion proposal to the IMC. The change that is proposed in Section M1505.4.3 exception 1.2 is italicizing the phrase "*balanced ventilation system*" so that the user is directed to the corresponding definition.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change is editorial and therefore will not increase or decrease the cost of construction.

RM17-21

IRC: M1506 (New), M1505.4.4, TABLE M1505.4.4, M1503.5

Proponents: Glenn Mathewson, BuildingCodeCollege.com, representing Self (glenn@glennmathewson.com)

2021 International Residential Code

Add new text as follows:

M1506 LOCAL EXHAUST RATES.

Revise as follows:

~~**M1505.4.4**~~ **M1506.1** ~~**Local exhaust rates**~~ **General.** *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table ~~M1505.4.4.~~ M1506.1

TABLE ~~M1505.4.4~~ M1506.1
MINIMUM REQUIRED LOCAL EXHAUST RATES ~~FOR ONE- AND TWO-FAMILY DWELLINGS~~

AREA TO BE EXHAUSTED	EXHAUST RATES[a]
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m^3/s, 1 inch water column = 0.2488 kPa.

a. The listed exhaust rate for bathrooms-toilet rooms shall equal or exceed the exhaust rate at a minimum static pressure of 0.25 inch water column in accordance with Section M1505.3.

M1503.5 Kitchen exhaust rates. Where domestic kitchen cooking *appliances* are equipped with ducted range hoods or down-draft exhaust systems, ~~the fans shall be sized in accordance with Section M1505.4.4.~~ the minimum exhaust rate shall be in accordance with Section M1506.1

Reason Statement: 1) Local exhaust rates for kitchens and bathrooms should not be a subsection of whole house mechanical ventilation. This proposal creates a new subsection 305.5 "Local Exhaust Rates"

2) There is no reason to state "one and two-family dwellings" unless this is meant to not apply to dwelling units in a townhouse. Technically (by definition), a townhouse contains "dwelling units" and is not a "dwelling". There is no reason this would not also apply to dwelling units in townhouses.
3) The reference to the minimum kitchen exhaust rate should be about exhaust rates, not "sizing of fans".

Cost Impact: The code change proposal will not increase or decrease the cost of construction
1) Striking out the term “for one- and two-family dwellings” will not change the cost of construction, because the provisions in the table are already applied to “dwelling units” in “townhouses” in industry standard practice. The IRC scope is only for one- and two-family dwellings and townhouses, and since the provisions in this table apply to all of those, there is no necessity to describe the building types in the table heading.

2) Moving Table M1506.1 into its own section does not change the application of the table and thus does not affect the cost of construction. It is simply a reorganization, as local exhaust rates are not directly associated with whole-house ventilation systems.

3) Changing the phrase “the fans” to “exhaust rate” used in Section M1503.5 to reference Table M1504.4 so that the object of the reference matches the title and purpose of the table (exhaust rate) will have no cost impact on construction.

RM17-21

RM18-21

IRC: M1602.2

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Myself (joe@buildingscience.com)

2021 International Residential Code

Revise as follows:

M1602.2 Return air openings. Return air openings for heating, *ventilation* and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, Manual D or the design of the *registered design professional*.
4. Return air shall not be taken from a closet, ~~bathroom,~~ toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

    Exceptions:

    1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
    2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

5. For other than dedicated HVAC systems, return air shall not be taken from indoor swimming pool enclosures and associated deck areas except where the air in such spaces is dehumidified,
6. Taking return air from an unconditioned *crawl space* shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the *crawl space* enclosure shall not be prohibited.
7. Return air from one *dwelling unit* shall not be discharged into another *dwelling unit*.

Staff Analysis: Multiple proposals RM18-21, RM19-21 and RM20-21 propose changes to M1602.2. Proposals RM18-21, RM19-21 and RM20-21 comply with CP2 #28 3.3.3 because they address different subject matter within Section M1602.2. RM18-21 addresses bathrooms. RM19-21 addresses closets. RM20-21 addresses boiler rooms and mechanical closets.

Reason Statement: Return air from bathrooms is necessary to control bathroom moisture levels during cooling periods.
Increasing air change with the rest of the occupied space results in lower moisture levels in the bathroom and allows the air conditioning system to remove moisture. Relying on bathroom exhaust fans exhausting to the exterior to control bathroom moisture does not effectively reduce bathroom moisture levels. Exhaust ventilation in bathrooms should be used to control odors not moisture. Exhaust ventilation results in increasing air change in the entire occupied space and increasing moisture loads due to infiltration of exterior humid air throughout the occupied space. This higher air change rate (infiltration) supplies more moisture than the air conditioning system can remove. Odors are still controlled by bathroom exhaust fans exhausting air to the exterior. These bathroom exhaust fans do not have to operate continuously to control odors. Only providing supply air to bathrooms exacerbates the problem by making roof surfaces colder.

This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

https://www.buildingscience.com/documents/building-science-insights-newsletters/bsi-006-no-good-deed-shall-go-unpunished

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct.

RM19-21

IRC: M1602.2

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, Building Science Corporation, representing Myself (joe@buildingscience.com)

2021 International Residential Code

Revise as follows:

M1602.2 Return air openings. Return air openings for heating, *ventilation* and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, Manual D or the design of the *registered design professional*.
4. Where return air is taken from a closet smaller than 30 ft2 (2.8 m2) the return air shall be no more than 30 cfm (15 l/s), shall serve only the closet, and shall not require a dedicated supply duct.
5. Where return air is taken from a closet smaller than 30 ft2 (2.8 m2) the closet door shall be undercut a minimum of 1.5 inches (38 mm) or the closet shall include a louvered door or transfer grille with a minimum net free area of 30 inch2 (194 cm2).

4 6. Return air shall not be taken from a ~~closet,~~ bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.
3. Return air taken from closets shall serve only the closet and may shall be permitted to be taken from closets that have no dedicated supply duct.

5 7. For other than dedicated HVAC systems, return air shall not be taken from indoor swimming pool enclosures and associated deck areas except where the air in such spaces is dehumidified,

6 8. Taking return air from an unconditioned *crawl space* shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the *crawl space* enclosure shall not be prohibited.

7 9. Return air from one *dwelling unit* shall not be discharged into another *dwelling unit*.

Staff Analysis: Multiple proposals RM18-21, RM19-21 and RM20-21 propose changes to M1602.2. Proposals RM18-21, RM19-21 and RM20-21 comply with CP2 #28 3.3.3 because they address different subject matter within Section M1602.2. RM18-21 addresses bathrooms. RM19-21 addresses closets. RM20-21 addresses boiler rooms and mechanical closets.

Reason Statement: Mold growth is now common in closets due to higher interior moisture loads and less heat gain in closets. Allowing a limited amount of return air provides a means of controlling closet moisture levels. Providing supply air to a closet exacerbates the problem by making closet surfaces colder.
This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct. However, this code change is not a requirement. It gives builders an option to solve and avoid problems.

RM20-21

IRC: M1602.2

Proponents: Craig Conner, representing self (craig.conner@mac.com); Joseph Lstiburek, representing Myself (joe@buildingscience.com)

2021 International Residential Code

Revise as follows:

M1602.2 Return air openings. Return air openings for heating, *ventilation* and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space. Return air taken from mechanical rooms shall serve only the mechanical room and shall be permitted to be taken from mechanical rooms that have no dedicated supply duct.
3. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, Manual D or the design of the *registered design professional*.
4. Where return air is taken from a mechanical room with combustion appliances only sealed combustion appliances shall be permitted within the mechanical room.
5. Where return air is taken from a mechanical room the pressure differential across the mechanical room door shall be limited to 0.01 inch WC (2.5 pascals) or less by undercutting the door, or installing a louvered door or transfer grille, or by some other means.

4 6. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, ~~mechanical room, boiler room, furnace room~~ or unconditioned attic.

Exceptions:

1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

5 7. For other than dedicated HVAC systems, return air shall not be taken from indoor swimming pool enclosures and associated deck areas except where the air in such spaces is dehumidified,

6 8. Taking return air from an unconditioned *crawl space* shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the *crawl space* enclosure shall not be prohibited.

7 9. Return air from one *dwelling unit* shall not be discharged into another *dwelling unit*.

Staff Analysis: Multiple proposals RM18-21, RM19-21 and RM20-21 propose changes to M1602.2. Proposals RM18-21, RM19-21 and RM20-21 comply with CP2 #28 3.3.3 because they address different subject matter within Section M1602.2. RM18-21 addresses bathrooms. RM19-21 addresses closets. RM20-21 addresses boiler rooms and mechanical closets.

Reason Statement: Mold growth is now common in boiler rooms, furnace rooms or mechanical rooms due to higher interior moisture loads and less heat gain in such rooms. Allowing a limited amount of return air provides a means of controlling room moisture levels. Providing supply air to such a space exacerbates the problem by making room surfaces colder.
This is one of six separate proposed changes related to controlling mold in closets, bathrooms and mechanical room. The six changes fix problems caused by an increase in code thermal resistance over the past several code cycles.

For a more detailed explanation see:

https://www.buildingscience.com/documents/building-science-insights/bsi-109-how-changing-filters-led-condensation-and-mold-problem

https://www.buildingscience.com/documents/building-science-insights-newsletters/bsi-006-no-good-deed-shall-go-unpunished

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal increases the cost of construction. The cost is the cost of adding the return duct. However, this *code change is not a requirement. It gives builders an option to solve and avoid problems.*

RM21-21

IRC: M1602.2

Proponents: Brent Ursenbach, West Coast Code Consultants, Inc, representing Utah Governor's Office of Energy Development (brentu@wc-3.com)

2021 International Residential Code

Revise as follows:

M1602.2 Return air openings. Return air openings for heating, *ventilation* and air-conditioning systems shall comply with all of the following:

1. Openings shall not be located less than 10 feet (3048 mm) measured in any direction from an open combustion chamber or draft hood of another *appliance* located in the same room or space.
2. The amount of return air taken from any room or space shall be not greater than the flow rate of supply air delivered to such room or space.
3. Return and transfer openings shall be sized in accordance with the *appliance* or *equipment* manufacturer's installation instructions, Manual D or the design of the *registered design professional*.
4. Return air shall not be taken from a closet, bathroom, toilet room, kitchen, garage, mechanical room, boiler room, furnace room or unconditioned attic.

    Exceptions:

    1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen only, and are located not less than 10 feet (3048 mm) from the cooking *appliances*.
    2. Dedicated forced-air systems serving only the garage shall not be prohibited from obtaining return air from the garage.

5. For other than dedicated HVAC systems, return air shall not be taken from indoor swimming pool enclosures and associated deck areas except where the air in such spaces is dehumidified,
6. Taking return air from an ~~unconditioned~~ unvented *crawl space* shall not be accomplished through a direct connection to the return side of a forced-air furnace. Transfer openings in the *crawl space* enclosure shall not be prohibited.
7. Return air from one *dwelling unit* shall not be discharged into another *dwelling unit*.

Reason Statement: Return is drawn from a crawl space when there is an unvented crawl space per IRC R408.3 (2.2), where the conditioned air supply option is used. This option requires a return air pathway to the common area, and insulated walls per IRC Chapter 11.
With insulated crawl space perimeter walls, an indirectly conditioned space is create, per the definition for conditioned space:

IRC N1106.2 CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

An unconditioned crawl space will be a vented crawl space, a space return air should not be drawn from.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The change is simply a clarification.

RM22-21

IRC: M1805.4 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Add new text as follows:

M1805.4 Factory built chimney offsets. Where a factory built chimney assembly incorporates offsets, no part of the chimney shall be at an angle of more than 30 degrees (0.52 rad.) from vertical at any point in the assembly and the chimney assembly shall not include more than 4 elbows.

Reason Statement: This language has been in the IMC for several cycles and applies to the IRC as much as it does the IMC. Its important for the user to be aware of the limitations in HT piping assemblies.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This extraction from the IMC will not result in an increase in cost because its already a requirement to follow the manufacturer's instructions for HT piping systems. It is not referenced in the IRC as it is in the IMC and needs to be to provide the user with guidance as to how to properly install the system.

RM23-21

IRC: M1805.4 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Add new text as follows:

M1805.4 Spark arrestors. Spark arrestors where installed shall be in accordance with Section R1003.9.2.

Reason Statement: This is just a user friendly pointer directing the user to pertinent information regarding the possible use of spark arrestors.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This pointer will not increase the cost of construction as it leads the user to the proper code section for more information. There are no new requirements to trigger an increase in cost.

RM24-21

IRC: M2002.4

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Revise as follows:

M2002.4 Pressure relief valve. Boilers shall be equipped with pressure relief valves with minimum rated capacities for the equipment served. Pressure relief valves shall be set at the maximum rating of the boiler. ~~Discharge shall be piped to drains by gravity to within 18 inches (457 mm) of the floor or to an open receptor~~. Relief valve discharge piping installation shall be in accordance with Section P2804.6.1.

Reason Statement: This is a friendly pointer taking the user to the appropriate Section for all discharge requirements for relief valves

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is editorial in nature and will not increase cost.

RM25-21

IRC: M2005.2, M2005.6 (New), M2005.7 (New)

Proponents: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2021 International Residential Code

Revise as follows:

M2005.2 Prohibited locations. ~~Fuel-fired water heaters shall not be installed in a room used as a storage closet. Water heaters located in a bedroom or bathroom shall be installed in a sealed enclosure so that *combustion air* will not be taken from the living space. Installation of direct-vent water heaters within an enclosure is not required.~~

Water heaters shall not be located in, or obtain combustion air from, any of the following rooms or spaces:

1. Sleeping rooms
2. Bathrooms
3. Toilet rooms
4. Storage closets.

Exceptions:

1. Direct vent water heaters that obtain all combustion air from the outdoors.
2. Water heaters installed in a dedicated enclosure where all combustion air is taken directly from the outdoors. Access to such enclosure shall be through a solid door, weather stripped in accordance with the exterior air leakage requirements of the International Energy Conservation code and equipped with an approved self-closing device.

Add new text as follows:

M2005.6 Required pan. Water heaters installed in a required pan shall be in accordance with Section P2801.6.

M2005.7 Protection from damage. Water heaters shall not be installed in a location subject to mechanical damage unless protected by approved barriers.

Reason Statement: The current language just doesn't go far enough in terms of specificity and reads rather clunky. This language is borrowed from the IMC and is a little more to the point. This section lacked some detail and this language refreshes this section permitting the user to find all the information in one place.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This clarification will not increase the cost of construction because no new requirement are called for. This further improves the code by providing the user with improved detailed guidance on the subject matter.

RM26-21

IRC: M1505.4.4, TABLE M1505.4.4

Proponents: Mike Moore, Stator LLC, representing Broan-NuTone (mmoore@statorllc.com)

2021 International Residential Code

Revise as follows:

M1505.4.4 Local exhaust rates. *Local exhaust* systems shall be designed to have the capacity to exhaust the minimum airflow rate determined in accordance with Table M1505.4.4. The listed exhaust airflow rate for bathrooms-toilet rooms shall equal or exceed the exhaust airflow rate in Table M1505.4.4 at a minimum static pressure of 0.25 inch wc in accordance with Section M1505.3.

TABLE M1505.4.4
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR ONE- AND TWO-FAMILY DWELLINGS

AREA TO BE EXHAUSTED	EXHAUST RATES[a]
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms-Toilet Rooms	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.0004719 m^3/s, 1 inch water column = 0.2488 kPa.

~~a. The listed exhaust rate for bathrooms-toilet rooms shall equal or exceed the exhaust rate at a minimum static pressure of 0.25 inch water column in accordance with Section M1505.3.~~

Reason Statement: Traditionally, airflow rates for bathroom-toilet room fans have been listed and reported at 0.1 inch wc; this is still common practice. However, engineering calculations, field measurements, and research have shown that higher static pressures are generally needed to achieve an airflow of 50 cfm through typical exhaust duct configurations. For this reason, Footnote A to Table M1505.4.4 of the IRC has established 0.25 inch wc as the minimum static pressure at which a bathroom-toilet room exhaust fan must achieve a minimum airflow of 50 cfm. An exhaust fan that is listed to provide 50 cfm at 0.1 inch wc may only exhaust 10-30 cfm when installed with a typical exhaust duct configuration. To ensure that builders are selecting fans that can be expected to achieve the required 50 cfm in the field, Footnote A should be moved to the main section.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposal is editorial only and does not increase or decrease the cost of construction.

RM26-21

RM27-21

IRC: M2103.3

Proponents: Lisa Reiheld, Viega LLC, representing Viega LLC (lisa.reiheld@viega.us)

2021 International Residential Code

Revise as follows:

M2103.3 Piping joints. Copper and copper-alloy systems shall be soldered, brazed, or press connected. Soldering shall be in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813. Brazing fluxes shall be in accordance with AWS A5.31. Press-connect joints shall be in accordance with ASME B16.51 or ASTM F3226. Piping joints that are embedded shall be installed in accordance with the following requirements:

1. Steel pipe joints shall be welded.
2. Copper tubing shall be joined by brazing complying with Section P3003.6.1.
3. Polybutylene pipe and tubing joints shall be installed with socket-type heat-fused polybutylene fittings.
4. CPVC tubing shall be joined using solvent cement joints.
5. Polypropylene pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings.
6. Cross-linked polyethylene (PEX) tubing shall be joined using cold expansion, insert or compression fittings.
7. Raised temperature polyethylene (PE-RT) tubing shall be joined using insert or compression fittings.

Reason Statement: ASTM F3226 Standard Specification for Metallic Press-Connect Fittings for Piping and Tubing Systems includes Carbon Steel, Stainless Steel, Copper and Copper-Alloy materials. ASTM F3226 is copper and copper alloy press-connect standard and should be included along with ASME B16.51 to correctly reference the standards for copper press-connect fittings. ASTM F3226 is listed in multiple national codes for copper and copper alloy materials for these applications.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is an additional optional standard to which press-connect fittings can be listed and not a new additional mandatory standard requirement.

There is no impact on cost and if anything would reduce cost by including all applicable press-connect fittings standards in the IRC.