2015 GROUP A PROPOSED CHANGES TO THE I-CODES MEMPHIS COMMITTEE ACTION HEARINGS

April 19–28, 2015
Memphis Cook Convention Center
Memphis, Tennessee
MECHANICAL CODE COMMITTEE

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Staff Liaison:
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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 M code change proposals may not be included on this list, as they are being heard by another committee.

Number(s) Not Used:
M7-15  
M16-15  
M74-15

M1-15 M38-15 M73-15 M112-15  
M2-15 M39-15 M75-15 M113-15  
M3-15 M40-15 M76-15 M114-15  
M4-15 M41-15 Part I M77-15 M161-15  
M5-15 M42-15 M78-15 M115-15  
M6-15 M43-15 M79-15 M116-15  
M8-15 M44-15 M80-15 M117-15  
M9-15 M45-15 M81-15 M118-15  
M11-15 M46-15 M82-15 M119-15  
M12-15 M47-15 M83-15 M120-15  
M13-15 M48-15 M84-15 M121-15  
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M130-15 M53-15 M90-15 M127-15  
M157-15 M54-15 M91-15 M128-15  
M10-15 M56-15 M93-15 M131-15  
M22-15 M60-15 M97-15 M135-15  
M25-15 M64-15 M100-15 M138-15  
M26-15 M65-15 M101-15 M139-15  
M29-15 M68-15 M104-15 M142-15  
M30-15 M69-15 Part I M105-15 M143-15  
M31-15 M69-15 Part II M106-15 M144-15  
M33-15 M70-15 Part II M108-15 M146-15  
M36-15 M71-15 M110-15 M149-15  
M 1-15

202

Proponent: Steven Ferguson, representing ASHRAE (sferguson@ashrae.org)

2015 International Mechanical Code

Revise as follows:

SECTION 202 DEFINITIONS

OCCUPATIONAL EXPOSURE LIMIT (OEL). The time-weighted average (TWA) concentration for a normal eight-hour workday and a 40-hour workweek to which nearly all workers can be repeatedly exposed without adverse effect, based on the OSHA PEL, ACGIH TLV-TWA, AIHA-TERA OARS WEEL, or consistent value.

Reason: The WEEL values were previously issued by the American Industrial Hygiene Association. These values are now issued by the Toxicology Excellence for Risk Assessment (TERA) Occupational Alliance for Risk Science (OARS).

Please visit this website to view the WEEL database: http://www.tera.org/OARS/WEEL.html

This change is consistent with addendum d to ASHRAE Standard 34-2013 which can be found here: https://www.ashrae.org/standards-research--technology/standards-addenda

Bibliography: http://www.tera.org/OARS/WEEL.html
https://www.ashrae.org/standards-research--technology/standards-addenda

Cost Impact: Will not increase the cost of construction

This proposal simply updates a definition to indicate what organization is responsible for WEEL values, which has no impact on construction cost.
Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code
Revise as follows:

SECTION 202 DEFINITIONS

ACCESS (TO). That which enables a device, appliance or equipment to be reached by ready access or by a means that first requires the removal or movement of a panel, door or similar obstruction [see also "Ready access (to)"].

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction [see "Access (to)"].

Reason: The term "door" has caused confusion because one must pass through one or more egress doors before reaching any object inside of a building. For example, if an emergency control must be readily accessed, personnel would likely pass through one or more egress/ingress doors before reaching the emergency control, and that is the reality of the situation. The term "door" as used in the definitions was referring to "access doors" similar to panels. The term "access door" might be an alternative to the term "door" because "access door" clearly differentiates between access doors/panels and egress doors. This proposal intends to distinguish egress doors from cabinet doors, access doors and alcove doors and intends to prevent these definitions from being misinterpreted as prohibiting room and closet doors.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.

M 2-15 : 202-ACCESS (TO)-
SNYDER3614


Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@icc.org)

2015 International Mechanical Code

Revise as follows:

SECTION 202 DEFINITIONS

COMMERCIAL COOKING APPLIANCES. Appliances used in a commercial food service establishment for heating or cooking food and which produce grease vapors, steam, fumes, smoke or odors that are required to be removed through a local exhaust ventilation system. Such appliances include deep fat fryers; upright broilers; griddles; broilers; steam-jacketed kettles; hot-top ranges; under-fired broilers (charbroilers); ovens; barbecues; rotisseries; and similar appliances. For the purpose of this definition, a commercial food service establishment shall include any building or portion thereof used for the preparation of food that is by volume and serving frequency not representative of food domestic household cooking.

Reason: 1) The current definition is circular in that Chapter 5 uses the term and dictates where a hood is required for such appliances, yet this definition says that a commercial cooking appliance is something that requires a hood (local exhaust system). The current definition is flawed because if Chapter 5 does not require a hood for a particular cooking appliance, then this definition would say that it is no longer a commercial cooking appliance.

2) The laundry list of appliances in this definition is incomplete and is redundant with and overlaps the definitions of light-, medium- and heavy-duty cooking appliances. The overlap among the definitions creates confusion.

3) There is no accepted definition for "commercial" therefore this proposal attempts to reunite the term with its roots. "Commercial" means commerce which means money exchanging hands, buying and selling. Clearly the cooking of food for sale is commercial, however, it becomes muddy when the cooking is large scale and frequent, but food is not sold. Consider charity kitchens, some church kitchens and some institutional occupancies. If food is not being sold, then other considerations such as volume and frequency of cooking must dictate what is commercial, because as the volume and frequency increase, so too do the hazards associated with such cooking.

4) The current definition says that ANY building or portion thereof used for preparing food is a food service establishment. This is extremely broad and could include, for example, a kitchenette (lunch/break room) in an office building. Food service establishments include, but are not limited to: restaurants, cafeterias, institutional kitchens, charity kitchens, dormitory and barrack kitchens, cooking schools, church kitchens, school cafeteria kitchens, mercantile kitchens, banquet and catering facilities, bakeries, wholesale production kitchens, and similar occupancies. The volume and frequency of cooking in these occupancies is not representative of domestic household cooking.

The revised definition dumps the appliance laundry list and describes what would be considered as commercial food service establishments, which is the intent of the definition. Chapter 5 determines where hoods are required, not this definition. The revised text nails down what is commercial by tying it to sales, and attempts to categorize the non-sales cooking facilities by contrasting them with domestic cooking. This is close as we can get to defining "commercial." If the cooking looks, smells, sounds and tastes like domestic cooking, then the code does not intend to treat it as commercial because the fire and health hazards just aren't there.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
Proponent: Vickie Lovell, InterCode Incorporated, representing RectorSeal Corp. (vickie@intercodeinc.com)

2015 International Mechanical Code

Add new definition as follows:

SECTION 202 DEFINITIONS

LOCKING-TYPE TAMPER-RESISTANT CAP. A cap that is designed to prevent its removal by means of hand-loosening or by means of commonly available tools. Such caps can be removed only by means of a unique key that is specifically designed for the locking cap.

Reason:

Section 1101.10 was a new section in the 2009 IMC and IRC that addresses the locking access of refrigerant port caps. New code sections in both the 2015 IMC and IRC require that access ports for refrigerants be contained in a secure location or, if located outside a locked, controlled area, be secured with a tamper-resistant locking cap. This code change was approved during the 2009, 2012 and 2015 cycles to help reduce unauthorized access to refrigerants, and to help AC system efficiency from the accidental mixing of refrigerant gases.

This proposal is intended to expand on the intent and purpose of the new code section in the IMC and the IRC by defining the primary safeguard: the locking-type tamper-resistant cap.

Refrigerant gas theft has become increasingly problematic in recent years. Some of this is due to the rising costs of these gases; however, stealing refrigerant for the act of “huffing” is increasing at an alarming rate. "Sniffing" or "huffing" refrigerant gas is extremely dangerous, causing brain damage or even death. Inhalants are the fourth most abused substance. According to the Inhalant Statistics and Reports, "59% of children are aware of friends huffing at age 12.” In the U.S., the 2006 National Survey on Drug Use and Health, found that 1.1 million youths aged 12 to 17 had used inhalants in the past year. "Sniffing" or "huffing" can begin at age 10 or younger. 22% of inhalant abusers who died of Sudden Sniffing Death Syndrome had no history of previous inhalant abuse—they were first-time users.

Some port caps are designed to be removed with a set bit, Allen wrench, Schrader valve tool or screwdriver. The use of such tools to remove a cap could be considered just an annoying delay to a determined thief because such port caps are not truly LOCKED. The majority of the victims of huffing are teens and pre-teens, many of whom could easily tamper with a port cap using such readily available tools. This definition clarifies that the cap should be a truly tamper-resistant lock to be effective, that is, can only be opened with a specially designed key.

This clarification of the definition of a specially designed "lock and key" will reduce theft and help to safeguard youngsters from serious injury or death resulting from the inhalation of dangerous refrigerants.

Cost Impact: Will increase the cost of construction

THIS CODE CHANGE PROPOSAL MAY HAVE A MINIMAL COST IMPACT DURING CONSTRUCTION.
2015 International Mechanical Code

Revise as follows:

SECTION 202 DEFINITIONS

MACHINERY ROOM. A room meeting prescribed safety An enclosed space that, where required by Chapter 11 to contain refrigeration equipment, must comply with the requirements and set forth in which refrigeration systems or components thereof are located (see Sections 1105 and 1106).

Reason: The proposed definition is consistent with the definition in IIAR 2 and resolves a problem with the current definition. The current definition implies that any room with refrigeration equipment is a machinery room, which is incorrect. Only those rooms that are required to contain certain refrigeration machinery and refrigerant quantities are classified as machinery rooms.

Cost Impact: Will not increase the cost of construction
This proposal is a clarification that should have no impact on the cost of construction.
202

Proponent: Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com)

SECTION 202 DEFINITIONS

PIPING.
Where used in this code, "piping" refers to either pipe or tubing, or both.

Pipe. A rigid conduit of iron, steel, copper, brass, copper-alloy, or plastic.

Tubing. Semirigid conduit of copper, copper-alloy, aluminum, plastic or steel.

Reason:
The proposal removes brass because brass is a copper-alloy and copper-alloy is the term used to identify materials manufactured where copper is the base metal and includes brass and bronze. Copper-alloy tubing is manufactured ASTM B135 & ASTM B251.

Cost Impact:
Will not increase the cost of construction

This proposal will not increase the cost of construction as this change is only to update the name of a material that is already in the code.
2015 International Mechanical Code

Revise as follows:

SECTION 202 DEFINITIONS

PRESS-CONNECT JOINT.

No change to text.

Reason: The only change in this proposal is to replace the term "PRESS" with the industry recognized term "PRESS-CONNECT". The ASTM standard, as well as the industry, refer to this technology as press-connect joints and press-connect fittings. This proposed edit to the definition was created to bring the IMC and other related standards into alignment and to prevent potential confusion in the industry. The IPC currently utilizes the term press-connect and this small edit would bring uniformity to the ICC Codes. A proposal to Section 1107.5 also uses the term press-connect and this would correlate with that proposal.

Cost Impact: Will not increase the cost of construction
This change is merely replacing a term, and is not a substantive technical change.
Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code
Revise as follows:

SECTION 202 DEFINITIONS

VENTILATION. The natural or mechanical process of introducing conditioned or unconditioned outdoor air to, or removing such a space and removing air from, any such space at an approximately equal rate.

Reason: The current definition dates back to when ventilation involved recirculation and has caused confusion because it still implies that ventilation involves recirculated air, when in fact, it does not. In the IMC, ventilation is by means of outdoor air only. There is no recognition of ventilation by recirculated indoor air. The revised definition makes this clear and also states a fundamental principal that ventilation does not occur without a balance of supplied air and removed air. If a system supplies 1000 cfm of outdoor ventilation air to a space, then it must exhaust, relieve or otherwise remove air at an equal rate or else the space will positively or negatively pressurize and the ventilation rate will not be realized. The revised definition is open such that it will recognize any means of supplying the outdoor air, such as by supply fans with relief fans or gravity openings and by means of exhaust fans and supply fans or gravity intake openings.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
313.1 Design of Building Water Systems

The design of building water systems shall be in accordance with ASHRAE 188.

Add new standard(s) as follows:

Reason: There are many design considerations in the ASHRAE standard that will help minimize Legionella bacteria growth in building water systems which can lead to Legionnaires Disease when water droplets are aerosolized and breathed in. Following the ASHRAE Standard will minimize the risk of a person contracting Legionnaires’ disease or Legionellosis by having the design team consider system maintenance procedures to control the risk of legionellosis associated with plumbing & mechanical systems.

Bibliography: See the following websites for more information:
http://www.cdc.gov/legionella/about/,
http://www.who.int/water_sanitation_health/emerging/legionella.pdf

Cost Impact: Will increase the cost of construction
Buildings without a history of Legionella and not fitting the requirements will not need to add to the cost of construction. A water management plan will need to be done if a building meets certain minimum requirements. The cost of construction to address temperature, stagnation and water treatment will slightly increase the cost of construction and maintenance. Any building that is operating without growing Legionella should already has these processes in place, this will simply require documentation as part of a water management plan. This will provide for system design, operation and treatment that will minimize legionella bacteria growth and help prevent Legionnaires Disease.

Analysis: A review of the standard proposed for inclusion in the code, ASHRAE 188, with regard to the ICC criteria for referenced standards (Section 3.6 of CPW28) will be posted on the ICC website on or before April 2, 2015.
M 11-15

303.7

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

2015 International Mechanical Code

Revise as follows:

303.7 Pit locations. Appliances installed in pits or excavations shall not come in direct contact with the surrounding soil and shall be installed not less than 6 inches above the pit floor. The sides of the pit or excavation shall be held back not less than 12 inches (305 mm) from the appliance. Where the depth exceeds 12 inches (305 mm) below adjoining grade, the walls of the pit or excavation shall be lined with concrete or masonry. Such concrete or masonry shall extend not less than 4 inches (102 mm) above adjoining grade and shall have sufficient lateral load-bearing capacity to resist collapse. Excavation on the control side of the appliance shall extend not less than 30 inches (762 mm) horizontally. The appliance shall be protected from flooding in an approved manner.

Reason: This Section lacks some detail in floor and control side language found in the other codes. This modification completes this section and has all the information necessary for a complete and code compliant installation.

Cost Impact: Will not increase the cost of construction

This proposal is just for correlation between codes for consistency.
Proponent: John Williams, CBO, Chair, representing Adhoc Health Care Committee

2015 International Mechanical Code

Add new text as follows:

**303.9 Fireplaces in Group I-2 Condition 2 occupancies.** Fuel burning appliances and fireplaces in Group I-2 condition 2 occupancies shall be in accordance with Section 901.5.

**901.5 Solid fuel-burning fireplaces and appliances in Group I-2 Condition 2.** In Group I-2 Condition 2 occupancies, solid fuel-burning fireplaces and appliances are prohibited.

Reason: The AHC committee is recommending limitations for the use of gas-fired fireplaces and decorative equipment and the restriction of solid-fuel burning fireplaces and appliances in the Group I-2, Condition 2 occupancy. Please note: these are not new requirements for the I-2 Occupancy facilities but are needed in the I-Codes for coordination of the long-standing provision of the construction and operational requirements for healthcare facilities.

It is standard practice and operational procedure to control the ignition sources in healthcare occupancies that can contain combustible, flammable (and sometimes even explosive) material. Fire risks need to be limited to the maximum extent feasible and specific requirements for these facilities are not currently or are not completely addressed in the I-Codes.

The language proposed in the IFGC prescribes limitations and conditions to provide the necessary safety and limitations of hazards from within the healthcare environments to the fire and ignition sources inherent to all gas-fired fireplaces and appliances. Combustion air has been restricted from being drawn from healthcare environments extending beyond the last decade and is not a new requirement.

The physical separation of the combustion chambers of gas-fired fireplaces and equipment is required to separate and provide a barrier between the ignition sources and the environmental air within healthcare occupancies. All combustion air is required to be taken directly from the exterior of the building in accordance with an existing exception that is provided for in IFGC Section 303.3.

The placement of solid fuel burning fireplaces and appliances, both decorative and heating, creates conditions where open flames that are not otherwise able to be controlled or extinguished like the similar gas-fed and fired appliances. This is why the Adhoc Healthcare Committee is proposing their restriction instead of a limitation with operational and special control equipment.

The code sections that address the installation limitations of fuel gas-fired fireplaces and appliances will also provide alternative means for compliance for existing facilities. Given the hazards present with these appliances in the Group I-2, Condition 2 Occupancies, the proposed IFC requirements will be 'retro-active' requirements for healthcare occupancies (I-2);

The proposals to the IFC that are being put forth by the Adhoc Healthcare Committee have been drafted to clarify, restrict and limit the ignition source hazards in healthcare occupancies and also will reference similar requirements being proposed in the IBC, IMC AND IFGC. For instance, solid fuel heating appliances are limited by other requirements of the IMC which is why heating appliances are not needed to be referenced in this section of the IFGC.

There was a concern mentioned during testimony at the code hearings for the 2012 I-codes that the AHC code change proposals placing restrictions on solid fuel burning fireplaces and appliances and fuel gas-fired fireplaces and appliances might be misinterpreted to prohibit mechanical heating equipment elsewhere regulated in the IMC.

The ICC Ad Hoc Committee on Healthcare (AHC) has just completed its 4th year. The AHC was established by the ICC Board to evaluate and assess contemporary code issues relating to hospitals and ambulatory healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation.

Information on the AHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the AHC effort can be downloaded from the AHC website at: http://www.iccsafe.org/cs/AHC/Pages/default.aspx.

Cost Impact: Will not increase the cost of construction

Wood burning fireplaces are not permitted by the federal CMS regulations, therefore, there is no change in cost of construction.
### Table 305.4

**Proponent:** Mike Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

#### 2015 International Mechanical Code

**Revise as follows:**

<table>
<thead>
<tr>
<th>PIPING MATERIAL</th>
<th>MAXIMUM HORIZONTAL SPACING (feet)</th>
<th>MAXIMUM VERTICAL SPACING (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE-RT one inch and smaller</td>
<td>$\frac{2}{3}$ (32 inches)</td>
<td>10c</td>
</tr>
<tr>
<td>PE-RT &gt; 1 1/4 inches</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>PEX tubing one inch and smaller</td>
<td>$\frac{2}{3}$ (32 inches)</td>
<td>10c</td>
</tr>
<tr>
<td>PEX tubing 1 1/4 inch and larger</td>
<td>4</td>
<td>10c</td>
</tr>
</tbody>
</table>

*Portions of table not shown remain unchanged*

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- **a.** See Section 301.18.
- **b.** The maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.
- **c.** Mid-story guide.

**Reason:** The 2015 code cycle for the IRC included updates to the PE-RT tubing for sizes larger than 1”. The IRC-P Table P2605.1 is current and correct and should be used as the base template for all other tables within the ICC codes as identified in this amendment proposal. The horizontal support spacing for both PEX and PE-RT tubing (piping) up to and including 1” size is 32” (2-2/3Ft) and 48” (4Ft) for sizes 1- 1/4” and larger. These dimensions are consistent with all published PEX literature and manufacture’s installation instructions. This would have been included in the IPC and IMC had it been in the same code cycle as the IRC for 2015.

**Cost Impact:** Will not increase the cost of construction

This proposal modifies the spacing for piping material support into the code and thus the code with this proposal added will not cause the cost of construction to increase, and could decrease the cost as less support is required for larger pipe.

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**ICC COMMITTEE ACTION HEARINGS :: April, 2015**
305.4

**Proponent:** Pennie L Feehan, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code
Revise as follows:

<table>
<thead>
<tr>
<th>PIPING MATERIAL</th>
<th>MAXIMUM HORIZONTAL SPACING (feet)</th>
<th>MAXIMUM VERTICAL SPACING (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS pipe</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>Aluminum pipe and tubing</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Brass pipe</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Brass tubing, 1(\frac{1}{4})-inch diameter and smaller</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Brass tubing, 1(\frac{3}{4})-inch diameter and larger</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Cast-iron pipe(^b)</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Copper or copper-alloy pipe and tubing</td>
<td>42c</td>
<td>10</td>
</tr>
<tr>
<td>Copper or copper-alloy tubing, 1(\frac{1}{4})-inch diameter and smaller</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Copper or copper-alloy tubing, 1(\frac{3}{4})-inch diameter and larger</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>CPVC pipe or tubing, 1 inch and smaller</td>
<td>3</td>
<td>10c</td>
</tr>
<tr>
<td>CPVC pipe or tubing, 1(\frac{1}{4})-inch and larger</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>Lead pipe</td>
<td>Continuous</td>
<td>4</td>
</tr>
<tr>
<td>PB pipe or tubing</td>
<td>2(\frac{2}{3}) (32 inches)</td>
<td>4</td>
</tr>
<tr>
<td>PE-RT</td>
<td>2(\frac{2}{3}) (32 inches)</td>
<td>10c</td>
</tr>
<tr>
<td>PE-RT &gt; 1(\frac{1}{4}) inches</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>Material</td>
<td>Horizontal Spacing</td>
<td>Cost Impact</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>PEX tubing</td>
<td>$2^{2/3}$ (32 inches)</td>
<td>10c</td>
</tr>
<tr>
<td>Polypropylene (PP) pipe or tubing, 1 inch or smaller</td>
<td>$2^{2/3}$ (32 inches)</td>
<td>10c</td>
</tr>
<tr>
<td>Polypropylene (PP) pipe or tubing, $\frac{1}{4}$ inches or larger</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>PVC pipe</td>
<td>4</td>
<td>10c</td>
</tr>
<tr>
<td>Steel tubing</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Steel pipe</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. See Section 301.18.

b. The maximum horizontal spacing of cast-iron pipe hangers shall be increased to 10 feet where 10-foot lengths of pipe are installed.

c. Mid-story guide.

**Reason:** Brass is a copper alloy and the supporting requirements are covered under the Copper and Copper Alloy Pipe and Tubing line. The 6 foot requirement is too restrictive. The Copper Tubing Handbook written by Copper Development Association recommends horizontal support every 8 feet.

**Cost Impact:** Will not increase the cost of construction

The proposal will not impact the cost of construction as it is only changing the material terminology and combining it with the copper section of this table.
Part I

2015 International Mechanical Code

Delete without substitution:

306.1.1 Central furnaces. Central furnaces within compartments or alcoves shall have a minimum working space clearance of 3 inches (76 mm) along the sides, back and top with a total width of the enclosing space being not less than 12 inches (305 mm) wider than the furnace. Furnaces having a firebox open to the atmosphere shall have not less than 6 inches (152 mm) working space along the front combustion chamber side. Combustion air openings at the rear or side of the compartment shall comply with the requirements of Chapter 7.

Exception: This section shall not apply to replacement appliances installed in existing compartments and alcoves where the working space clearances are in accordance with the equipment or appliance manufacturer's installation instructions.

Part II

2015 International Residential Code

Delete without substitution:

M1305.1.1 Furnaces and air handlers. Furnaces and air handlers within compartments or alcoves shall have a minimum working space clearance of 3 inches (76 mm) along the sides, back and top with a total width of the enclosing space being not less than 12 inches (305 mm) wider than the furnace or air handler. Furnaces having a firebox open to the atmosphere shall have not less than a 6 inch (152 mm) working space along the front combustion chamber side. Combustion air openings at the rear or side of the compartment shall comply with the requirements of Chapter 17.

Exception: This section shall not apply to replacement appliances installed in existing compartments and alcoves where the working space clearances are in accordance with the equipment or appliance manufacturer's installation instructions.

Reason: Part I (IMC): This section is antiquated and has apparently lost its purpose. There is no reason to single out central furnaces. Clearances for working spaces are already covered by the manufacturer's instructions and Section 306.1. The requirement for a 3 inch clearance around the sides, back and top has no apparent justification. What work could personnel perform in a 3 inch space? What is the 12 inch extra width supposed to accomplish? Section 306.1 covers this adequately. There is nothing in Chapter 7 regarding combustion air openings on the sides and rear of the furnace. If these requirements are really necessary, then why does the exception negate them for subsequent (replacement) installations?

Part II (IRC): This section is antiquated and has apparently lost its purpose. There is no reason to single out central furnaces. Clearances for working spaces are already covered by the manufacturer's instructions and Sections M1307.1, M1401.1 and M1402.2. The requirement for a 3 inch clearance around the sides, back and top has no apparent justification. What work could personnel perform in a 3 inch space? What is the 12 inch extra width supposed to accomplish? Section M1305.1 covers this adequately. There is nothing in Chapter 17 regarding combustion air openings on the sides and rear of the furnace. If these requirements are really necessary, then why does the exception negate them for subsequent (replacement) installations?

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact:

Part I: Will not increase 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 nor are the code requirements made more stringent.

Part II: Will not increase 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 nor are the code requirements made more stringent.
Proponent: Pennie L Feehan, Copper Development Association, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code

Revise as follows:

307.2.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be cast iron, galvanized steel, copper and copper alloy, cross-linked polyethylene, polyethylene, ABS, CPVC, PVC, or polypropylene pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 7 of the International Plumbing Code relative to the material type. Condensate waste and drain line size shall be not less than 3/4-inch (19.1 mm) internal diameter and shall not decrease in size from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with Table 307.2.2.

Reason: Copper alloys fittings and pipe are used regularly in condensate waste disposal systems and were missing from the list of approved materials. As an example, nipples and unions.

Cost Impact: Will not increase the cost of construction
This proposal is adding a material use in the field and will not impact the cost of construction.
M 18-15

308.1

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

2015 International Mechanical Code

Revise as follows:

308.1 Scope. This section shall govern the reduction in required clearances to combustible materials, including gypsum wallboard, and combustible assemblies for chimneys, vents, kitchen exhaust equipment, mechanical appliances, and mechanical devices and equipment.

Reason: This is a similar change that was approved in the IFGC last cycle. It's important to note that the IMC considers gypsum wallboard to be combustible even when the IBC does not. Nowhere in the IMC is it stated so clearly. Even though there is a definition of non-combustible, adding these words will clarify the intent of the code for the user.

Cost Impact: Will not increase the cost of construction
There will be no additional cost as this is a clarification of current intent.
2015 International Mechanical Code
Revise as follows:

401.2 Ventilation required. Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch water column (50 Pa) in accordance with Section R402.4.1.2 of the International Energy Conservation Code, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

Reason: This proposal is intended to clarify a current point of contention in the code. Section 401.2 begins by allowing either natural or mechanical ventilation in the design. It then goes on to require mechanical ventilation if the infiltration rate is less than 5 air changes per hour (ACH) when tested per IECC section R402.4.1.2. However, IECC section R402.4.1.2 contains the procedures for verifying that the air leakage rate not exceed 5 ACH (climate zones 1 and 2) or 3 ACH (climate zones 3 – 8). This effectively allows the designer to pick natural ventilation up front only to get failed ultimately because of a catch-22 resulting from post-construction testing.

Further, it should be noted that the testing requirements ("air infiltration rate", i.e., "uncontrolled inward air leakage") does not comply with the IMC's definition of natural ventilation ("the movement of air into and out of a space through intentionally provided openings...").

The proposed change reverts back to the requirements in the 2009 IMC which simply allows for either natural or mechanical ventilation.

Cost Impact: Will not increase the cost of construction
This proposal allows the option of not installing mechanical ventilation, saving on construction costs.
**202 (New), 401.2**

**Proponent:** Mike Moore, Newport Ventures, representing Broan-NuTone, representing Newport (mmoore@newportventures.net)

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**2015 International Mechanical Code**

Add new definition as follows:

**SECTION 202 DEFINITIONS**

**NONTRANSIENT** Characterized by occupancy of a dwelling unit for greater than 30 days by occupants who are primarily permanent in nature.

Revise as follows:

**401.2 Ventilation required.** Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Where the air infiltration rate of dwelling units in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch water column (50 Pa) in accordance with Section R402.4.1.2 of the International Energy Conservation Code, the dwelling unit nontransient residential occupancies shall be ventilated by mechanical means in accordance with Section 403. Ambulatory care facilities and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407.

**Reason:** Compartmentalized Units are Tight and Should Require Mechanical Ventilation!

Attached dwelling units are being built tighter than ever, with increasing focus on compartmentalization of dwelling units for suppression of fire, smoke, odors, and environmental tobacco smoke; reduced energy use for heating and cooling; improved acoustics; and improved occupant comfort. Despite dwelling units being built tighter, there is no requirement for these tight units to be provided with mechanical ventilation. This proposal introduces a requirement for mechanical ventilation in today's tight and energy efficient buildings to provide occupants with minimum acceptable indoor air quality.

So, how tight are these dwelling units covered by the IMC being built? Unfortunately, we don't know, because very little data are available on new, code-minimum units. We do know that in general, dwelling units are getting much tighter over time (see Figure 1), but how much, we're not sure. For argument's sake, let's say they're TWICE as leaky as ENERGY STAR multifamily high rise units. Sound reasonable? This would put them at about 12 ACH50. That sounds plenty leaky to provide sufficient natural ventilation, until you consider that a significant portion of the infiltration of attached dwelling units is likely to be transfer air from neighboring units, since much less of an attached unit's surface area is adjacent to the outdoors.

For example, interior dwelling units have only 1/6 surfaces exposed to the exterior, or about 10% of the total surface area for a unit with a square floor plan. Let's assume that up to 40% of the dwelling unit leakage comes through the 10% of the surface area accounted for by the exterior wall. This number can vary widely, but is a reasonable assumption based on multiple sources and feedback from builders, developers, and energy professionals that the most difficult area to air seal in attached units is the fire rated assembly wall separating dwelling units. So, for attached dwelling units that are twice as leaky as ENERGY STAR units, the effective outdoor air leakage rate would be about 5 ACH50 (40% of 12 ACH50). This is the leakage rate that triggers mechanical ventilation requirements in both the IRC and IMC.
Table 1. Estimating the tightness of typical attached dwelling units.

In other words, by the IRC and IMC’s own standards, typical dwelling units, regardless of whether or not they have a blower door test, should be provided with mechanical ventilation. This proposal limits the requirements for mechanical ventilation to the dwelling units that will have the highest impact on occupant health - those units whose occupants are expected to be nontransient, since these account for the lion’s share of pollutant exposure over time. The definition of nontransient is adapted from the IBC definition of transient.

<table>
<thead>
<tr>
<th>ENERGY STAR Tight</th>
<th>Typical Tightness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Leakage</td>
<td>Total Leakage</td>
</tr>
<tr>
<td>–6 ACH50 (0.3 cfm50/sqft)</td>
<td>–12 ACH50 (assuming twice as leaky as ENERGY STAR)</td>
</tr>
</tbody>
</table>

Figure 1. Airtightness of Multi-Unit Residential Buildings (MURB), by year. The 0.4 cfm75/sqft metric for units built after 1995 would translate to about 0.3 cfm50/sqft. However, because this data set is limited and includes some high performance buildings across the U.S. and Canada, it should only be used to indicate a trend in tightness over time (dwelling units are getting tighter!) and should not be used to validate a specific leakage rate.
Building Tight without Mechanically Ventilating Can Have Huge Health Impacts

Building tight, compartmentalized dwelling units (5 ACH50 and below) has become the new standard practice, regardless of whether or not a developer confirms the tightness with a blower door test. Of course, the one potential problem with building tight is the negative impact it has on indoor air quality if mechanical ventilation is not provided. Without mechanical ventilation, tight dwelling units can experience elevated humidity levels; increased condensation potential on windows; higher concentrations of dust mites and allergens; and higher concentrations of pollutants such as particulate matter (which can be transmitted to the circulatory system and organs after being introduced to the lungs), radon (the second leading cause of lung cancer; has also been detected in high-rise units\(^5\)), formaldehyde, acetaldehyde, and other VOCs that have negative health impacts.

We spend 90% of our time indoors, so it’s no wonder that health impacts associated with poor indoor air quality include increased risk or exacerbation of asthma, stroke, neurotoxicity, and cancer, among others.\(^6,9,10\) Many indoor air pollutants originate from building materials and finishes. Recent studies have shown that air pollution levels in dwelling units that are not mechanically ventilated can exceed outdoor national air quality standards for CO in 7-8% of homes and NO\(_2\) in 55-70% of homes, during a typical week.\(^3\) Other sources point to the increase in flame retardants in building materials and finishes driven by codes and standards as contributing to the presence of these chemicals in indoor dust and air and ultimately in the bodies of people (33 different flame retardants products have now been discovered in people's bodies; health effects of many of these are still largely unknown).\(^11\)

Estimates for the cost of poor indoor air quality are staggering. The cost of asthma triggered by dampness and mold in U.S. residences has been estimated at $3.5 billion annually\(^2\), and asthma now affects one in five Americans\(^4\). While dampness and mold should be controlled as much as possible at the source, there are other pollutants where source control is not an option for many households. Even when you exclude radon and second hand smoke from the list of indoor pollutants, poor indoor air quality in U.S. residences is estimated to account for 14% of all years of life lost and years of disability associated with "noncommunicable and nonpsychiatric diseases." Based on another study, this is roughly equal to the negative health impacts of alcohol use, diabetes, and HIV/AIDS combined.\(^7\)

Relying on Natural Ventilation Alone Doesn’t Cut It In Tight Dwelling Units

A prominent study on occupant window operation in new (2002-2004 era) single family homes concluded that “a substantial percentage of homeowners never open their windows, especially in the winter” and that window operation coupled with natural infiltration does not provide the airflow rates necessary to achieve minimum indoor air quality.\(^8\)

Nonetheless, natural ventilation through operable windows provides a useful and sometimes necessary function. Operable windows offer natural ventilation in addition to daylight and egress. Even with mechanical ventilation, a home occupant needs to be able to control their own environment, particularly in the case of an emergency such as a power failure (e.g., being able to open windows for airflow in the aftermath of a storm or blackout or in the case of equipment failure). The intention of this proposal is not to supplant natural ventilation, but to complement it. Experience shows that where mechanical ventilation is required (i.e., all ENERGY STAR homes, low-rise dwelling units built to the 2012 IECC, all new low-rise dwelling units in CA, etc.), builders are not generally using it to trade off against natural ventilation requirements. The exception for this would be toilet rooms, which for decades have often been provided with local exhaust instead of an operable window.

At this point, mechanical ventilation is needed to provide minimum acceptable air quality for code-minimum construction. This change will ensure that the comfortable, energy efficient homes that builders and developers are now building are also provided with the systems required by national consensus standards to provide for this need.

Bibliography:

2. States/jurisdictions that do not have a mechanical ventilation requirement include all of those that are currently enforcing the 2009 IECC. These figures were developed from the following sources:
   c. Jurisdictional data: Building department websites of various jurisdictions.
12. The ENERGY STAR requirement for maximum total air leakage in high-rise multifamily dwelling units is 0.3 cfm/ft\(^2\) of the dwelling unit's envelope surface area. For a square, 1000 sqft unit with 9 foot ceilings, this translates to 6.3 ACH50 (the ENERGY STAR requirement for low-rise and mid-rise multifamily units is even tighter, at 3-6 ACH50, depending on climate zone). Assuming typical units are twice as leaky as high rise units would place them at ~12 ACH50 total leakage. Then, assuming that these units have 40% of their leakage to outdoors means that the effective outdoor air
leakage rate would be ~5 ACH50.


**Cost Impact:** Will increase the cost of construction

For those dwelling units that are not already provided with outdoor air, retail incremental costs for compliant systems can be less than $70. This is based on the incremental, retail cost difference between an entry-level exhaust fan (Broan 688 at $11.56) and a quiet, higher-efficiency exhaust fan that meets the requirements of the 2012 IECC (Broan QTR080 at $79.15). Prices were sourced from zoro.com on December 19, 2014.
401.2 Ventilation required. Every occupied space shall be ventilated by natural means in accordance with Section 402 or by mechanical means in accordance with Section 403. Where mechanical ventilation shall be required for the following:

1. Dwelling units where the air infiltration rate in a dwelling unit is less than 5 air changes per hour when tested with a blower door at a pressure of 0.2-inch water column (50 Pa) in accordance with Section R402.4.1.2 of the International Energy Conservation Code, the
2. Kitchens in dwelling unit shall be ventilated by mechanical means in accordance with Section 403 units.
3. Ambulatory care facilities and Group I-2 occupancies. Such ventilation shall be ventilated by mechanical means in accordance with Section 407.

501.3 Exhaust discharge. The air removed by every mechanical exhaust system shall be discharged outdoors at a point where it will not cause a public nuisance and not less than the distances specified in Section 501.3.1. The air shall be discharged to a location from which it cannot again be readily drawn in by a ventilating system. Air shall not be exhausted into an attic, crawl space, or be directed onto walkways.

Exceptions:
1. Whole-house ventilation-type attic fans shall be permitted to discharge into the attic space of dwelling units having private attics.
2. Commercial cooking recirculating systems.
3. Where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled domestic ductless range hoods shall not be required to discharge to the outdoors.

Reason:
Pollutants from cooking have been identified as some of the worst in the home, in terms of health impacts. Pollution during cooking events includes NO₂, CO, HCHO (formaldehyde), acrolein (produced when cooking meats and oils; used as a nerve agent in WWI), polycyclic aromatic hydrocarbons, and particulate matter (which can become lodged in the lungs or pass through the lungs to the circulatory system). Overall, indoor air pollution from residential dwelling units (excluding the impacts of radon and second hand smoke) is estimated to account for 14% of all years of life lost and years of disability associated with "noncommunicable and nonpsychiatric diseases." Based on another study, this is roughly equal to the negative health impacts of alcohol use, diabetes, and HIV/AIDS combined. The lion's share of the health impacts of poor indoor air quality in dwelling units has been linked to particulate matter, and indoor particulate matter is emitted when cooking on both electric and gas stoves.

Overall, the primary source of particulate matter in non-smoking dwelling units is unvented cooking. Natural ventilation alone is an insufficient means to provide required ventilation because it relies on pressure differentials that may or may not exist, and when they exist, the pressure differential could be equally as likely to spread the pollutant throughout the dwelling unit and neighboring units as it would be to exhaust the pollutant directly to the outdoors. Further, studies have shown that occupants often do not operate windows for ventilation. Concerns with window operation include security and discomfort (including severe draft in winter).

To improve the health and life safety of dwelling unit occupants, this proposal would require that mechanical ventilation be provided for all kitchens in dwelling units. Some compelling facts and quotes on kitchen pollutants and ventilation follow.

- Simulations show that where a natural gas cooktop is used without a vented range hood, "62%, 9%, and 53% of occupants are routinely exposed to NO₂, CO, and HCHO (formaldehyde) levels that exceed acute health-based standards and guidelines."
- "Emissions of nitrogen dioxide in homes with gas stoves exceed the EPA's definition of clean air in an estimated 55 percent to 70 percent of those homes, according to one model; a quarter of them have air quality worse than the worst recorded smog (nitrogen dioxide) event in London. Cooking represents one of the single largest contributors, generating particulate matter (formally known as PM2.5) at concentrations four times greater than major haze events in Beijing." Increased exposure to NO₂ in dwelling units has been associated with an increased number of asthma attacks. "People don't need to radically change their lifestyles. We need to change the building codes so that everyone gets a venting range hood." - Dr. Jennifer Logue, Research Scientist with Lawrence Berkeley National Laboratory.

Bibliography:


Cost Impact: Will increase the cost of construction

For those units that do not already install kitchen exhaust, the cost of construction will increase, depending on equipment selection. Exhaust hoods start around $30 retail (e.g., Broan economy hood #403001, 2-speed, moving 160 cfm, priced on zoro.com at $33.36 with free shipping on December 19, 2014). Most dwelling units have some sort of recirculating exhaust hood at a minimum, so the actual incremental cost could probably be disregarded for the equipment itself. For units that are recirculating only, installed cost to the GC for ducting is estimated at ~$13/linear foot for 3.25x10" duct (RS Means 2013 Residential Cost Data, adjusted for inflation).
**Table 401.5**

**Proponent:** Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code

Revise as follows:

<table>
<thead>
<tr>
<th>OUTDOOR OPENING TYPE</th>
<th>MINIMUM AND MAXIMUM OPENING SIZES IN LOUVERS, GRILLES AND SCREENS³ MEASURED IN ANY DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake openings in residential occupancies</td>
<td>Not &lt; 1/4 inch and not &gt; 1/2 inch</td>
</tr>
<tr>
<td>Intake openings in other than residential occupancies</td>
<td>&gt; 1/4 inch and not &gt; 1 inch</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. For rectangular openings, the table requirements apply to the shortest side. For round openings, the table requirements apply to the diameter. For square openings, the table requirements apply to any side.

**Reason:** The current text would not permit slotted louvers and grilles because the size limit applies to all sides “in any direction.” A slot 3/8 inch wide and 12 inches long meets the intent of the code but would be prohibited by the current table. The table appears to rule out slots and instead allows only openings that are a maximum of 1/2 by 1/2 or 1 x 1 inch. What if the openings are round? If so, the measurement should apply to the diameter of the circle. “Measured in any direction” would also include the diagonal of a square or rectangle. For example, a 1/2 by 1/2 inch square mesh screen on a residential building has a diagonal of 11/16 inch, which exceeds the 1/2 inch maximum. As revised, note (a) clearly specifies the measurement that applies to the geometry of the opening.

**Cost Impact:** Will not increase 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 nor are the code requirements made more stringent.
Proponent: Mike Moore, Newport Ventures, Representing Broan-NuTone, representing Newport (mmoore@newportventures.net)

2015 International Mechanical Code

Add new definition as follows:

SECTION 202 DEFINITIONS

NONTRANSIENT Characterized by occupancy of a dwelling unit for greater than 30 days by occupants who are primarily permanent in nature.

Revise as follows:

403.1 Ventilation system. Mechanical ventilation shall be provided by a method of supply air and return or exhaust air except that mechanical ventilation air requirements for Group R-2, R-3 and R-4 occupancies three stories and less dwelling units in height above grade plane nontransient residential occupancies shall be provided by an exhaust system, supply system or combination thereof. The amount of supply air shall be approximately equal to the amount of return and exhaust air. The system shall not be prohibited from producing negative or positive pressure. The system to convey ventilation air shall be designed and installed in accordance with Chapter 6.

403.3 Outdoor air and local exhaust airflow rates. Group R-2, R-3 and R-4 occupancies three stories and less dwelling units in height above grade plane nontransient residential occupancies shall be provided with outdoor air and local exhaust in accordance with Section 403.3.2. All other buildings intended to be occupied shall be provided with outdoor air and local exhaust in accordance with Section 403.3.1.

403.3.1 Other buildings intended to be occupied. The design of local exhaust systems and ventilation systems for outdoor air for occupancies other than Group R-2, R-3 and R-4 three stories and less above grade plane nontransient residential occupancies shall comply with Sections 403.3.1.1 through 403.3.1.5.

403.3.2 Group R-2, R-3 and R-4 dwelling units in nontransient residential occupancies, three stories and less. The design of local exhaust systems and ventilation systems for outdoor air in Group R-2, R-3 and R-4 occupancies three stories and less dwelling units in height above grade plane nontransient residential occupancies shall comply with Sections 403.3.2.1 through 403.3.2.3.

403.3.2.1 Outdoor air for dwelling units in nontransient residential occupancies. No change to text.

Delete without substitution:

403.3.2.2 Outdoor air for other spaces. Corridors and other common areas within the conditioned space shall be provided with outdoor air at a rate of not less than 0.06 cfm per square foot of floor area.

Revise as follows:

TABLE 403.3.2.3
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR GROUP R-2, R-3, AND R-4 DWELLING UNITS IN NONTRANSIENT RESIDENTIAL OCCUPANCIES

<table>
<thead>
<tr>
<th>AREA TO BE EXHAUSTED</th>
<th>EXHAUST RATE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kitchens</td>
<td>100 cfm intermittent or 25 cfm continuous</td>
</tr>
<tr>
<td>Bathrooms and toilet rooms</td>
<td>50 cfm intermittent or 20 cfm continuous</td>
</tr>
</tbody>
</table>

For SI: 1 cubic foot per minute = 0.0004719 m³/s.

Reason: This proposal is intended to simplify the optional mechanical ventilation compliance path for all dwelling units in nontransient residential occupancies, regardless of building height. This change is aligned with a recent scope change in standards ASHRAE 62.2 and 62.1 that moved jurisdiction of dwelling units in nontransient residential occupancies to the scope of ASHRAE 62.2, regardless of building height. This change was strongly supported by both committees, primarily for the following reason:

- Ventilation rates for dwelling units in nontransient residential occupancies should be consistent across all units, regardless of building height.

Why should a dwelling unit in a 4 story building require an outdoor air ventilation rate that is up to two times greater than that in a 3 story
Approval of this particular proposal to the IMC would have the following benefits:

- More closely align the IMC’s ventilation requirements with consensus standards without requiring the user to access or purchase those standards.
- Simplify the design, specification, and enforcement of outdoor air ventilation and exhaust requirements for dwelling units in nontransient residential occupancies, regardless of building height.
- Save significant energy: As an example, the IMC currently requires a 1000 sqft, 2 bedroom apartment with 9 foot ceilings to be provided with 53 cfm of outdoor air when located in a three story building (using equation 4-9). For the identical unit in a four story building, the IMC requires 53-105 cfm of outdoor air, depending on the type of HVAC system installed (equations 4-1 and 4-2, and tables 403.3.1.1 and 403.3.1.1.1.2). So, up to 50% of the ventilation energy currently required for high-rise dwelling units can be saved by simply transitioning all ventilation requirements for dwelling units in nontransient residential occupancies to those currently contained in Section 403.3.2.

Bibliography:

1. ASHRAE 62.2-2013 Addendum G. To access a free copy, please contact ASHRAE at (404) 636-8400.

Cost Impact: Will not increase the cost of construction

This change is not expected to increase the cost of construction because it serves to simplify the design, specification, and enforcement of outdoor air ventilation and exhaust requirements for dwelling units in nontransient residential occupancies, regardless of building height.
**M 24-15**

**Table 403.3.1.1**

**Proponent:** Steven Ferguson, representing ASHRAE (sferguson@ashrae.org)

**2015 International Mechanical Code**

Revise as follows:

<table>
<thead>
<tr>
<th>OCCUPANCY CLASSIFICATION</th>
<th>OCCUPANT DENSITY #/1000 FT² a</th>
<th>PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_p ) CFM/PERSON</th>
<th>AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_a ) CFM/FT² a</th>
<th>EXHAUST AIRFLOW RATE CFM/FT² a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correctional facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booking/waiting</td>
<td>50</td>
<td>7.5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Cells</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>without plumbing fixtures</td>
<td>25</td>
<td>5</td>
<td>0.12</td>
<td>—</td>
</tr>
<tr>
<td>with plumbing fixtures</td>
<td>25</td>
<td>5</td>
<td>0.12</td>
<td>1.0</td>
</tr>
<tr>
<td>Day room</td>
<td>30</td>
<td>5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Dining halls</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>(see food and beverage service)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guard stations</td>
<td>15</td>
<td>5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Dry cleaners, laundries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coin-operated dry cleaner</td>
<td>20</td>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Coin-operated laundries</td>
<td>20</td>
<td>7.5</td>
<td>0.060.12</td>
<td>—</td>
</tr>
<tr>
<td>Commercial dry cleaner</td>
<td>30</td>
<td>30</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Commercial laundry</td>
<td>10</td>
<td>25</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Storage, pick up</td>
<td>30</td>
<td>7.5</td>
<td>0.12</td>
<td>—</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art classroom (ages 5-8)</td>
<td>20</td>
<td>10</td>
<td>0.18</td>
<td>0.7</td>
</tr>
<tr>
<td>Auditoriums</td>
<td>150</td>
<td>5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Classrooms (ages 5-8)</td>
<td>25</td>
<td>10</td>
<td>0.12</td>
<td>—</td>
</tr>
<tr>
<td>OCCUPANCY CLASSIFICATION</td>
<td>OCCUPANT DENSITY #/1000 FT² a</td>
<td>PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_p ) CFM/PERSON</td>
<td>AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_a ) CFM/FT² a</td>
<td>EXHAUST AIRFLOW RATE CFM/FT² a</td>
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<tr>
<td>Hotels, motels, resorts and dormitories</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bathrooms/toilet—private b</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>25/50 f</td>
</tr>
<tr>
<td>Bedroom/living room</td>
<td>10</td>
<td>5</td>
<td>0.06</td>
<td>--</td>
</tr>
<tr>
<td>Conference/meeting</td>
<td>50</td>
<td>5</td>
<td>0.06</td>
<td>--</td>
</tr>
<tr>
<td>Dormitory sleeping areas</td>
<td>20</td>
<td>5</td>
<td>0.06</td>
<td>--</td>
</tr>
<tr>
<td>Gambling casinos</td>
<td>120</td>
<td>7.5</td>
<td>0.18</td>
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<td></td>
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<tr>
<td>Lobbies/prefunction</td>
<td>30</td>
<td>7.5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Multipurpose assembly</td>
<td>120</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td><strong>Offices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conference rooms</td>
<td>50</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Main entry lobbies</td>
<td>10</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Office spaces</td>
<td>5</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Reception areas</td>
<td>30</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Telephone/data entry</td>
<td>60</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td><strong>Private dwellings, single and multiple</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garages, common for multiple units</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.75</td>
</tr>
<tr>
<td>Kitchens</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>25/100f</td>
</tr>
<tr>
<td>Living area</td>
<td>—</td>
<td>—</td>
<td>0.35 ACH but not less than 15 cfm/person</td>
<td></td>
</tr>
<tr>
<td>Toilet rooms and bathrooms</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>25/50f</td>
</tr>
<tr>
<td><strong>Public spaces</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridors</td>
<td>—</td>
<td>—</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Courtrooms</td>
<td>70</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Elevator car</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
</tr>
<tr>
<td>Legislative chambers</td>
<td>50</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Libraries</td>
<td>10</td>
<td>5</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Museums (children's)</td>
<td>40</td>
<td>7.5</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>Museums/galleries</td>
<td>40</td>
<td>7.5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Places of religious worship</td>
<td>120</td>
<td>5</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Shower room (per shower head)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>50/20f</td>
</tr>
<tr>
<td>Smoking lounges</td>
<td>70</td>
<td>60</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Toilet rooms — public</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>50/70e</td>
</tr>
<tr>
<td>OCCUPANCY CLASSIFICATION</td>
<td>OCCUPANT DENSITY /1000 FT$^2$</td>
<td>PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, $R_p$ CFM/PERSON</td>
<td>AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, $R_a$ CFM/FT$^2$</td>
<td>EXHAUST AIRFLOW RATE CFM/FT$^2$</td>
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<td>---------------------------</td>
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<tr>
<td>Specialty shops</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Automotive motor-fuel dispensing stations$^b$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Barber</td>
<td>25</td>
<td>7.5</td>
<td>0.06</td>
<td>0.5</td>
</tr>
<tr>
<td>Beauty salons$^b$</td>
<td>25</td>
<td>20</td>
<td>0.12</td>
<td>0.6</td>
</tr>
<tr>
<td>Nail salons$^b, h$</td>
<td>25</td>
<td>20</td>
<td>0.12</td>
<td>0.6</td>
</tr>
<tr>
<td>Embalming room$^b$</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
</tr>
<tr>
<td>Pet shops (animal areas)$^b$</td>
<td>10</td>
<td>7.5</td>
<td>0.18</td>
<td>0.9</td>
</tr>
<tr>
<td>Supermarkets</td>
<td>8</td>
<td>7.5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Sports and amusement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowling alleys (seating areas)</td>
<td>40</td>
<td>10</td>
<td>0.12</td>
<td>—</td>
</tr>
<tr>
<td>Disco/dance floors</td>
<td>100</td>
<td>20</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Game arcades</td>
<td>20</td>
<td>7.5</td>
<td>0.18</td>
<td>—</td>
</tr>
<tr>
<td>Gym, stadium, arena (play area)</td>
<td>—7</td>
<td>—20</td>
<td>0.300.18</td>
<td>—</td>
</tr>
<tr>
<td>Health club/aerobics room</td>
<td>40</td>
<td>20</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Health club/weight room</td>
<td>10</td>
<td>20</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>OCCUPANCY CLASSIFICATION</td>
<td>OCCUPANT DENSITY #/1000 FT²&lt;sup&gt;a&lt;/sup&gt;</td>
<td>PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_p ) CFM/PERSON</td>
<td>AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, ( R_a ) CFM/FT²&lt;sup&gt;a&lt;/sup&gt;</td>
<td>EXHAUST AIRFLOW RATE CFM/FT²&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>--------------------------------------</td>
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<td>---------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
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<tr>
<td>Workrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank vaults/safe deposit</td>
<td>5</td>
<td>5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Computer (without printing)</td>
<td>4</td>
<td>5</td>
<td>0.06</td>
<td>—</td>
</tr>
<tr>
<td>Copy, printing rooms</td>
<td>4</td>
<td>5</td>
<td>0.06</td>
<td>0.5</td>
</tr>
<tr>
<td>Darkrooms</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.0</td>
</tr>
<tr>
<td>Meat processing&lt;sup&gt;c&lt;/sup&gt;</td>
<td>10</td>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Pharmacy (prep. area)</td>
<td>10</td>
<td>5</td>
<td>0.18</td>
<td>—</td>
</tr>
<tr>
<td>Photo studios</td>
<td>10</td>
<td>5</td>
<td>0.12</td>
<td>—</td>
</tr>
</tbody>
</table>
For SI: 1 cubic foot per minute = 0.0004719 m$^3$/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m$^3$/s • m$^{-2}$, °C = \[\left(\frac{°F}{1.8}\right) - 32\], 1 square foot = 0.0929 m$^2$.

a. Based upon net occupiable floor area.

b. Mechanical exhaust required and the recirculation of air from such spaces is prohibited. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Item 3).

c. Spaces unheated or maintained below 50°F are not covered by these requirements unless the occupancy is continuous.

d. Ventilation systems in enclosed parking garages shall comply with Section 404.

e. Rates are per water closet or urinal. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

f. Rates are per room unless otherwise indicated. The higher rate shall be provided where the exhaust system is designed to operate intermittently. The lower rate shall be permitted only where the exhaust system is designed to operate continuously while occupied.

g. Mechanical exhaust is required and recirculation from such spaces is prohibited except that recirculation shall be permitted where the resulting supply airstream consists of not more than 10 percent air recirculated from these spaces. Recirculation of air that is contained completely within such spaces shall not be prohibited (see Section 403.2.1, Items 2 and 4).

h. For nail salons, each manicure and pedicure station shall be provided with a source capture system capable of exhausting not less than 50 cfm per station. Exhaust inlets shall be located in accordance with Section 502.20. Where one or more required source capture systems operate continuously during occupancy, the exhaust rate from such systems shall be permitted to be applied to the exhaust flow rate required by Table 403.3.1.1 for the nail salon.

Reason: This proposal seeks to update the existing ventilation rate table in the IMC. Standard 62.1 is the source material for this table, and this updates the table to match the ventilation rates in 62.1-2013.

Addendum s to ASHRAE Standard 62.1-2007 added a minimum outdoor airflow rate per person as well as a minimum per unit area rate in response to concerns expressing that minimum rates were needed for those spaces. Additionally, that addendum increased the outdoor airflow rate for coin operated laundry facilities based on concerns that those types of spaces were not getting enough outdoor air.

Addendum h to ASHRAE Standard 62.1-2010 modified the ventilation rates for gym/arenas/play areas because the space types had ventilation rates based on floor area only; the per-person rate was zero. Users of the standard expressed interest in applying demand-controlled ventilation to these space types, which was effectively prohibited by the lack of a per-person component to the ventilation rate. The addendum, and this associated change replaces these space types with the new rates in this proposal. One concern about allowing CO2-based demand controlled ventilation in these spaces is that the volume per person in these spaces is typically large, which means that CO2 concentration changes will have longer than usual lag times behind occupancy changes.

Addendum L to 62.1-2010 added a new category for refrigerated warehouses/freezers. The current code includes ventilation spaces for warehouses, which would apply to refrigerated warehouses. Refrigerated warehouse spaces are significantly different from conventional warehouses in a number of ways. The low temperatures will slow the emission of contaminants, such as VOCs, from the materials stored in the space; the characteristics of the items being stored will be different; and the amount of time spent in the space by occupants may be shorter (particularly for spaces kept at sub-freezing temperatures).

This proposal adds a refrigerated warehouse space type to Table 6-1, providing revised ventilation rates for these spaces. These rates include a People Outdoor Air Rate which will require ventilation during periods of expected occupancy, but do not include an Area Outdoor Air Rate which will allow the ventilation rate to be zero for refrigerated warehouses with no occupants. This change was provided to ASHRAE TC 10.1, Custom Engineered Refrigeration Systems, for review. Based on comments from that Technical Committee, the Area Outdoor Air Rate was set to zero, and no distinction is made between refrigerated and freezer spaces.

Bibliography: ASHRAE Standard 62.1-2013
Addendum s to ASHRAE Standard 62.1-2007
Addendum h to ASHRAE 62.1-2010
Addendum L to ASHRAE 62.1-2010
Addenda to ASHRAE Standard 62.1 can be found here: https://www.ashrae.org/standards-research--technology/standards-addenda

Cost Impact: Will increase the cost of construction

While many of these changes may not increase the cost of construction, the cost of construction may increase in refrigerated warehouses/freezers, and warehouses as there will now need to be mechanical ventilation in those spaces, while there was no previous airflow rate requirement.
2015 International Mechanical Code

Add new text as follows:

403.3.2.4 System controls. Control devices for outdoor air ventilation systems shall be provided with text or a symbol indicating the device’s function.

Reason:
Tight dwelling units are being outfitted with code-mandated outdoor air ventilation systems. These systems are often simply a bathroom exhaust fan expected to run continuously. The problem is that without a label indicating the system’s function, occupants have no idea of the purpose of these systems and are likely to turn them off – thereby increasing the rate of accumulation of harmful indoor pollutants without their knowledge. At a minimum, these systems should be labeled to indicate that they are different than a typical bath fan.

Cost Impact: Will increase the cost of construction
This proposal is expected to have minimal cost impacts, as it simply involves labeling equipment for its intended purpose. This label could either be supplied from manufacturers (incremental cost would probably be <$0.10) or field-applied.
Proponent: Mike Moore, Newport Ventures, representing Broan-NuTone, representing Newport (mmoore@newportventures.net)

2015 International Mechanical Code

Add new text as follows:

403.3.2.4 Ventilating Equipment. Exhaust equipment serving single dwelling units shall be listed and labeled to provide the minimum required air flow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

Add new standard(s) as follows:
ANSI/AMCA 210 - ANSI/ASHRAE 51 -07 Laboratory Methods of Testing Fans for Aerodynamic Performance Rating

Reason:
Industry experience and research have shown that "for advertised airflows that are not certified, the actual installed airflow can be a small fraction of the advertised value". Without a code minimum requirement for listing and labeling flows in accordance with an ANSI standard, there is nothing in place to stop a manufacturer from reporting an airflow under whatever conditions they please (e.g., the condition with no duct work attached). Requiring listing and labeling of ventilating equipment per ANSI/AMCA 210 - ANSI/ASHRAE 51 is the first step in ensuring that fans perform to expectations. In 2015, the IRC adopted a requirement for fans to be tested per ANSI/AMCA 210 - ANSI/ASHRAE 51 when using prescriptive duct sizing Table M1506.2 (see footnote "a"), so this standard has already been referenced elsewhere in the I-codes.

Listing and labeling of products tested to this standard is maintained by the Home Ventilating Institute, which has been in operation for decades. Verification of listing and labeling to this standard can be accomplished by visually inspecting the equipment for an HVI sticker or by looking up the equipment in the on-line database. Certification by HVI in accordance with ANSI/AMCA 210 - ANSI/ASHRAE 51 is already required by ASHRAE 62.2, ENERGY STAR for Homes, and the State of California, among other groups. Roughly 12,000 ventilating equipment products are listed, labeled, and can be referenced in the HVI directory.

Bibliography:

Cost Impact: Will increase the cost of construction
Over 12,000 ventilating equipment products are labeled and listed in the HVI directory. These fans are tested for airflow in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51. For these products, there will be no incremental cost associated with this change. For equipment that is not currently tested, listed, and labeled, the incremental costs are highly dependent upon volume of the specific products sold.

Analysis: A review of the standard proposed for inclusion in the code, ANSI/AMCA 210 - ANSI/ASHRAE 51, 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 April 2, 2015.
M 27-15

404.1

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

2015 International Mechanical Code

Revise as follows:

404.1 Enclosed parking garages. Where mechanical ventilation systems for enclosed parking garages operate intermittently, such operation shall be automatic by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be listed in accordance with UL 2075 and installed in accordance with their listing and the manufacturers’ instructions.

Add new standard(s) as follows:
UL 2075-2013 Standard for Gas and Vapor Detectors and Sensors

Reason: This proposal clarifies that the detectors required by this section must be listed to UL 2075 and installed in accordance with their listing. Requiring these detectors to be listed to UL 2075 is consistent with IBC and IFC requirements.

Cost Impact: Will increase the cost of construction
Listed UL 2075 detectors might be marginally more expensive than non-listed detectors.

Analysis:
A review of the standard proposed for inclusion in the code, UL 2075, 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 April 2, 2015.
2015 International Mechanical Code

Revise as follows:

404.1 Enclosed parking garages. Where mechanical ventilation systems for enclosed parking garages shall operate intermittently, such operation shall be automatically operated by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be installed in accordance with their manufacturers' recommendations. Automatic operation shall cycle the ventilation system between the following two modes of operation:

1. Full-on at an airflow rate of not less than 0.75 cfm per square foot of the floor area served.
2. Standby at an airflow rate of not less than 0.05 cfm per square foot of the floor area served.

Delete without substitution:

404.2 Minimum ventilation. Automatic operation of the system shall not reduce the ventilation airflow rate below 0.05 cfm per square foot (0.00025 m³/s • m²) of the floor area and the system shall be capable of producing a ventilation airflow rate of 0.75 cfm per square foot (0.0038 m³/s • m²) of floor area.

Reason: This section has been misinterpreted regarding intermittent operation. No technical changes are proposed by this revision. It is simpler to state that the exhaust system either has to run constantly or it has to run automatically. It is either on all of the time, or it is allowed to be cycled between full-on and minimum-on by the detectors. "Intermittent" operation implies that the system shuts off completely, but, Section 404.2 clearly does not allow the system to shut off completely. The current text breaks the requirements into two separate sections which adds to the confusion. Section 404.2 is being rolled into Section 404.1. Section 404.2 does not convey the simple concept that the system has to exhaust 0.75 cfm continuously or must cycle between 0.75 cfm and some rate that is not less than 0.05 cfm. The detectors determine when the system goes from standby airflow rate to full-on airflow rate.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
404.2 Minimum ventilation. Automatic operation of the system shall not reduce the ventilation airflow rate below 0.05 cfm per square foot (0.00025 m$^3$/s • m$^2$) of the floor area **and when the garage is occupied**. The system shall be capable of producing a ventilation airflow rate of 0.75 cfm per square foot (0.0038 m$^3$/s • m$^2$) of floor area.

**Reason:** This proposal clarifies that a ventilating system for an enclosed parking garage must operate at a minimum ventilation airflow rate only when occupants are present. This tactic conserves energy and saves the building owner money without compromising occupant health.

**Cost Impact:** Will not increase the cost of construction

This proposal is only a code clarification
501.2 Independent system required. Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer exhaust shall be independent of all other systems. Type I exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems. Kitchen exhaust systems shall be constructed in accordance with Section 505 for domestic cooking operations and Sections 506 through 509 for commercial cooking operations.

506.1 General. Commercial kitchen hood ventilation ducts and exhaust equipment shall comply with the requirements of this section. Commercial kitchen grease ducts shall be designed for the type of cooking appliance and hood served.

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2 and 507.3. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment and makeup air system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are listed and labeled in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual appliance shall be considered as occupying not less than 100 square feet (9.3 m²).
3. Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.

507.1.2 Domestic cooking appliances used for commercial purposes. Domestic cooking appliances utilized for commercial purposes shall be provided with Type I or Type II hoods as required for the type of appliance and cooking processes in accordance with Sections 507.2 and 507.3. Domestic cooking appliances utilized for domestic purposes cooking shall comply with Section 505.

509.1 Where required. Commercial cooking Cooking appliances required by Section 507.2 to have a Type I hood shall be provided with an approved automatic fire suppression system complying with the International Building Code and the International Fire Code.

Reason: The existing verbiage in this section is somewhat confusing, in that it refers to the type of cooking equipment to justify the type of hood (commercial cooking equipment), then states that when domestic cooking equipment is used for commercial purposes, hoods are also required. This code change is intended to clarify that hoods and fire suppression systems are required where the hazard justifies such protection, regardless of the type of equipment being covered. Section 501.2 addresses the construction of hoods based upon the type of appliance being used; however, other sections (505.4, 507.1.2, 507.2, 507.3) contain requirements based upon the hazard regardless of the type of equipment. The proposed change to 501.2 clarifies and correlates the requirements in the chapter.

Currently, 506.1 states that hood ventilation ducts and exhaust equipment be designed for the type of appliance; however, Section 507.1.2 requires a Type I hood where domestic appliances are used in commercial operations that produce grease or smoke (refers to 507.2). Domestic appliances are currently available that generate very similar heating characteristics as commercial appliances; as a matter of fact, some of the appliances being sold to consumers for their homes are virtually indistinguishable from commercial appliances and may easily be used in commercial cooking operations. The proposed change clarifies that the hazards generated from the cooking operation dictate the required protection scheme.

Section 507.1 currently states that Type I or Type II hoods shall be installed above all commercial cooking appliances, but points to sections of the code that describe requirements for both cooking appliances and other appliances such as dishwashers. In addition, 507.1.2 clearly states that Type I or Type II hoods are required for domestic cooking appliances used for commercial purposes. The proposed change clarifies that hoods should be installed over appliances based upon the hazard (or lack thereof) rather than the type of appliance.
507.1.2 requires Type I or Type II hoods over domestic appliances utilized for commercial purposes. It then states that the type of hood is dependent upon the type of appliance and the process being used, and refers the user to sections 507.2 and 507.3. These sections clearly apply to commercial cooking and other commercial applications, so maintaining the reference to the type of appliance only confuses the user. The proposed change to this section clarifies the intent of the code.

The change to 509.1 is intended to clarify that any time a Type I hood is required, suppression is required, regardless of the type of equipment.

**Cost Impact:** Will not increase the cost of construction
The code change is for purposes of clarification, and does not change the overall requirements of the section, thus will not change the cost of compliance.
M 31-15

501.3.1

Proponent: Mike Moore, Newport Ventures, representing Broan-NuTone, representing Newport (mmoore@newportventures.net)

2015 International Mechanical Code

Revise as follows:

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

1. For ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from property lines; 10 feet (3048 mm) from operable openings into buildings; 6 feet (1829 mm) from exterior walls and roofs; 30 feet (9144 mm) from combustible walls and operable openings into buildings which are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.

2. For other product-conveying outlets: 10 feet (3048 mm) from the property lines; 3 feet (914 mm) from exterior walls and roofs; 10 feet (3048 mm) from operable openings into buildings; 10 feet (3048 mm) above adjoining grade.

3. For all environmental air exhaust: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable openings into buildings for all occupancies other than Group U, and 10 feet (3048 mm) from mechanical air intakes. Such exhaust shall not be considered hazardous or noxious. Where a combined exhaust and intake terminal is used to separate intake air from exhaust air originating in living space other than kitchens, a minimum separation distance between these two openings shall not be required, provided that the exhaust air concentration within the intake air flow does not exceed 10%, as established by the manufacturer of such terminal.

4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the International Building Code for utilities and attendant equipment.

5. For specific systems see the following sections:
   5.1. Clothes dryer exhaust, Section 504.4.
   5.2. Kitchen hoods and other kitchen exhaust equipment, Sections 506.3.13, 506.4 and 506.5.
   5.3. Dust stock and refuse conveying systems, Section 511.2.
   5.4. Subslab soil exhaust systems, Section 512.4.
   5.5. Smoke control systems, Section 513.10.3.
   5.6. Refrigerant discharge, Section 1105.7.
   5.7. Machinery room discharge, Section 1105.6.1.

Reason:

Combined exhaust/supply 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. Combined terminations are regularly approved and installed in single family and multifamily dwelling units across the country, and manufacturer tests have demonstrated that minimum cross-contamination of airflow results from these terminations. There has currently no industry standard by which to test these units, so we have simply proposed that their performance be verified by the manufacturer, as is the practice in other areas of the code (IMC Sections 513.10.1, 801.14, 1002.2, 1006.3, 1006.7, 1007.2, 1102.2.2.3, 1108.1 exception 3, 1206.7, 1210.6.6.2, etc.). The 10% cross contamination metric is based on language in ASHRAE 62.1 that limits cross contamination of exhaust and supply streams to 10% for “air with moderate contaminant concentration, mild sensory-irritation intensity, or mildly offensive odors”; a similar exception exists in the IMC, Section 514.4. In both the IMC and ASHRAE 62.1, no standard is cited for determining cross-contamination, presumably because none yet exists.

Cost Impact: Will not increase the cost of construction

This proposal is expected to reduce construction costs by eliminating the need for a second wall cap and extra ducting that would otherwise be required to separate intake and exhaust airstreams.
501.6 (New)

Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code

Add new text as follows:

501.6 Discharge from multiple exhaust fans. The discharge outlets of multiple exhaust fans shall not be connected to a common duct. The discharge outlets of exhaust fans serving separate dwelling units shall not be connected to a common duct.

Reason: If exhaust fans such as toilet and kitchen exhaust fans are connected together on the positive pressure (discharge) side of the fans, exhaust air will flow through any fan that is not running. The typical backdraft dampers do not prevent leakage and are not reliable unless cleaned and maintained. If the fans operate in parallel or have effective backdraft dampers, they could share a common discharge duct if such duct was properly sized and configured. Often such connections involve no engineering and consist of fans duct taped to a tee fitting without even increasing the duct size as necessary. If the fans serve different dwelling units, the exhaust air from one dwelling would discharge into another dwelling unit and this is unacceptable.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC). The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will increase the cost of construction

This proposal will increase the cost of construction in those cases where the discharge side of exhaust fans would have been connected to a common duct, because separate exhaust terminations are required by the proposed text.
2015 International Mechanical Code

Revise as follows:

502.14 Motor vehicle operation. In areas where motor vehicles operate, mechanical ventilation shall be provided in accordance with Section 403. Additionally, areas in which stationary motor vehicles are operated shall be provided with a source capture system that connects directly to the motor vehicle exhaust systems. Such system shall be engineered by a registered design professional or shall be factory-built equipment designed and sized for the purpose. Makeup air for the ventilation system shall be provided by permanent openings or mechanical makeup air supply units. Motorized dampers for such openings and makeup air supply units shall be automatically controlled to start and operate simultaneously with operation of the ventilation system.

Exceptions:

1. This section shall not apply where the motor vehicles being operated or repaired are electrically powered.
2. This section shall not apply to one and two-family dwellings.
3. This section shall not apply to motor vehicle service areas where engines are operated inside the building only for the duration necessary to move the motor vehicles in and out of the building.

Reason: Overhead doors in repair garages and service garages should not be relied upon to provide makeup air for the required mechanical exhaust/ventilation system because they may or may not be open when makeup is needed. Dampered outdoor air intake openings and makeup air supply units need to be controlled so that they function when the exhaust/ventilation system functions.

Cost Impact: Will increase the cost of construction

This proposal will increase the cost of construction in those cases where overhead doors would have been used as makeup air inlets. Alternative makeup air openings are mandated and control wiring will be required to cause simultaneous operation of ventilation systems and the makeup supply units and motorized louvers.
504.3

**Proponent:** Julius Ballanco, JB Engineering and Code Consulting, P.C., representing In-O-Vate Technologies (JBENGINEER@aol.com)

**2015 International Mechanical Code**

Revise as follows:

**504.3 Cleanout.** Each vertical riser shall be provided with a means for cleanout. **Dryer duct terminations shall by design, provide access for cleaning the exhaust duct.**

**Reason:** The routine cleaning of the dryer exhaust ducts minimizes the potential for a fire in the duct as well as increasing the efficiency of the appliance. Duct cleaning services now provide this service for dryer exhaust ducts using a wand and brush. Many duct cleaning service companies enter the dryer exhaust duct through the duct termination. This offers an easy access to the dryer exhaust duct system. If a proper dryer exhaust terminal is not provided that allows ease of access, some companies have been known to wrongly remove the termination lid or cover creating a potential leak situation.

Examples of vent caps that duct cleaners wrongly disassemble to gain access.
Examples of vent caps that duct cleaners wrongly disassemble to gain access.

Cost Impact: Will increase the cost of construction
The cost may increase for a vent terminal that allows cleaning.
2015 International Mechanical Code

Revise as follows:

504.4 Exhaust installation. Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Exhaust duct penetrations of exterior wall and roof assemblies shall be sealed air-tight to prevent dryer exhaust from re-entering the building. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.

Reason: This change clarifies that the dryer exhaust must vent to the outside without the possibility of having the dryer exhaust return to the building. In some regions, friction-fitting a ducts’ end into a roof cap appears to still be acceptable. This change adds the language to require a positive leak-proof assembly that will prevent the dryer exhaust from reentering the building. The high humidity of the dryer exhaust can cause all sorts of problems within the building elements if the dryer exhaust can reenter the building. Humidity control is an important part of any building design. As such, humid lint-laden air should never be given a path to enter the building after being exhausted.

Cost Impact: Will not increase the cost of construction
This change is simply clarifying the intent of the code.
**M 36-15**

**504.4, 504.8.2**

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

**2015 International Mechanical Code**

**Revise as follows:**

**504.4 Exhaust installation.** Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums.

**504.8.2 Duct installation.** Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than \( \frac{1}{8} \) inch (3.2 mm) into the inside of the duct.

**Reason:** As a result of the newer language in Section 504.8.2, this language is no longer required and will only cast doubt on Section 504.8.2.

**Cost Impact:** Will not increase the cost of construction

There is no cost impact as this modification is strictly editorial in nature
2015 International Mechanical Code

Add new text as follows:

**504.4 Exhaust installation.** Dryer exhaust ducts for clothes dryers shall terminate on the outside of the building and shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination. Ducts shall not be connected or installed with sheet metal screws or other fasteners that will obstruct the exhaust flow. Clothes dryer exhaust ducts shall not be connected to a vent connector, vent or chimney. Clothes dryer exhaust ducts shall not extend into or through ducts or plenums. Clothes dryer exhaust ducts shall be sealed in accordance with Section 603.9

**Reason:** Section 504 covers duct construction for dryers, however, it is unclear on the requirement to seal dryer ducts. Sealing is specified in 603.9. Because we don’t have a reference directing the code official to 603.9 do we inadvertently lose the duct sealing requirements? This code change clarifies that dryer ducts must be sealed in accordance with 603.9 removing any doubt.

**Cost Impact:** Will not increase the cost of construction

The requirement has always been in the code to seal ducts. This code change proposal just reminds you that it is also required for dryer ducts within the section that regulates dryer ducts.
504.4.1 (New)

**Proponent:** Julius Ballanco, JB Engineering and Code Consulting, P.C., representing In-O-Vate Technologies (JBENGINEER@aol.com)

2015 International Mechanical Code

Add new text as follows:

**504.4.1 Exhaust termination outlet and passageway size.** The passageway of dryer exhaust duct terminals shall be undiminished in size and shall provide an open area of not less than 12.5 square inches (8,065 sq mm).

**Reason:** The allowable (calculated) length of the dryer exhaust duct is based on an open (non-restrictive) exhaust terminal. Some exhaust terminals increase resistance due to their inherent design characteristics (path and final opening size). This results in the dryer exhaust duct having to be reduced in length. However, there is no allowance for a reduction in length for a highly resistant vent cap. Short of requiring testing standards for every vent termination, the code must require a minimum open area of 12.5 sq inches which equates to a 4” round duct. The code is very sensitive and detailed as it relates to 90 degree elbows and their respective friction loss but does not prohibit or penalize for termination hoods that grossly create back pressure, reducing the efficiency of the dryer.

The dimension used for the opening in the interior area of the 4 inches duct is rounded to an even number (12.5”). By maintaining the same opening area throughout the vent terminal, the friction resistance in vent caps can be greatly reduced.

**Video Links:**

[www.youtube.com/watch?v=SkK1Rp3eXNbk](http://www.youtube.com/watch?v=SkK1Rp3eXNbk)


**Cost Impact:** Will increase the cost of construction

The cost of the vent terminal may be higher.
504.4.1 (New)

Proponent: Rick Harpenau, In-O-Vate Technologies, representing Self

2015 International Mechanical Code

Add new text as follows:

504.4.1 Exhaust termination pathways. Dryer exhaust duct terminal pathways that cause a change in direction of air flow between 45 and 90 degrees shall have an area not less than 20 percent larger than the cross sectional area of the exhaust duct served. Dryer exhaust duct terminal pathways that cause a change in direction of air flow greater than 90 degrees shall have an area not less than 30 percent larger than the cross sectional area of the exhaust duct served. Exhaust duct terminal passageways shall maintain throughout an area of not less than 12.5 square inches (8,065 sq mm).

Reason: The code is very sensitive and detailed as it relates to 90 degree elbows and their respective friction loss but does not prohibit or penalize for termination hoods that grossly create back pressure, reducing the efficiency of the dryer. There are wall vents and roof vents on the market that with minimal testing equipment show clearly they create as much back pressure as 3 and 4 elbows. Short of requiring testing standards for every vent termination, the council should consider language whereby the passageway increases in size to make up for the friction causing bends. If this addition to the codes makes sense, actual calculations can be provided. Bottom line, treat terminations the same as elbows and run lengths.

Video Links:
www.youtube.com/watch?v=5KnRp3eXNbk
http://youtu.be/ZL2zV1-GjdI?t=50s

Cost Impact: Will increase the cost of construction
A larger opening at the termination may cost more.
M 40-15

504.6.1 (New)

Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing In-O-Vate Technologies, Inc. (JBENGINEER@aol.com)

2015 International Mechanical Code

Add new text as follows:

504.6.1 Make-up air for tight construction. Make-up air shall be provided for clothes dryers where the air infiltration rate is known to be less than 0.4 air changes per hour (ACH). Make-up air shall be provided by a duct that communicates with the outdoors, a ventilated crawl space, or a ventilated attic space and such duct shall have a cross sectional area not less than that of a 4 inch round duct. The make-up air duct shall open into the room in which the clothes dryer is located. Make-up air duct inlets shall be provided with a screen having a mesh size not less than \( \frac{1}{4} \) inch and not greater than \( \frac{1}{2} \) inch. The make-up air inlet shall be equipped with an air admitting damper that opens during the operation of the clothes dryer.

Exception: Condensing dryers shall not require make-up air.

Reason: Today homes are much more tightly constructed, creating an inadequate condition for the proper operation of a clothes dryer. The exhaust rate for a residential dryer ranges from 125 to 200 cfm with newer dryers favoring 200 cfm. When the air infiltration rate drops to less than 0.4 air changes per hour, this creates a condition of inadequate make-up for the clothes dryer. When there is inadequate ambient air to pull from, the dryer is starved and not capable of efficiently drying the clothes any longer. This extends the length of time for the dryer cycle wasting energy. It also reduce the life of the dryer since the fan is attempting to exhaust air that is not available.

Many clothes dryers are located in the basement of a home. When located in the basement, they have the available air in the basement as make-up air for exhausting the moisture. If a basement in 25 feet by 25 feet with an 8 foot ceiling, there is 5,000 cubic feet of available air. However, with an air exchange rate of 0.4, the available air for exhaust is 2000 cubic feet. That translates to 33.3 cfm of air. This means that the dryer has to draw air from other locations in order to properly operate, potentially pulling it from other unsafe sources.

Outside air is normally required by combustion air when the air infiltration rate is less than 0.4 as identified in Section G2407.5. This code change is consistent by requiring make-up air when the air exchange rate is below this value. The amount of air required for combustion air is normally less than the amount of make-up air for a dryer exhaust. An 80,000 Btu/hr furnace only requires between 16.6 and 26.6 cfm for combustion air, whereas the dryer requires between 125 and 200 cfm.

With a 4 inch duct, the make-up air can be provided at an acceptable rate. Furthermore, the fan in the clothes dryer would draw the make-up air through the make-up air duct.

A screened air admitting damper or equivalent device is necessary to prevent outside air from entering the home when the clothes dryer is not in use. The screen dimension are taken from Table 401.5 of the IMC for residential occupancies. The air admitting damper also prevents the loss of conditioned air when the dryer is not in use.

Cost Impact: Will increase the cost of construction

There is a cost to installing a make up air supply system.

M 40-15 : 504.6.1 (New)-
BALLANCO3702
Part Part I

2015 International Mechanical Code

Revise as follows:

504.8.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal having a minimum thickness of not less than 0.016 inch (0.4 mm) thick in thickness. The exhaust duct shall be round and the size shall be 4 inches (102 mm) nominal in diameter.

Part Part II

2015 International Residential Code

Revise as follows:

M1502.4.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal having a minimum thickness of not less than 0.0157 inches (0.3950 mm) in thickness (No. 28 gage). The exhaust duct shall be round and the size shall be 4 inches (102 mm) nominal in diameter.

Reason: The code assumes that the dryer ducts are 4 inch round duct, but this not stated in the code. Square, rectangular and oval ducts all have differing flow characteristics and the exhaust system design is based on round duct. The code states 4 inch diameter which clearly indicates round duct, but it would be very clear to state that it must be round.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact:

Part Part I: Will not increase 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 nor are the code requirements made more stringent.

Part Part II: Will not increase 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 nor are the code requirements made more stringent.

Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)
Proponent: Julius Ballanco, JB Engineering and Code Consulting, P.C., representing In-O-Vate Technologies (JBENGINEER@aol.com)

2015 International Mechanical Code
Revise as follows:

504.8.2 Duct installation. Exhaust ducts shall be supported at 4-foot (1219 mm) intervals and secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than $\frac{1}{8}$ inch (3.2 mm) into the inside of the duct. Where dryer exhaust ducts are enclosed in wall or ceiling cavities, such cavities shall have a least dimension of not less than 4.25 inches (108 mm). Round duct shall not be deformed.

Reason: The dryer exhaust duct must remain round in shape to reduce friction loss in the duct system. The length of the duct and termination are based on friction loss for round duct, not oval duct. The length of the dryer exhaust duct would have to be reduced if the 4 inch duct was oval in shape. In addition to the reduction in efficiency, the oval pipe creates a difficult connection for the consumer to make to the dryer exhaust transition hose.

A 1 inch furring strip (1x2) can be added to a 2 x 4 stud providing the 4.25 inches of space. In most cases, this “mechanical” wall is busy with other trades (plumbing drainage and vent stacks, gas piping, electric service, laundry services and water piping). A 4.25 inch space will benefit all of the trades working within that space. The minimum space required to keep the dryer exhaust duct round is 4.125 inches. This dimension could also be referenced here, however, most contractors will simply use a furring strip on a 2 x 4 to provide the minimum spacing for the duct.
**Cost Impact:** Will increase the cost of construction.
There is an added cost of adding furring strips to a 2 x 4 wall.

Examples of “mechanical walls” showing the abundance of utilities in this wall, demonstrating the need to provide more than 3.5”
M 43-15

504.8.2

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

2015 International Mechanical Code

Revise as follows:

504.8.2 Duct installation. Exhaust ducts shall be supported at 4-foot intervals not to exceed 12 feet (3657 mm) intervals and shall be secured in place. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Ducts shall not be joined with screws or similar fasteners that protrude more than \( \frac{1}{8} \) inch (3.2 mm) into the inside of the duct.

Reason: Twelve feet is what is found in the SMACNA Manual for 4 inch duct as strapping every 4 feet is unnecessarily restrictive.

Cost Impact: Will not increase the cost of construction
This proposal will actually decrease costs by not having to install as many hangers and the labor to do so.
SECTION 505
DOMESTIC KITCHEN-COOKING EXHAUST EQUIPMENT

Add new text as follows:

505.1 General. Domestic cooking exhaust equipment shall comply with the requirements of this section.

505.2 Domestic cooking exhaust. Where domestic cooking exhaust equipment is provided it shall comply with the following as applicable:

1. Overhead range hoods and downdraft exhaust equipment not integral with the cooking appliance shall be listed and labeled in accordance with UL 507.
2. Domestic cooking appliances with integral downdraft exhaust equipment shall be listed and labeled in accordance with UL 858 or ANSI Z21.1.
3. Microwave ovens with integral exhaust for installation over the cooking surface shall be listed and labeled in accordance with UL 923.

Revise as follows:

505.3 Exhaust ducts. Where domestic range hoods and domestic appliances equipped with downdraft Domestic cooking exhaust are provided, such hoods and appliance equipment shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.

Exceptions:

1. In other than Group I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors.
2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
   1. The duct shall be installed under a concrete slab poured on grade.
   2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
   3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
   4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
   5. The PVC ducts shall be solvent cemented.

505.4 Other than Group R. In other than Group R occupancies, where cooktops, ranges, and open-top broilers are installed, domestic cooking appliances are utilized for domestic purposes, such appliances shall be provided with domestic range hoods. Hoods and exhaust systems shall be in accordance with Sections 505.1 and 505.2 provided.

Add new standard(s) as follows:

ANSI Z21.1 - 2010 Household Cooking Gas Appliances
UL 507 - 2014 Standard for Safety Electric Fans

Reason: The IMC currently has no criteria for exhaust hoods and downdraft equipment. This proposal accomplishes the following:
1. Includes a new charging Section 505.1 that is similar to other charging sections in the IMC.
2. New section 505.2 describes the listing standards used to investigate the various types of exhaust equipment.
3. Section 505.3 (formerly Section 505.1) was retitled “Exhaust ducts” to more accurately reflect what is covered in the section. Some edits were made to clarify the wording. No substantive changes were made to the requirements for the exhaust ducts.
4. Section 505.4 was revised to clarify the types of domestic cooking appliance that requires a domestic cooking exhaust system. Without this change an exhaust system could be required for a coffee maker, wall mounted oven, rice cooker, etc.
Cost Impact: Will increase the cost of construction
In most cases there should be no increase in costs if exhaust hoods and downdraft equipment are listed to the specified standards, which appears to be common practice.

Analysis:
A review of the standard proposed for inclusion in the code, UL 507, 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 April 2, 2015.
Proponent: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2015 International Mechanical Code

Revise as follows:

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are provided, such hoods and appliances shall discharge to the outdoors through sheet metal ducts constructed of galvanized steel, stainless steel, aluminum or copper. Such ducts shall have smooth inner walls, shall be air tight, shall be equipped with a backdraft damper, and shall be independent of all other exhaust systems.

Exceptions:

1. In other than Group I-1 and I-2, where installed in accordance with the manufacturer's instructions and where mechanical or natural ventilation is otherwise provided in accordance with Chapter 4, listed and labeled ductless range hoods shall not be required to discharge to the outdoors. Installations in Group I-1 and Group I-2 occupancies shall be in accordance with Section 407.2.6 of the International Building Code and Section 904.13 of the International Fire Code.

2. Ducts for domestic kitchen cooking appliances equipped with downdraft exhaust systems shall be permitted to be constructed of Schedule 40 PVC pipe and fittings provided that the installation complies with all of the following:
   2.1. The duct shall be installed under a concrete slab poured on grade.
   2.2. The underfloor trench in which the duct is installed shall be completely backfilled with sand or gravel.
   2.3. The PVC duct shall extend not more than 1 inch (25 mm) above the indoor concrete floor surface.
   2.4. The PVC duct shall extend not more than 1 inch (25 mm) above grade outside of the building.
   2.5. The PVC ducts shall be solvent cemented.

Reason: These pointers are going to aid the user in finding the pertinent information regarding fire suppression for these range hoods. It can be very time consuming trying to locate the correct language for a code compliant installation. The user would never know that fire suppression is even required without these pointers.

Cost Impact: Will not increase the cost of construction

There is no cost impact as this proposal is strictly editorial in nature.
2015 International Mechanical Code

Revise as follows:

**505.2 Makeup air required. Exhaust hood systems**

Where one or more gas, liquid, or solid-fuel burning appliances that are neither direct vent nor use a mechanical draft venting system are located within a dwelling unit's air barrier, each exhaust system capable of exhausting in excess of 400 cfm (0.19 m³/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 a means not less than one damper that complies with Section 505.2.1.

**Exception:** Makeup air is not required for exhaust systems installed for the exclusive purpose of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system, operated only when windows or other air inlets are open.

Add new text as follows:

**505.2.1 Makeup air dampers.** Where makeup air is required by Section 505.2, such dampers shall comply with this section. Dampers shall be gravity or barometric dampers or electrically operated dampers that automatically open when the exhaust system operates. Dampers shall be accessible for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced. Gravity or barometric dampers shall not be used in passive makeup air systems except where the dampers are rated to provide the design makeup airflow at a pressure differential of 0.01 in. w.c. (3 Pa) or less.

**Reason:**

Backdrafting of combustion appliances typically presents the greatest danger associated with depressurizing a space. Field tests have confirmed that naturally vented combustion appliances (i.e., those that are not mechanically vented or direct-vent) are the most susceptible to depressurization, and measures should be taken to provide makeup air (MUA) for large exhaust appliances when such appliances are located within the dwelling unit's air barrier. ASHRAE 62.2, the consensus standard for Ventilation and Acceptable Indoor Air Quality in residential dwelling units, does not require MUA when combustion appliances are mechanically vented or are direct-vent. The ASHRAE 62.2 committee recently reviewed the 62.2 section requiring MUA, and the general consensus (no vote taken) was a reaffirmation that the MUA requirement should not apply to mechanically vented or direct-vent combustion appliances, due to lack of data to substantiate their susceptibility to backdrafting.

This proposal would relax the MUA requirement in the IMC for dwelling units by aligning it more closely with ASHRAE 62.2. Similar changes have been made to this section in Florida’s and Virginia’s adoptions of the IRC, which has a similar requirement to the IMC.

The proposal introduces a new section to address MUA dampers specifically, with the second and third sentences in Section 505.2.1 taken verbatim from the 2015 IRC. The last sentence introduces a new requirement for gravity or barometric dampers. It makes no sense to design a system to provide MUA if the damper does not open before the combustion appliance starts spilling. So, the new requirement is intended to ensure that when MUA is required, any gravity or barometric damper used to provide MUA shall engage at the pressure differential above which naturally drafted combustion appliances can be expected to backdraft (3 Pa, based on an acceptable 5%-20% failure rate across all outdoor conditions)¹. This proposed requirement only applies to gravity or barometric dampers in "passive" MUA systems, which are those provide MUA without the assistance of a fan. Gravity or barometric dampers in "active" MUA systems are excluded from this requirement because we assume that the fan will create a sufficient pressure differential to open the damper.

**Bibliography:**


**Cost Impact:** Will not increase the cost of construction

This proposal is expected to reduce construction costs by reducing the number of scenarios requiring makeup air for kitchen exhaust.
506.3.11.2 Field-applied grease duct enclosure. Grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a listed and labeled field applied grease duct enclosure material, systems, product, or method of construction specifically evaluated for such purpose in accordance with ASTM E 2336. The surface of the duct shall be continuously covered on all sides with not less than two layers of field applied grease duct enclosure material from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through penetration fire stop system tested and listed in accordance with ASTM E 814 or UL 1479 and having a "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. The grease duct enclosure and firestop system shall be installed in accordance with the listing and the manufacturer's instructions. Partial application of a field applied grease duct enclosure shall not be installed for the sole purpose of reducing clearances to combustibles at isolated sections of grease duct. Exposed duct-wrap systems shall be protected where subject to physical damage.

Reason: ASTM E-2336 states that two layers are required to be applied to meet the Standard. All the manufacturer's instructions and the ICC evaluations also state the same. Many installers and designers are not aware that two layers are required. This was disapproved last cycle because of the possibility that a single layer system may someday be developed. Manufacturers of duct wrap material would rather sell twice as much material so there is little incentive to develop a single layer system. This is important information that the user needs to know ahead of time, not only for bidding purposes but in order to pass an inspection the first time around. Inspectors also need this information so they know what to look for. This is a simple "heads up" for code users and installers

Cost Impact: Will not increase the cost of construction
There will be no additonal cost as this in only an editorial modification and clarification. Installers are already required to do do this.
Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee
(PMGCAC@iccsafe.org)

2015 International Mechanical Code

Revise as follows:

506.3.13.2 Termination through an exterior wall.
Exhaust outlets shall be permitted to terminate through exterior walls where the smoke, grease, gases, vapors and odors in
the discharge from such terminations do not create a public nuisance or a fire hazard. Such terminations shall not be located
where protected openings are required by the International Building Code. Other exterior openings shall be
located in accordance with Section 506.3.13.3 and shall not be located within 3 feet (914 mm) of such terminations.

Reason: The current last sentence implies that outdoor air intakes and windows can be within 3 feet of the exhaust terminal, however Section
506.3.13.3 requires a 10 foot separation for outdoor intakes unless there is a 3 foot vertical separation. This section has been misinterpreted to allow
grease duct terminations to be within 3 feet of an operable window. The real intent of the current last sentence is fire safety related and that intent is
preserved in the proposed revision. Exterior openings include all openings in the wall such as fixed (non-openable) fenestration panels. The clearance
requirement of Section 506.3.13.3 must not be overlooked.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the
ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the
technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open
meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss
and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
M 49-15
506.3.13.3.1 (New)

**Proponent:** Jon Marcus, representing Jon Marcus

2015 International Mechanical Code

Add new text as follows:

506.3.13.3.1 **Clearance from dwelling units**

Where an exhaust discharge outlet is located within 250 feet horizontally of a dwelling unit, it shall comply with one or more of the following:

1. The point of discharge for such outlet shall be located 25 feet or greater above the highest opening into the dwelling unit.
2. The exhaust system shall be served by a pollution control unit that is listed for that application and designed to effectively capture and control effluent particulates, contaminants and odors.
3. The exhaust system shall be an engineered system utilizing a utility set fan and discharge nozzle designed to eject the effluent vertically to a height not less than 25 feet above the dwelling unit.

**Reason:** The code currently allows commercial kitchen effluent to discharge as close as 10 feet from an adjacent building which could include single family dwellings and dwelling units in multifamily residential buildings. The occupants of dwelling units that are close to the effluent discharge are subjected to the smoke, grease, particulates and odor in the effluent. This can prevent the occupants from opening their windows and enjoying their exterior spaces such as porches and balconies. In some cases, the contaminants enter the dwellings and deposit on the dwelling's interior surfaces. This scenario is all too common in urban areas where dwellings and businesses coexist next door or across a street from each other. The 250 foot horizontal distance and 25 foot vertical are reasonable and would likely allow the effluent to dissipate and be carried away such that the impact on the dwellings is minimal. The proposed text would require a 250 foot horizontal separation, but would allow any lesser horizontal separation where the discharge point is at least 25 foot above the highest window or door of any dwelling within 250 feet.

**Cost Impact:** Will increase the cost of construction

This proposal will increase the cost of construction because it would require vertical discharge duct extensions or pollution control equipment where it would not be required currently by the code.
2015 International Mechanical Code
Revise as follows:

506.3.2.5 Grease duct test.
Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct leakage test. A light water test shall be performed to determine that all welded and brazed joints are liquid tight. A light water test shall be performed by passing a lamp having a power rating of not less than 100 watts grease duct pressure washing equipment through the entire section of ductwork to be tested and visually inspecting for leakage of water. The lamp pressure washing equipment shall be open so as to emit light equally in all directions perpendicular to the duct walls of a type used for professionally cleaning commercial kitchen grease ducts. A test shall be performed for the entire duct system, including the hood-to-duct connection. Where the duct work shall be permitted to be tested in sections, provided that every joint is tested shall be excluded from testing. For listed factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

Reason: The light test required currently has many deficiencies. Openings in overlapped joint welds would not allow light to reach the observer. Pinhole leaks may not allow enough light through to be observed. The faults in the joints could be on sides not observed during the test and some duct sides may not be visible at all when installed. How fast can the lamp be pulled through the duct? What if the ambient light is bright or it is sunlight? What are the chances that a light test will disclose any, much less, all of the faults in joints? A test with pressurized duct cleaning equipment will expose all faults in the joints by visible water leakage.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will increase the cost of construction
This proposal will increase the cost of construction because the proposed water test will require more labor and equipment than the currently required light test.
M 51-15
202 (New), 506.5.2 (New)

Proponent: Shawn Strausbaugh, Arlington County, VA representing the VA Plumbing and Mechanical Officials Association (VPRIA) and the VA Building Code Officials Association (VBCOA), Guy McMann, Jefferson County CO, representing the CO Association of Plumbing and Mechanical Officials (CA, representing Arlington County, VA representing the VA Plumbing and Mechanical Inspectors Association (VPMIA) and the VA Building Code Officials Association (VBCOA) (sstrausbaugh@arlingtonva.us)

2015 International Mechanical Code
Add new definition as follows:

SECTION 202 DEFINITIONS

POLLUTION CONTROL UNIT (PCU) Manufactured equipment that is installed in a grease exhaust duct system for the purpose of extracting smoke, grease particles, and odors from the exhaust flow by means of a series of filters.

Add new text as follows:

506.5.2 Pollution Control Units. Pollution control units shall be installed in accordance with the manufacturer's installation instructions and shall be in accordance with all of the following:

1. Pollution control units shall be listed and labeled in accordance with UL 1978.
2. Fans serving pollution control units shall be listed and labeled in accordance with UL 762.
3. Pollution control units shall be mounted and secured in accordance with the manufacturer's installation instructions and the International Building Code.
4. Pollution control units located indoors shall be listed and labeled for such use. Where enclosed duct systems, as required by Section 506.3.11, are connected to a pollution control unit, such unit shall be located in a room or space having the same fire-resistance rating as the duct enclosure. Access shall be provided for servicing and cleaning of the unit. The space or enclosure shall be ventilated in accordance with the manufacturer's installation instructions.
5. A clearance of not less than 18 inches (457 mm) shall be maintained between the pollution control unit and combustible material.
6. Roof mounted pollution control units shall be listed for exterior installation and shall be mounted not less than 18 inches (457 mm) above the roof.
7. Exhaust outlets for pollution control units shall be in accordance with Section 506.3.13.
8. An airflow differential pressure control shall be provided to monitor the pressure drop across the filter sections of a pollution control unit. When the airflow is reduced below the design velocity, the airflow differential pressure control shall activate a visual alarm located in the area where cooking operations occur.
9. Pollution control units shall be provided with a factory installed fire suppression system.
10. Service space shall be provided in accordance with the manufacturer's instructions for the pollution control unit and the requirements of Section 306.
11. Wash down drains shall discharge through a grease interceptor and shall be sized for the flow. Drains shall be sealed with a trap or other approved means to prevent air bypass. Where a trap is utilized it shall have a seal depth that accounts for the system pressurization and evaporation between cleanings.
12. Protection from freezing shall be provided for the water supply and fire suppression systems where such systems are subject to freezing.
13. Duct connections to pollution control units shall be in accordance with Section 506.3.2.3. Where water splash or carryover can occur in the transition duct as a result of a washing operation, the transition duct shall slope downward toward the cabinet drain pan for a length not less than 18 inches (457 mm). Ducts shall transition to the full size of the units inlet and outlet openings.
14. Extra heavy duty appliance exhaust systems shall not be connected to pollution control units except where such units are specifically designed and listed for use with solid fuels.
15. Pollution control units shall be maintained in accordance with the manufacturer's instructions.

Reason: Pollution Control Units have been manufactured by numerous companies for several years. The desire to limit the amount of smoke, grease, and other particulate at the exhaust outlets of commercial cooking appliances has driven the use of these units as numerous entities are requiring these types of units to be installed. These units need minimum construction and installation standards to be addressed in the mechanical code.
Cost Impact: Will increase the cost of construction
The cost of construction of these specific units may be increased by manufacturers if their current unit did not meet the minimum requirements per this new section. As we do not represent manufacturers it is difficult to substantiate if this proposed change will have create such a cost increase or not.
Proponent: Thomas Johnson, Johnson Diversified Products, Inc, representing Johnson Diversified Products, Inc. (tomj@jdpinc.com)

2015 International Mechanical Code
Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2 and 507.3. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment and makeup air system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:

1. Factory-built commercial exhaust hoods that are listed and labeled in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.1.1, 507.1.2, 507.1.3, 507.1.4, 507.1.5, 507.2, 507.2.1, 507.2.2, 507.2.3, 507.2.4, 507.2.5, 507.2.6, 507.2.7, 507.2.8, 507.3.1, 507.3.8.1, 507.3.9, 507.8.2, 507.8.9, 507.9, 507.4.1, 507.4.2, 507.5, 507.5.1, 507.4.2, 507.5.2, 507.5.3, 507.5.4, 507.6.1, 508.1, 508.1.1, 508.2 and 507.509.1.

2. Factory-built commercial cooking recirculating systems that are listed and labeled in accordance with ANSI UL 710B, and installed in accordance with Section 304.1, shall be installed in accordance with their listings and the manufacturers’ instructions. Such systems shall not be required to comply with Sections 507.1.1.1, 507.1.2, 507.1.3, 507.1.4, 507.1.5, 507.2, 507.2.1, 507.2.2, 507.2.2, 507.2.3, 507.2.4, 507.2.5, 507.2.6, 507.2.7, 507.2.8, 507.2.9, 507.3.1, 507.3.8.1, 507.3.9, 507.8.2, 507.8.9, 507.9, 507.4.1, 507.4.2, 507.5, 507.5.1, 507.4.2, 507.5.2, 507.5.3, 507.5.4, 507.6.1, 508.1, 508.1.1, 508.2 and 507.509.1. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual appliance shall be considered as occupying not less than 100 square feet (9.3 m²).

3. Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.

Reason: Manufacturered systems that are performance tested to an ANSI Accredidited test by an ANSI Certifying body are to be installed pursuant to their listings and manufacturers instructions.

The prescriptive formulas of the model building and mechanical codes have always been intended to prescribe minimum safety criteria for those systems that are not performance tested and certified by an accredited ANSI certifying body. Rather, they are field commissioned and accepted by an AHJ that is immune from liability prosecution - if they get it wrong and the fabricated and field installed compliant system fails. ANSI performance tested, listed and labeled products and systems installed pursuant to their manufacturers instruction provide comprehensive liability protection far beyond that of one built in a fabrication shops with many different trades having a hand in their narrow scope of work.

When the code and its interpretation by an AHJ conflicts with the products listing or the manufacturers instructions, the instructions from the manufacturer must prevail as liability for the product and its intended use is tied to its listing and manufacturers instructions. Licensing agencies do not assume liability for their interpretations. When their code interpretations conflict with a products listing and manufacturers instructions, reasonable standards of care require adherence to the listing and the manufacturers instructions. Contractors, design professionals and owners that acquieze to an denying AHJ in such matters can incur significant incremental risk exposures when complainants pursue them for injury due to teh forced compliants while the AHJ’s that provided the written order for the deviation quickly invoke thier discretionary immunity.

In recent State and Local licensing agencies that have denied acceptance of such products have been succesfully pursued in Boards or appeals and in courts of law for overreaching, arbitrary interpretations that in fact comprise a restraint to trade.

Accordingly, I seek to provide code language that makes it clear that ANSI performance tested, listed and labelled products must be installed pursuant to their listings and manufacturers instructions as a preordanal requirement to the presscriptice criteria of the code.

Bibliography:

ANSI UL 710B
ANSI UL710
ANSI UL710C
UL KNLZ
ASHRAE Std 154
NFPA 96
EPA 202
Cost Impact: Will not increase the cost of construction.

There will be enormous cost savings when the confusion the pervades regulatory agencies, designers and the construction trade in general is clearly delineated in this code section - and all others.

To be clear, I’d have preferred to be very brief and simply state that ANSI performance tested listed and labelled systems installed pursuant to their listings and manufacturers instructions are exempt from the remaining criteria of the code. This makes sense as the rest of the criteria in the code is prescriptive and intended for sheet metal fabricators and the different trades that essentially sew (cobble?) their specialties together in the field to comprise a coherent “compliant” system.
Proponent: Guy McMann, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2015 International Mechanical Code

Revise as follows:

507.1 General. Commercial kitchen exhaust hoods shall comply with the requirements of this section. Hoods shall be Type I or II and shall be designed to capture and confine cooking vapors and residues. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2 and 507.3. Where any cooking appliance under a single hood requires a Type I hood, a Type I hood shall be installed. Where a Type II hood is required, a Type I or Type II hood shall be installed. Where a Type I hood is installed, the installation of the entire system, including the hood, ducts, exhaust equipment and makeup air system shall comply with the requirements of Sections 506, 507, 508 and 509.

Exceptions:
1. Factory-built commercial exhaust hoods that are listed and labeled in accordance with UL 710, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5.
2. Factory-built commercial cooking recirculating systems that are listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1, shall not be required to comply with Sections 507.1.5, 507.2.3, 507.2.5, 507.2.8, 507.3.1, 507.3.3, 507.4 and 507.5. Spaces in which such systems are located shall be considered to be kitchens and shall be ventilated in accordance with Table 403.3.1.1. For the purpose of determining the floor area required to be ventilated, each individual appliance shall be considered as occupying not less than 100 square feet (9.3 m²).
3. Where cooking appliances are equipped with integral down-draft exhaust systems and such appliances and exhaust systems are listed and labeled for the application in accordance with NFPA 96, a hood shall not be required at or above them.

Reason: The IMC does not follow NFPA-96 strictly as pertinent text is extracted. This reference implies that the standard needs to be complied with in its entirety when in fact this is not the case. Standards generally speaking contain much non-mandatory language.

Cost Impact: Will not increase the cost of construction
By not having to comply entirely with the NFPA Standard there could actually be a cost savings.
2015 International Mechanical Code

Revise as follows:

507.2 Type I hoods. Type I hoods shall be installed where cooking appliances produce grease or smoke as a result of the cooking process. Type I hoods shall be installed over medium-duty, heavy-duty and extra-heavy-duty cooking appliances.

Exception:

1. A Type I hood shall not be required for an electric cooking appliance where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with UL 710B.
2. Listed and labeled solid fuel-fired ovens that are constructed of solid masonry or reinforced portland or refractory cement concrete, that are vented by natural draft in accordance with NFPA 211 and that are installed in accordance with the manufacturer's instructions and NFPA 96.

Reason: This proposal provides clarity for the installation of solid fuel ovens that are listed to be natural draft vented. The IMC recognizes listed solid fuel appliances vented per NFPA211. However, when used as an oven for foods, a solid fuel appliance is currently required to be disconnected from its flue and utilize an extra-heavy duty Type I hood to vent products of combustion.

This proposal brings forward current methods from Chapter 14 of NFPA 96 for the use of natural draft vented solid fuel ovens without a grease hood or automatic fire extinguishing equipment. NFPA 96 recognizes the safe operation of these oven types utilizing natural draft venting. Ovens listed for this use are heavy duty, solid fuel appliances (IMC Chapter 9). Most units weigh in excess of 2,000 pounds and are intended to operate in excess of 650°F baking temperature.

This proposal will not reduce safety. Some ovens have dual listings to UL 737. A UL 737 appliance can be installed as a decorative stove in the middle of a restaurant seating area, burn high fuel content wood, and be direct vented thru NFPA 211 products. But current IMC language requires that once lower fuel content food product is introduced, the oven must be disconnected from its listed, code-compliant, safely-functioning vent and placed under Type I extra-heavy duty category hood.

Keeping a listed appliance connected to its listed flue system does not reduce safety relative to the current IMC requirement for locating under a Type I hood:

1. Connected to a listed vent, the products of combustion remain at high temperature and are safely removed from the building per the listing. When located under an extra-heavy duty Type I hood, the combustion gases are mixed with 5-10 times more ventilation air and the flue gases cool significantly. This cools any grease vapors below the condensation point, creating grease build-up in the Type I system. Type I systems are intended to capture grease vapors because the exhaust temperatures are always within the condensation range. When installed as a listed natural draft vent, gases, including any possible grease vapor, enter the flue above condensation point and are carried beyond the vent system.

An additional wrinkle is added using an Extra-heavy duty Type I hood over solid fuel combustion: the mixing of combustion gases cools the flow to the condensation point of creosote (about 250°F for most wood types). The high flow rate of extra heavy duty Type I hoods mixes more cool (room make-up) air with the flue gases than other hoods, which reduces the temperature of the combined air stream. Creosote build-up on the hood, hood filters, exhaust duct and fan is a less safe condition than utilizing a natural vent, NFPA 211 intended to limit and prevent creosote build-up.

a. Listed solid fuel appliance is designed to maintain flue temperatures above creosote development temperatures. Dilution of flue gases under a Type I hood almost guarantees creosote development on surfaces not intended for this material. Cleaning creosote requires different procedures from cleaning grease: removal from fan parts is more difficult.

2. A natural draft solid fuel appliance does not rely on an external fan for safe operation. When under a Type I hood, fan failure or loss of power will result in uncontrolled release of combustion products and smoke into the occupied space. The fire in the oven cannot be quickly or easily extinguished during this type event. A natural draft oven will maintain safe operation in event of a power failure.

3. Lack of clear guidance on automatic extinguishing within current IMC. An open solid fuel grille (for grilling) may experience a food product fire that exceeds the heat release of the cooking fire. See https://www.youtube.com/watch?v=ikd8Xxq_ZOs video of a fire on an open grille not intended to contain a flare-up. This video shows the obvious intent for the Extra-heavy duty appliance definition in IMC Chapter 2. This proposal concerns solid fuel for cooking inside a refractory oven designed to safely contain a fire. Current IMC has no clear intent of how a fire system would put out a fire within a fireplace that is already "on fire".

a. Automatic extinguishing is required for the extra heavy duty hood. The extinguishing systems will not be triggered should food products ignite inside of the oven. Should pizza/bread catch fire, it will not create a temperature rise or differential greater than the fuel already burning in the oven. Even if the food had no water content, the food has a lower fuel-content than the burning wood. The oven is designed to maintain adequate natural draft; food that catches fire inside of the oven will not create enough flare-up leaving the oven door to trigger an automatic system. Manual operation may be possible. Note that NFPA 96 requires a portable extinguisher. But a code minimum automatic system has little, if any, value.

b. There is unclear guidance of where to direct the extinguishing system nozzles. Should they be pointed at the oven housing? This will not extinguish a fire inside of a refractory oven. Should they point at the oven opening?

c. There is no method to cut off fuel flow to the oven. While the operator may refrain from adding fuel, the fuel inside of the oven will continue to safely burn at full fire: that's what a solid-fuel oven (fireplace) is supposed to do. A heavy refractory enclosure will contain any fire.

4. Safer containment for accidental food combustion than a deck-type oven. Deck-type pizza ovens under current code and commentary
recognize that these deck-type appliances are light duty appliances (and can be located under a Type II hood per IMC 507.2.2). These appliances are bread finishing/cheese melting appliances. It is recognized that if a pizza catches fire, the oven door can be closed and the burning food be contained within the deck-type oven. But a conveyorized pizza ovens are currently considered medium duty appliances. Current logic is that burning food product cannot be contained within the conveyorized oven. For a solid fuel oven, should the food product catch fire in a wood oven, the oven is already listed to safely contain a fire.

5. The high temperature operation of these ovens will limit any chance for grease build-up. The temperature in the oven is well above the smoke point of animal fats (Lard = 390F; Tallow = 420F). Grease will not build up on interior surfaces of the oven. See photos of the interior of a wood oven in operation:

http://www.fornobravo.com/pizza_oven_management/oven_firing.html

There is no chance for build-up of grease inside the oven: the internal temperature of the oven is "self-cleaning" during each firing cycle. The flue requires the same cleaning required for any solid fuel chimney. Grease build-up is not of concern.

NOTE: OMOA may have video/pictures of a flue outlet.

6. OMOA and State of Oregon recognizes this as a statewide method of compliance.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction and can reduce cost of installation and operation.
Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code

Revise as follows:

507.2.6 Clearances for Type I hood. A Type I hood shall be installed with a clearance to combustibles of not less than 18 inches (457 mm).

Exceptions:

1. Exception: Clearance shall not be required from gypsum wallboard or 1/2-inch (12.7 mm) or thicker cementitious wallboard attached to noncombustible structures provided that a smooth, cleanable, nonabsorbent and noncombustible material is installed between the hood and the gypsum or cementitious wallboard over an area extending not less than 18 inches (457 mm) in all directions from the hood.

2. Type I hoods listed and labeled for clearances less than 18 inches in accordance with UL710 shall be installed with the clearances specified by such listings.

Reason: Type I hoods can be listed to the latest edition of UL710 which now includes testing for clearances to combustibles. There are hoods that are listed for clearances of less than 18 inches, however, the code does not currently recognize this fact and would require 18 inches minimum in all cases. Adding the new exception will allow lesser clearances without having to seek alternative approval from the AHJ. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
Proponent: Guy McMann, Jefferson County, Colorado., representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2015 International Mechanical Code

Revise as follows:

507.6.1 Capture and containment test. The permit holder shall verify capture and containment performance of the exhaust system. This field test shall be conducted with all appliances under the hood at operating temperatures, with all sources of outdoor air providing makeup air for the hood operating and with all sources of recirculated air providing conditioning for the space in which the hood is located operating. Capture and containment shall be verified visually by observing smoke or steam produced by actual or simulated cooking, such as provided by smoke candles, smoke puffers, and similar means.

Reason: The term “smoke generators” includes all forms of smoke producing products and cleans up the section a little bit.

Cost Impact: Will not increase the cost of construction
There will be no additional cost as this is only an editorial modification and clarification.
510.5 Incompatible materials and common shafts. Incompatible materials, as defined in the International Fire Code, shall not be exhausted through the same hazardous exhaust system. Hazardous exhaust systems shall not share common shafts with other duct systems, except where such systems are hazardous exhaust systems originating in the same fire area.

**Exception:***

1. The provisions of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:
   1. All of the hazardous exhaust ductwork and other laboratory exhaust within both the occupied space and the shafts are under negative pressure while in operation.
   2. The hazardous exhaust ductwork manifolded together within the occupied space must originate within the same fire area.
   3. Hazardous exhaust ductwork originating in different fire areas and manifolded together in a common shaft shall meet the provisions of Section 717.5.3, Exception 1, Item 1.1 of the International Building Code.
   4. Each control branch has a flow regulating device.
   5. Perchloric acid hoods and connected exhaust shall be prohibited from manifolding.
   6. Radioisotope hoods are equipped with filtration, carbon beds or both where required by the registered design professional.
   7. Biological safety cabinets are filtered.
   8. Each hazardous exhaust duct system shall be served by redundant exhaust fans that comply with either of the following:
      8.1. The fans shall operate simultaneously in parallel and each fan shall be individually capable of providing the required exhaust rate.
      8.2. Each of the redundant fans is controlled so as to operate when the other fan has failed or is shut down for servicing.

2. Hazardous exhaust ducts serving laboratories that are used solely for educational purposes shall not be prohibited from sharing common shafts with other ducts.

**Reason:** Laboratories within educational teaching facilities typically use less hazardous materials and chemicals in such a manner and in such low quantities that the exhaust produced by these substances does not pose significant risks to health/safety when compared to the exhaust resulting from laboratories meant for manufacturing or commercial use. Therefore it is not justifiable to impose the same regulations and restrictions on exhaust systems from these types of facilities as if they were equivalent. Exhaust from labs in educational facilities, though technically meeting the definition of hazardous, rarely pose an actual threat. For this reason, there is no need for the exhaust systems of these facilities to be subject to such stringent regulation.

**Cost Impact:** Will not increase the cost of construction

Given that the second exception proposed to IMC 510.5 is designed to reduce the regulatory requirements imposed upon Group B occupancies, it follows that the proposed change will not increase the cost of construction. This proposal would limit the number of regulations with which hazardous air exhaust systems in Group B occupancies have to comply, and in doing so would actually mitigate the expense of applicable construction projects by relieving the need to spend money on certain features/technologies (flow regulating devices, redundant fans, etc.) that would be required under the code as it currently stands.
510.8

Proponent: Peter Levitt, Sternvent, representing Sternvent (plevitt@sternvent.com)

2015 International Mechanical Code

Revise as follows:

510.8 Suppression required. Ducts shall be protected with an approved automatic fire suppression system installed in accordance with the International Building Code. Dust collection system ducts shall be protected by a spark detection and extinguishing system.

Exceptions:
1. An approved automatic fire suppression system shall not be required in ducts conveying materials, fumes, mists and vapors that are nonflammable and noncombustible under all conditions and at any concentrations.
2. Automatic fire suppression systems shall not be required in metallic and noncombustible, nonmetallic exhaust ducts in semiconductor fabrication facilities.
3. An approved automatic fire suppression system shall not be required in ducts where the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).
4. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems.

Reason: Many designers of dust collection systems are not familiar with what type of fire suppression system is suitable for a dust collection system duct and the associated dust particle conveying velocity of 3000-5000 feet per minute. If a source of ignition such as a spark enters a dust collection system, burning embers will travel towards the dust collector. Due to the small mass of the embers and high transport velocity in the duct, there will not be enough heat generated to activate a thermocouple sprinkler head. A photocell spark detection and extinguishing system is typically used. This technology is defined and recognized by NFPA in #69 and recognized in #664.

Bibliography:
NFPA 69
NFPA 664
and
NFPA Guide to Combustible Dusts
Authors: Walter Frank & Samuel Rodgers
Editor: Guy Colonna
2012
Pages 171-178

Cost Impact: Will increase the cost of construction
While a thermocouple sprinkler head has a cost of approx $100 and the cost of the spark detection system is $5,000-$8,000, the spark detection system will prevent a fire or explosion in the dust collector and as a result prevent property loss, injury & loss of life, whereas a thermocouple head will be ineffective in this application.
M 59-15

510.8.4 (New)

Proponent: Ellie Klausbruckner, representing Klausbruckner & Associates Inc. (ek@klausbruckner.com)

2015 International Mechanical Code

Add new text as follows:

510.8.4 Duct cleanout. Ducts conveying combustible dust as part of a dust collection system shall be equipped with cleanouts that are provided with access. The cleanouts shall be located at the base of each vertical duct riser and at intervals not exceeding 20 foot in horizontal sections of duct.

Reason: To avoid an accumulation of combustible dust and reduce potential dust deflagration from the accumulation of dusts inside ducts, cleanouts are needed to provide accessible points as part of the housekeeping and inspection. While this hazard is more commonly found in industries that produce heavy combustible dusts [e.g. metal dusts, etc.], the potential accumulation of dusts in ducts exist in all combustible dust producing facilities.

Cost Impact: Will increase the cost of construction

The proposed code change will increase the cost of construction since previous editions did not require cleanouts.
2015 International Mechanical Code

Revise as follows:

511.1.3 Conveying systems exhaust discharge. An exhaust system shall discharge to the outside of the building either directly by flue or indirectly through the bin or vault into which the system discharges, except where the contaminants have been removed. Exhaust system discharge shall be permitted to be recirculated provided that the solid particulate has been removed at a minimum efficiency of 99.9 percent at 10 microns (10.01 mm) and where flammable vapors are present in the exhaust flow, such vapor concentrations are less than 25 percent of the LFL, and approved equipment is used to monitor vapor concentrations determined by a hazard analysis. Where flammable vapor concentrations are greater than 25% of the vapor concentration-LFL, the exhaust system discharge shall not be recirculated.

Reason: The current wording of section 511.1.3 requires vapor monitoring equipment for all dust collection systems that recirculate the filtered air back to the building, regardless if vapors are ever present. Dust collection system air streams rarely include flammable or non-flammable vapors. Vapors are not a part of the process or created by cutting wood, grinding metals, conveying chemical or food products, etc. Vapors are more likely to be part of the air stream for refuse conveying.

The current requirement for vapor monitoring equipment for all dust collectors that recirculate the air seems to be overly burdensome. I believe the current text first appeared in the 2009 edition.

Some code enforcers who are familiar with section 511.1.3 have been requiring flammable vapor detection systems for woodworking shops in schools, maintenance and commercial facilities, that do not have flammable vapors, because of the IMC requirement.

Flammable vapor detection systems are typically used in industrial processes where there is the potential for flammable vapors to exist in the work area and there is also a potential ignition source. Some applications include; printing, paint manufacturing, commercial painting and storage areas.

Cost Impact: Will not increase the cost of construction

A typical flammable vapor detection system cost $10,000-$15,000.

End users, who do not have flammable vapors in their air stream or have flammable vapors that have a concentration of less than 25% of the LFL and need to recirculate the filtered air from the dust collection system, will no longer need to purchase a flammable vapor detection system and therefore save $10,000-$15,000.
M 61-15

512.2

Proponent: Pennie L Feehan, Copper Development Association, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code

Revise as follows:

512.2 Materials. Subslab soil exhaust system duct material shall be air duct material listed and labeled to the requirements of UL 181 for Class 0 air ducts, or any of the following piping materials that comply with the International Plumbing Code as building sanitary drainage and vent pipe: cast iron; galvanized steel; brass or copper and copper-alloy pipe; copper and tube of a weight not less than that of copper drainage tube, Type DWV; and plastic piping.

Reason: The proposal removes brass because brass is a copper alloy and reworded the sentence without changing the meaning.

Cost Impact: Will not increase the cost of construction
This proposal will not impact the cost of construction as this is only changing the name of the material.
Proponent: Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

2015 International Mechanical Code

Revise as follows:

601.5 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. Return air shall not be taken from a hazardous or insanitary location or a refrigeration room as defined in this code.
3. 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.
4. Return and transfer openings shall be sized in accordance with the appliance or equipment manufacturer's installation instructions, ACCA Manual D or the design of the registered design professional.
5. Return air taken from one dwelling unit shall not be discharged into another dwelling unit.
6. Taking return air from a 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 shall not be taken from a closet, bathroom, toilet room, kitchen, garage, boiler room, furnace room or unconditioned attic.

Exceptions:

7.1. Taking return air from a kitchen is not prohibited where such return air openings serve the kitchen and are located not less than 10 feet (3048 mm) from the cooking appliances.
7.2. Dedicated forced air systems serving only the garage shall not be prohibited from obtaining return air from the garage.
7.3. Return air shall not be taken from indoor swimming pool enclosures and associated deck areas except where such spaces are dehumidified.

Reason: It is not desirable to pull return air from swimming pool areas due to the affects it would have on the system from humidity and chemical odors associated with such spaces. A dedicated system would be required or a combination of supply and exhaust or the air should be dehumidified.

Cost Impact: Will not increase the cost of construction
No cost unless the air is treated.
601.6 Balanced return air. Provisions shall be made to prevent unbalanced air flows and pressure differentials caused by restricted return air flow. Pressure differentials caused by air distribution systems across individually closed interior doors, where return air intakes are centrally located, shall be limited to 0.01 inch WC (2.5 pascals). Pressure differentials across fire walls and other partitions within ceiling space plenums shall be limited to 0.01 inch WC (2.5 pascals) by providing air duct pathways or air transfer pathways from the high pressure zone to the low pressure zone.

601.6.1 Prescriptive alternatives. The following are alternatives to the requirements of Section 601.6 and apply only to habitable rooms.

1. Transfer ducts or other transfer pathways shall be provided and shall have an area that is not less than 1½ times the cross sectional area of the supply duct or supply ducts serving the room or space. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.

2. Transfer grilles shall be provided and shall have an area of not less than 0.50 square inches for each 1 cfm of supply air. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.

Reason: Restricted return air affects building pressures and increases air infiltration which in turn increases energy use and can cause comfort, building durability, and health and safety issues. A similar balance return air requirement is already in the Florida Building Code for these reasons. A comparison of homes built prior to the code change to those after the code change showed a 74% reduction in pressure differentials across closed interior doors, from an average of 9.1 pascals to 2.4 pascals. (See supporting publication from Cummings and Withers 2006.) This code change has been successfully implemented in Florida with little difficulty. The prescriptive alternatives are widely used and there have been few problems in verifying compliance. Inspection of these alternatives is straightforward. Contractors readily learn what steps are required to achieve the 2.5 pascal target.


Combustion Safety Concerns and Energy Savings in Very Airtight Residences, Cummings, J., Building America Expert Meeting Presentation, June 28, 2012 (see Attachments).

Cost Impact: Will increase the cost of construction

An HVAC contractor indicates the extra material cost for a three bedroom home is $60 and 1.5 hours of labor. While installing return air pathways adds to first cost, it reduces energy waste that results from increased air infiltration and yields a reduced life-cycle cost. Monitored energy savings finds a payback of 3 years. Health benefits not counted.
2015 International Mechanical Code

Revise as follows:

602.1 General. Supply, return, exhaust, relief and ventilation air plenums shall be limited to uninhabited crawl spaces, areas above a ceiling or below the floor, attic spaces and mechanical equipment rooms and the framing cavities addressed in Section 602.3. Plenums shall be limited to one fire area. Air systems shall be ducted from the boundary of the fire area served directly to the air-handling equipment. Fuel-fired appliances shall not be installed within a plenum.

Reason: Section 602.3 is in the plenum Section 602 and covers stud and joist space plenums, however, Section 602.1 does not recognize such plenums. Section 602.1 limits plenums to a list of spaces that excludes stud and joist space plenums. This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will not increase 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 nor are the code requirements made more stringent.
Proponent: Janine Snyder, representing Plumbing, Mechanical, and Fuel Gas Code Action Committee (PMGCAC@iccsafe.org)

2015 International Mechanical Code

Revise as follows:

**602.2 Construction.** Plenum enclosure construction materials that are exposed to the airflow shall comply with the requirements of Section 703.5 of the *International Building Code* or such materials shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

The use of gypsum boards to form plenums shall be limited to systems where the air temperatures do not exceed 125°F (52°C) and the building and mechanical system design conditions are such that the gypsum board surface temperature will be maintained above the airstream dew-point temperature. Air plenums formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

**Exception:** The materials from which the stud and joist space plenums addressed in Section 602.3 are constructed shall not be required to comply with Section 703.5 of the International Building Code and shall not be required to have a maximum flame spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance ASTM E 84 or UL723.

**Reason:** The significant change to Section 602.2 did not specifically address stud and joist space plenums. It is assumed that that Section 602.2 was intended to apply to spaces such as under-floor and above-ceiling spaces utilized as plenums. If Section 602.2 does apply to stud and joist space plenums, then such plenums would not be allowed to be constructed with wood studs, wood joists, wood trusses and wood floor decking. Section 602.2 should not have the effect of banning the common variety of stud and joist space plenums.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

**Cost Impact:** Will not increase 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 nor are the code requirements made more stringent.
**Proponent:** Janine Snyder, City of Thornton, Colorado, representing Colorado Association of Plumbing & Mechanical Officials (CAPMO) (Janine.Snyder@cityofthornton.net)

**2015 International Mechanical Code**

**Revise as follows:**

**602.2.1 Materials within plenums.** Except as required by Sections 602.2.1.1 through 602.2.1.7, materials within plenums shall be noncombustible or shall be listed and labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

**Exceptions:**

1. Rigid and flexible ducts and connectors shall conform to Section 603.
2. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.
3. This section shall not apply to materials exposed within plenums in one- and two-family dwellings.
4. This section shall not apply to smoke detectors.
5. Combustible materials fully enclosed within one of the following:
   5.1. Continuous noncombustible raceways or enclosures.
   5.2. Approved gypsum board assemblies.
   5.3. Materials listed and labeled for installation within a plenum and listed for the application.
6. Materials in Group H, Division 5 fabrication areas and the areas above and below the fabrication area that share a common air recirculation path with the fabrication area.

**Reason:** There is a misconception that any material listed for plenum use such as ordinary insulation can be used to cover PVC pipe so it can be installed in a plenum. There are specific products which have been specifically designed and tested for specific applications. This section leaves something to be desired in terms of specificity in that although some insulations may indeed be listed for plenum use, they cannot be installed to protect pipes during a fire. They are not tested for limiting flame propagation or smoke generation.

**Cost Impact:** Will increase the cost of construction
This will prevent the errors in the field as the construction community will not have to spend additional time and money removing the improper insulation and replacing with the correct material.
2015 International Mechanical Code

Revise as follows:

602.2.1.1 Wiring. Combustible electrical wires and cables and optical fiber cables exposed within a plenum shall be listed and labeled as having a maximum peak optical density of not greater than 0.50 or less, an average optical density of not greater than 0.15 or less, and a maximum flame spread distance of not greater than 5 feet (1524 mm) or less when tested in accordance with NFPA 262 or shall be installed in metal raceways or metal sheathed cable. Combustible optical fiber and communication raceways exposed within a plenum shall be listed and labeled as having a maximum peak optical density of not greater than 0.5 or less, an average optical density of not greater than 0.15 or less, and a maximum flame spread distance of not greater than 5 feet (1524 mm) or less when tested in accordance with ANSI/UL 2024. Only plenum-rated wires and cables shall be installed in plenum-rated raceways. Electrical wires and cables, optical fiber cables and raceways addressed in this section shall be listed and labeled and shall be installed in accordance with NFPA 70.

602.2.1.2 Fire sprinkler piping. Plastic fire sprinkler piping exposed within a plenum shall be used only in wet pipe systems and shall be listed and labeled as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1887. Piping shall be listed and labeled.

602.2.1.3 Pneumatic tubing. Combustible pneumatic tubing exposed within a plenum shall be listed and labeled as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm) when tested in accordance with UL 1820. Combustible pneumatic tubing shall be listed and labeled.

Reason: This proposal is primarily editorial and introduces no substantive changes. It provides consistency with the pass/fail criteria for the testing of these products, and the listing and labeling requirements. The last sentence of each section is not necessary because the first sentence already requires the product to be listed and labeled.

In Section 602.2.1.1 the requirement for the electrical wiring to be installed in accordance with NFPA 70 was deleted because Section 301.10 already requires electrical wiring to be installed in accordance with NFPA 70.

Cost Impact: Will not increase the cost of construction

Editorial changes only.
2015 International Mechanical Code

Revise as follows:

602.2.1.2 Fire sprinkler and water distribution piping. Plastic fire sprinkler piping exposed within a plenum shall be used only in wet pipe systems and shall have a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread of not greater than 5 feet (1524 mm) when tested in accordance with UL 1887. Plastic water distribution piping exposed within a plenum shall have a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread of not greater than 5 feet (1524 mm) when tested in accordance with UL 2846. Piping shall be listed and labeled.

602.2.1.7 Plastic DWV and chemical waste plumbing pipe and tube. Plastic drain, waste and vent (DWV) and chemical waste piping and tubing used in plumbing systems shall be listed and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

Add new standard(s) as follows:
UL 2846 - 2014 Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics

Reason: The proposal is to add a new standard for mounting of water distribution pipe. UL 2846 is proposed to be added to Section 602.2.1.2 Fire Sprinkler piping. This section currently lists UL 1887 for sprinkler pipe and the acceptance criteria in the new UL 2846 standard is the same as UL 1887. Both fire sprinkler pipe and water distribution pipe are water filled. Therefore it makes sense to reference UL 2846 in the same section as UL 1887.

The proposed change to 602.1.7 will make this section applicable to DWV and special waste where the tests standards are ASTM E 84 and UL 723. These proposed changes will clearly distinguish between water distribution and DWV/Special Waste.

Cost Impact: Will not increase the cost of construction
No cost impact. The change will permit plastic water distribution piping meeting UL 2846 to be installed in a plenum. This will provide a cost effective alternative to pipe in a plenum.

Analysis: A review of the standard proposed for inclusion in the code, UL 2846, 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 April 2, 2015.
Part I:

2015 International Mechanical Code

Revise as follows:

602.2.1.6 Foam plastic insulation - interior finish and interior trim in plenums. Foam plastic insulation used as interior wall and ceiling finish in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall also comply with one or more of Sections 602.2.1.6.1, 602.2.1.6.2 and 602.2.1.6.3.

602.2.1.6.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

602.2.1.6.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 of the International Building Code when tested in accordance with NFPA 286.

The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9 of the International Building Code.

602.2.1.6.3 Covering. The foam plastic insulation shall be covered by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Part II:

2015 International Building Code

Revise as follows:

2603.7 Foam plastic insulation - interior finish or interior trim in plenums. Foam plastic insulation used as interior wall or ceiling finish in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall comply with one or more of Sections 2603.7.1, 2603.7.2 and 2603.7.3.

2603.7.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

2603.7.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 when tested in accordance with NFPA 286. The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9.

2603.7.3 Covering. The foam plastic insulation shall be covered by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Reason:

Part I: This is simple clarification. The important issue is that the foam plastic is used as interior finish or as interior trim and not whether it additionally has an insulative function: that is immaterial. This has apparently caused confusion. This is exactly the same change that is proposed for section 2603.7 of the IBC and is simple clarification.

The IBC proposal produces the following language:
Revise as follows:

2603.7 Foam plastic interior finish or interior trim in plenums.
Foam plastic interior wall or ceiling finish or foam plastic interior trim in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall comply with one or more of Sections 2603.7.1, 2603.7.2 and 2607.3.

Revise as follows:

2603.7.1 Separation required.
The foam plastic shall be separated from the plenum by a thermal barrier complying with Section 2603.4 and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Revise as follows:

2603.7.2 Approval.
The foam plastic shall exhibit a flame spread index of 25 or less and a smoke developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 when tested in accordance with NFPA 286. The foam plastic shall be approved based on tests conducted in accordance with Section 2603.9.

Revise as follows:

2603.7.3 Covering.
The foam plastic shall be covered by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Part II: This is simple clarification. The important issue is that the foam plastic is used as interior finish or as interior trim and not whether it additionally has an insulative function: that is immaterial. This has apparently caused confusion.
This is the same language that is proposed for the corresponding IMC section.
The IMC proposal would lead to the following language:

Revise as follows:

602.2.1.6 Foam plastic interior finish or interior trim in plenums
Foam plastic interior wall or ceiling finish or foam plastic interior trim in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 and shall also comply with one or more of Sections 602.2.1.6.1, 602.2.1.6.2 and 602.2.1.6.3.

Revise as follows:

602.2.1.6.1 Separation required.
The foam plastic shall be separated from the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use.

Revise as follows:

602.2.1.6.2 Approval.
The foam plastic shall exhibit a flame spread index of 25 or less and a smoke developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 of the International Building Code when tested in accordance with NFPA 286.
The foam plastic shall be approved based on tests conducted in accordance with Section 2603.9 of the International Building Code.

Revise as follows:

602.2.1.6.3 Covering.
The foam plastic shall be covered by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use.

Cost Impact:

Part I: Will not increase the cost of construction
Simple clarification.

Part II: Will not increase the cost of construction
Simple clarification.
Part I:

2015 International Mechanical Code

Delete without substitution:

602.2.1.6 Foam plastic insulation. Foam plastic insulation used in plenums as interior wall or ceiling finish or as interior trim shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall also comply with one or more of Sections 602.2.1.6.1, 602.2.1.6.2 and 602.2.1.6.3.

Add new text as follows:

602.2.1.6 Foam plastic insulation in plenums as interior finish or interior trim. Where exposed to the airflow in plenums, foam plastic insulation in plenums used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, and shall be tested in accordance with NFPA 286 and meet the acceptance criteria of Section 803.1.2 of the International Building Code.

Exceptions:

1. Foam plastic insulation in plenums used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code.

2. Foam plastic insulation in plenums used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm).

3. Foam plastic insulation in plenums used as interior wall or ceiling finish or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by not less than a 1 inch (25mm) thickness of masonry or concrete.

Delete without substitution:

602.2.1.6.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use.

602.2.1.6.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 of the International Building Code when tested in accordance with NFPA 286.

The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9 of the International Building Code.

602.2.1.6.3 Covering. The foam plastic insulation shall be covered by corrosion resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723 at the thickness and density intended for use.

Part II

THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IMC COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Proponent: John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (XPSA) (jwoestman@kellencompany.com)
Add new text as follows:

2603.7 Foam plastic insulation in plenums as interior finish or interior trim. Where exposed to the airflow in plenums, foam plastic insulation in plenums used as interior wall or ceiling finish, or interior trim, shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use, and shall be tested in accordance with NFPA 286 and meet the acceptance criteria of Section 803.1.2.

Exceptions:

1. Foam plastic insulation in plenums used as interior wall or ceiling finish, or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by a thermal barrier complying with Section 2603.4.
2. Foam plastic insulation in plenums used as interior wall or ceiling finish, or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm).
3. Foam plastic insulation in plenums used as interior wall or ceiling finish, or interior trim, shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use, where it is separated from the airflow in the plenum by not less than a 1 inch (25mm) thickness of masonry or concrete.

Delete without substitution:

2603.7 Foam plastic insulation used as interior finish or interior trim in plenums. Foam plastic insulation used as interior wall or ceiling finish or as interior trim in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall comply with one or more of Sections 2603.7.1, 2603.7.2 and 2607.3.

2603.7.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

2603.7.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use, and shall meet the acceptance criteria of Section 803.1.2 when tested in accordance with NFPA 286. The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9.

2603.7.3 Covering. The foam plastic insulation shall be covered by corrosion resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Add new text as follows:

2604.1.1 Plenums. Foam plastics installed in plenums as interior wall or ceiling finish shall comply with Section 2603.7. Foam plastics installed in plenums as interior trim shall comply with Sections 2604.2 and 2603.7.

Reason:

Part I: This proposal is intended to revise the requirements for foam plastic in plenums. There is a companion proposal for the International Building Code. This code change is intended to not revise technical requirements, but clarifies the code's intent for the use of foam plastic in plenums. The following revisions are proposed:

1) The term “exposed to the airflow” is added to clarify the placement of the foam relative to the plenum airflow. This term is taken from the IMC Section 602.2: “602.2 Construction. Plenum enclosure construction materials that are exposed to the airflow shall comply with . . . .”
2) The requirements for foam plastic exposed to the plenum airflow (currently 602.2.1.6.2 Approval) are moved to the charging paragraph in proposed Section 2603.7.
3) Not including the last sentence in 602.2.1.6.2 in this re-write of 602.2.1.6 clearly establishes the ASTM E84 performance limits and NFPA 286 with the identified acceptance criteria in IBC Section 803.1.2 as the qualifying tests for use of foam plastics exposed to the airflow in plenums.
4) The use of a thermal barrier (currently Section 602.2.1.6.1 Separation required) separating the foam plastic from the air flow in the plenum is allowed and therefore listed as an exception.
5) The use of an alternate barrier (currently Section 602.2.1.6.3 Covering) separating the foam plastic from the airflow in the plenum is allowed and therefore listed as an exception.
6) A new exception is added to recognize the use of masonry or concrete as a means to separate the foam plastic from the airflow in the plenum. Masonry and concrete, with minimum 1 inch thickness, are approved thermal barriers for foam plastic per IBC Section 2603.4.1.

The changes bring needed clarification regarding the approved barriers and corresponding flame spread and smoke-developed requirements for foam plastic used in plenums.
Part II: This proposal is intended to revise the requirements for foam plastic in plenums. There is a companion proposal for the International Mechanical Code. This code change is intended to not revise technical requirements, but clarifies the code's intent for the use of foam plastic in plenums. The following revisions are proposed:

1) The term "exposed to the airflow" is added to clarify the placement of the foam relative to the plenum airflow. This term is taken from the IMC Section 602.2: "602.2 Construction. Plenum enclosure construction materials that are exposed to the airflow shall comply with . . . . "

2) The requirements for foam plastic exposed to the plenum airflow (currently 2603.7.2 Approval) are moved to the charging paragraph in proposed Section 2603.7.

3) Not including the last sentence in 2603.7 in this re-write of 2603.7 clearly establishes the ASTM E84 performance limits and NFPA 286 with the identified acceptance criteria in 803.1.2 as the qualifying tests for use of foam plastics exposed to the airflow in plenums.

4) The use of a thermal barrier (currently Section 2603.7.1 Separation required) separating the foam plastic from the airflow in the plenum is allowed and therefore listed as an exception.

5) The use of an alternate barrier (currently Section 2603.7.3 Covering) separating the foam plastic from the airflow in the plenum is allowed and therefore listed as an exception.

6) A new exception is added to recognize the use of masonry or concrete as a means to separate the foam plastic from the airflow in the plenum. Masonry and concrete, with minimum 1 inch thickness, are approved thermal barriers for foam plastic per Section 2603.4.1.

7) A sentence is added to the Interior Finish and Trim (Section 2604.1) pointing back to the plenum requirements in Section 2603.7. The changes bring needed clarification regarding the approved barriers and corresponding flame spread and smoke-developed requirements for foam plastic used in plenums.

Cost Impact:

Part I: Will not increase the cost of construction
No cost increase. This code proposal revises existing requirements without technical changes.

Part II: Will not increase the cost of construction
No cost increase. This code proposal revises existing requirements without technical changes.
M 71-15
602.2.1.7

Proponent: Mike Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

2015 International Mechanical Code
Revise as follows:

602.2.1.7 Plastic plumbing pipe and tube. Plastic piping and tubing used in plumbing systems shall be listed and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

Reason: While some of the exceptions for products in this section of the mechanical code contain, "listed and labeled" language, some have no mention of "listing and labeling", section 602.2.1.7 oddly only says, "listed".

We propose to delete, "listed" from this section, as it is inconsistent with the other language.

Cost Impact: Will not increase the cost of construction
This proposal seeks to determine if the "listing / listing and labeling" language is correct compared with other sections, and seeks conformity in the language. Thus the code with this proposal added will not cause the cost of construction to increase.
Proponent: Mike Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

2015 International Mechanical Code

Revise as follows:

602.2.1.7 Plastic plumbing pipe and tubing. Plastic plumbing system piping and tubing used in plumbing systems exposed within a plenum shall be listed and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723. As an alternative, plastic water distribution piping and tubing exposed within a plenum, shall be listed in accordance with UL 2846, and shall have a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread of not greater than 5 feet (1524 mm).

Add new standard(s) as follows:
UL 2846-2014 Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics

Reason: PPFA supports a new UL testing method for water distribution piping, UL 2846, "Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics". This proposal would allow plastic water distribution only to be tested to ASTM E84, UL 723 or UL 2846. Other (service and DWV) plumbing piping would still be tested to E84 or UL 723.

Cost Impact: Will not increase the cost of construction
This proposal simply adds another option for testing piping material for use in plenums into the code and as such, the option is not requiring that this method be chosen. Thus the code with this proposal added will not cause the cost of construction to increase.

Analysis: A review of the standard proposed for inclusion in the code, UL 2846, 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 April 2, 2015.
M 73-15
602.2.1.7

Proponent: Forest Hampton, representing Lubrizol Advanced Material, Inc. (forest.hampton@lubrizol.com)

2015 International Mechanical Code

Revise as follows:

602.2.1.7 Plastic plumbing pipe and tube. Plastic piping and tubing used in plumbing systems shall be listed and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723 or CAN/ULC S102.2.

Add new standard(s) as follows:
CAN/ULC S102.2-10 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies

Reason: There are no mounting methods for plastic pipe in ASTM E84 or UL 723. The addition of ULC-S102.2-2010 provides a relevant method for testing flame and smoke properties of actual plastic pipes, fittings and valves. This method is representative of how pipes and assemblies are used in the field. This method has been in use since the 1980’s and has provided a safe determination of flame and smoke properties for use in air handling systems.

Cost Impact: Will not increase the cost of construction
The proposal adds an additional test method to show acceptance.

Analysis:
A review of the standard proposed for inclusion in the code, CAN/ULC S102.2, 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 April 2, 2015.
2015 International Mechanical Code

Revise as follows:

602.2.1.7 Plastic plumbing pipe and tube.
Plastic piping and tubing used in plumbing systems shall be listed and labeled and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

Reason: This section was added at the last edition. When the language was developed the section was written stating that the plastic piping and tubing needs to be "listed" instead of "listed and labeled" as other products in plenums are.

Cost Impact: Will increase the cost of construction
If jurisdictions approved plastic piping and plumbing items that were listed but not listed and labeled they will, in future, have to be both listed and labeled.
M 76-15

602.2.1.7

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

2015 International Mechanical Code

Revise as follows:

602.2.1.7 Plastic plumbing pipe piping and tubing. Plastic piping and tubing used in plumbing systems exposed within a plenum shall be listed and shall exhibit labeled as having a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

Exception: Plastic water distribution piping and tubing listed and labeled in accordance with UL 2846 as having a peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet (1524 mm), and installed in accordance with its listing.

Add new standard(s) as follows:

UL 2846-14, Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics

Reason: This proposal accomplishes the following:

1. Clarifies that this section is only applicable to plastic piping and tubing exposed within a plenum, using wording similar to Section 602.2.1.3.
3. Allows an option for water distribution piping and tubing to be listed to the UL 2846 criteria noted.

UL 2846 is an ANSI standard that includes a test method for determining values of flame propagation distance and optical smoke density for individual pairs of plastic plumbing pipes for distribution of potable water that can be installed in ducts, plenums, and other spaces used for environmental air. The scope of this standard can be viewed at http://ulstandards.ul.com/standard/?id=2846.

The acceptance criteria specified (peak optical density not greater than 0.50, an average optical density not greater than 0.15, and a flame spread distance not greater than 5 feet) is consistent with values in Sections 602.2.1.1, 602.2.1.2 and 602.2.1.3.

Cost Impact: Will not increase the cost of construction

This proposal provides an alternative method for evaluating plastic water distribution system piping and tubing.

Analysis:

A review of the standard proposed for inclusion in the code, UL 2846, 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 April 2, 2015.
Proponent: David Seiler, Arkema Inc, representing Arkema Inc. (dave.seiler@arkema.com)

2015 International Mechanical Code
Revise as follows:

602.2.1.7 Plastic plumbing pipe and tube. Plastic piping and tubing used in plumbing systems shall be listed and shall exhibit a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723 without any liquid in the pipe and utilizing the full width of the test apparatus tunnel during such tests.

Reason: This is a simple clarification to confirm the testing procedure of ASTM E84

Bibliography: NFPA 90A, ASTM E84, UL 723

Cost Impact: Will not increase the cost of construction
This clarification makes no change in the material types that currently meet the code, thus there is no cost impact.
M 78-15
602.2.1.8 (New)

Proponent: Marcelo Hirschler, representing GBH International (gbhint@aol.com)

2015 International Mechanical Code
Add new text as follows:

602.2.1.8 Pipe insulation. Pipe insulation in plenums shall comply with the requirements of Section 604.

Reason: Section 602 contains the requirements for materials in plenums. However, pipe insulation in plenums, which is supposed to comply with the same requirements as duct insulation (shown in section 604) is not specifically included. The default requirements in section 602 are simply a flame spread index of 25 and a smoke developed index of 50, when tested in accordance with ASTM E84. However, section 604 contains further details, including the requirements to meet testing in accordance with ASTM C411, the temperature requirements and the details of the mounting method for ASTM E84 (which should be in accordance with ASTM E2231). Some people may consider this as implicit but it is always better to be explicit rather than implicit. ASTM E2231 is entitled Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics and it deals with both pipe and duct insulation and it is already referenced in section 604 of the IMC.

Cost Impact: Will increase the cost of construction
This provides a pointer to clarify a missing requirement and should not affect requirements. However, if some jurisdictions now handle pipe insulation in plenums different from duct insulation then the requirements would change for those jurisdictions.
2015 International Mechanical Code

Add new text as follows:

602.2.1.8 Pipe and duct insulation within plenums. Pipe and duct insulation contained within plenums, including insulation adhesives, shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Pipe and duct insulation shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature at which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Pipe and duct insulation shall be listed and labeled.

Reason: Section 602 covers the contents of plenums and section 604 covers insulation of ducts. However, it is quite common to have insulated pipes and/or insulated ducts within plenums. Pipe insulation is not specifically covered by the IMC. Moreover, the potential exists that duct insulation contained within plenums falls through the cracks and is not properly regulated. Moreover, there is also the possibility that section 604 is amended and that would affect pipe or duct insulation contained within plenums.

Note that duct insulation could be applied outside buildings and the requirements may need to be different from duct insulation within plenums.

Therefore it is proposed to add the same requirements from Section 604.3 to the new section on pipe and duct insulation within plenums, and, that way, the section addressing materials contained within plenums is independent of the section on materials associated with ducts, whether the ducts are free-standing or within plenums.

Exception 2 to section 602.2.1 does not specifically mention pipe or duct insulation within plenums.

Cost Impact: Will not increase the cost of construction

This is clarification only because fire safety requirements for materials contained within plenums already exist.
2015 International Mechanical Code

Add new text as follows:

602.2.2 Plastic piping in plenums. Plastic piping installed in plenums shall be tested in strict accordance with the requirements of ASTM E84 and UL723 including the mounting method used and the size of the sample tested. Modified tests that use mounting methods or sample sizes different than those required by the E84 and UL723 shall not be accepted as proof of compliance.

Reason: The requirements found in STM E84 and UL723 are the requirements. Changing the sample size or mounting methods to enable a plastic pipe manufacturer to achieve a passing grade ignore the basis by which the existing requirements exist. That reason is the protection of the health and safety of the occupants of the building. Allowing the use of modified tests exposes all plastic pipe manufacturers to liability which some might not wish to accept.

Cost Impact: Will not increase the cost of construction
This change merely highlights that the requirement of the standards regarding a product's acceptability for use in a plenum be followed without alteration. The practice of modifying or altering the requirements of ASTM E84 and UL 723 has been gaining momentum in the industry and diluting results that are intended to provide safety to the industry by measuring flame spread and smoke development of material used in a plenum. This change does not add to the cost of construction.
Proponent: John Hamilton, representing TABB (jhamilton@tabbcertified.org)

2015 International Mechanical Code

Revise as follows:

603.1 General. An air distribution system shall be designed and installed to supply the required distribution of air. The installation of an air distribution system shall not affect the fire protection requirements specified in the *International Building Code*. Ducts shall be constructed, braced, reinforced and installed to provide structural strength and durability. Ducts shall be listed in accordance with UL 181.

Delete without substitution:

603.6.2 Flexible air connectors. Flexible air connectors, both metallic and nonmetallic, shall be tested in accordance with UL 181. Such connectors shall be listed and labeled as Class 0 or Class 1 flexible air connectors and shall be installed in accordance with Section 304.1.

603.6.2.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

Reason: Allowing the use of air connectors breaches the ICC fire protection codes. Air connectors do not have to pass a U.L. flame penetration test, thus allowing flames to easily jump from floor to floor or flames to enter wall cavities.

Cost Impact: Will not increase the cost of construction

The cost of air connectors is within 5% of flexible air ducts.

Search ASHRAE 5.2 on YouTube or use this link:
https://www.youtube.com/watch?v=l5oKO_hRoxw
2015 International Mechanical Code

Revise as follows:

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3 and 603.6.4. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.4.

Delete without substitution:

603.6.2.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

Revise as follows:

603.6.3 Air temperature. The design temperature of air to be conveyed in flexible air ducts and flexible air connectors shall be less than 250°F (121°C).

603.6.4 Flexible air duct and air connector clearance. Flexible air ducts and air connectors shall be installed with a minimum clearance to an appliance as specified in the appliance manufacturer's installation instructions.

Reason: UL test air connectors, but they have to weak of a lableing requirment. Many time inspectors can not tell flex duct from air connectors. Air ducts have rectangular lables indicating it is UL approved duct.

Air connectors have a round lable indicating it is UL approved air connector.

Some manufactures put large rectangular performance lables on air connectors along with a small round UL lable saying the item is air connectors. In my attached photo it shows the problem. The performance label (rectangular) is 4.3 times larger than the UL air connector lable. ASHRAE 5.2 is going to question UL on how to lable air connectors better so inspectors can see what they are.

Until UL has a better labeing system the ICC should not recognize them.
Bibliography: UL 181

Cost Impact: Will not increase the cost of construction
Flex air duct is about the same cost
Table 603.4

Proponent: John Hamilton, representing TABB (jhamilton@tabbcertified.org)

2015 International Mechanical Code

Revise as follows:

<table>
<thead>
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<th>TABLE 603.4</th>
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| DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESS FOR OVER 14 FEET IN LENGTH FOR SINGLE DWELLING UNITS

(Portions of table and notes not shown remain unchanged)

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3 and 603.6.4. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.4.

603.6.2.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

603.6.4 Flexible air duct and air connector clearance. Flexible air ducts and air connectors shall be installed with a minimum clearance to an appliance as specified in the appliance manufacturer's installation instructions.

Reason: Why have a minimum metal thickness if the code allows air connectors to be used. Seems odd when installing metal duct it has to be a min thickness but if a paper thin material other than metal is used there is no thickness requirement.

Cost Impact: Will not increase the cost of construction
Would help make HVAC systems cheaper
2015 International Mechanical Code

Add new text as follows:

603.6.5 Flexible duct installation. Flexible duct shall be installed fully extended without compression and shall be cut to the length necessary for the installation. Flexible duct shall be supported at intervals not less than 4 feet (1219 mm) for horizontal ducts and not less than 6 feet (1829) intervals for vertical ducts. The duct sag between supports shall not exceed ½ inch per foot of duct length between the supports. Flexible duct supports shall be of rigid material and not less then 1.5 inch (38 mm) in width. Hangers shall be installed to prevent restriction of the internal diameter of the duct. Flexible air duct bends shall have a radius of not less than the duct diameter. Flexible ducts shall not be bent across objects such as pipes, wires, joists and trusses. Screws shall not penetrate the inside liner of nonmetallic flexible ducts. Flexible duct connections shall be made with rigid collars that are not less than 2 inches (51 mm) in length. Such collars shall be beaded except where metal worm-gear clamps are used to secure the duct liner. Flexible duct liners shall extend not less than 1 inch (25 mm) beyond the collar bead.

Reason: Of all the studies done on flex duct to date not one has found a situation where flex duct is installed properly. The information is already code but buried in 3rd party documents that most inspectors do not have or want to purchase. Bring the current requirements into the code book. Ralph will even let you use pictures :-)

1. Install flex duct fully extended. Do not install in the compressed state or use excess length.
2. Install horizontal flex duct hangers at least every 4 feet (1.2 m).
3. Install vertical flex duct hangers at least every 6 feet (1.8 m)
4. Install flex duct so that sag does not exceed ½ in. per ft (42 mm per m). That means no more than 1” of sag between hangers.
5. Use flex duct supports that are ridged and at 1.5 inch (38 mm) minimum wide (no cloth hangers). Hanger shall be of sufficient width to prevent any restriction of the internal diameter of the duct when the weight of the supporting section rests on the hanger.
6. Install flex duct so that bends exceed one duct diameter radius. Do not bend ducts across sharp corners such as pipes, wires, joists or trusses.
7. Do not install non-metallic flex duct with screws penetrating the inside liner.
8. All flex duct connections shall be attached to a 2” ridged collar with a bead. The flex must be pulled over at least 1” over the bead before a fasten strap is affixed. Beads on connections are optional when using metal worm-gear clamps.

Bibliography: ADC 5th edition

Cost Impact: Will not increase the cost of construction
It is already code so no code is changing, so no increase in cost.
M 85-15

603.6.1.1

Proponent: John Hamilton, representing TABB (jhamilton@tabbcertified.org)

2015 International Mechanical Code

Revise as follows:

603.6.1.1 Duct length. Flexible air ducts shall not be limited to 5 feet (1524 mm) in length.

Reason: There is no standard to which flex duct is made and tested regarding the friction loss (resistance) it creates on the HVAC system. Because of this no one test can show how much flex duct really cost in energy use.

Even the Air Diffusion Council test are on one specific brand of flex duct and that flex duct may not even be made anymore.

Duct flex creates more pressure resistance than metal ducts thus creating a higher energy use.

Unify the IMC with the UMC

Some examples from ASHRAE Reasearch Project 1333 or RP-1333:

- 6” metal duct = 10” flex
- 8” metal duct = 12” flex
- 10” metal duct = 14” flex duct
- Turning flex 90 degrees to use it as a elbow can create 20-40 times the resistance of a sheet metal elbow.
- Not one study to date has found flex duct to be installed properly

Limiting flex to 5 feet would help bring many codes together. Several states limit the length of flex duct. Engineering firms limit the length of flex.

Target corporation world wide limits flex to 6’ lengths. The UMC limits flex duct to 5 foot.

The common argument against this limit is where is the technical data? There is lots of it attached in this proposal. Including ASHRAE spending over 400,000 dollars to document the restriction and energy use flex creates.

Technical reasons for limiting flex

1. Installation practices:
   A. Poor installation practices can raise the total pressure loss by as much as a factor of 10.
   ASHRAE Research Project RP-1333, Final Report
   B. As a subject for future work, it is recommended that ASHRAE study actual installations. As part of the preparation for this project, numerous housing and industrial installations were reviewed. In this limited survey, it was found that every installation was not in compliance with Manual D and ADC (2003) requirements.

2. Performance:
   A. Culp and Cantrill (2009), even when installed properly, i.e. adequately stretching the flexible duct, the pressure loss per unit length can be up to 120% greater than the values recorded in the ASHRAE Handbook for round metal duct of the same size when seen in their testing of 305 mm (12 in.), 356 mm (14 in.), and 406 mm (16 in.) duct diameters.
   B. Example of sizing flex using the ASHRAE Duct Fitting Database
   Flex size* Flex Compression
   4% 15% 30% 45%
   6” 7.3 8.4 9.2 9.8
   8” 9.5 10.7 11.7 12.3
   10” 11.6 12.9 13.9 14.6
   12” 13.6 15.1 16.1 16.7
   14” 15.7 17.1 18.2 18.9
   ASHRAE. 2012. ASHRAE Duct Fitting Database
   C. The ASHRAE Standard 120 test protocol which is conducted while the sample is supported on a flat surface, such that the duct is first stretched taut with a prescribed tensile force of 110 N (25 lbf) as measured with a pull scale, for a period of one minute.
   None of the above underlined criteria is a typical field practice when installing flex duct.
   D. Per the installation standard published by ADC (2010), accepted industry practice is to install flexible ducts fully extended, and duct compression and excessive lengths are to be avoided. Does this mean the flex is not to be allowed to compress back to 4%-15% how can an installer do this?
   E. Culp (2011) observed that the pressure loss measurements varied approximately ±20% to ±30%. These disparities were attributed to several factors, such as: (i) actual duct diameters can vary up to 6 mm (0.25 in.) among different manufacturers, (ii) it was difficult to obtain uniform compression in duct samples having an outer insulation and duct sleeve installed, because the insulation tended to reduce the inflation of the inner liner, (iii) various manufacturers employ different materials, wire diameters/pitches, and coil attachment methods to construct their products, and (iv) a ‘hysteresis’ (interior liner memory) effect was observed at high volume flow rates, such that when the duct deformed to a zigzag type of configuration
and was then re-straightened, the duct pressure loss was perceived to increase ~20%. The implication is that field installations may potentially exhibit significantly different pressure losses from those predicted by the present analysis.


F. The cases involving flexible ducts considered in this study were limited to low pressure applications where the pressure loss per unit length did not surpass approximately 16.3 Pa/m (2 in. water/100 ft). The use of flexible ducts for applications exceeding this limit is not recommended by flexible duct manufacturers.


G. The 1995 ACCA data does not include compressibility factors. The 2009 ACCA Manual D discusses the effect of compression, but does not have friction charts for various degrees of duct compression.

H. In field studies, observed pressure drops in flexible duct systems are often higher than expected based on design calculations. This is because the flexible ducts are not installed in a fully stretched condition; they are often found to be compressed to varying degrees. This common problem leads to excessive pressure drop in many systems with associated increases in fan power, flow reduction, and noise. For design purposes and for diagnostics of duct systems, friction charts and friction loss equations and coefficients from various references are used. For fully stretched flexible duct, in particular, ASHRAE Fundamentals (ASHRAE 2001a) and ACCA Manual D (ACCA 1995) provide pressure drop calculations using such charts, equations and coefficients.

Compression Effects on Pressure Loss in Flexible HVAC Ducts Published in ASHRAE HVAC&R Research Journal, Vol. 10, No. 3, July

3. Unknowns:
A. Nylon Straps
Sherman (2005) showed that some nonmetallic flexible duct core-to-collar clamps have unacceptable high-temperature performance. Most of the standard nylon straps failed before the two-year test period was completed.
B. Rodents
Chewing through duct work is that acceptable?
C. UV light
Has been shown and created failures in flex duct.
D. Concealed spaces?
How long should a duct last inside a concealed space?
E. Duct cleaning
The ADC and every manufacture I have researched has said not to clean flex duct you should replace it. Is it feasible to put flex duct in concealed space?

Bibliography:
D - Allison A. Bailes III, Ph.D., Green Building Advisor, Should flexible duct Be Banned? (Nov. 28, 2012).
K - Energy Design Resources, Design Brief, Integrated Design for Small Commercial HVAC.
L - PDHonline Course, M246 (4PDH) HVAC Ducting - Principles and Fundamentals (2012).
M - Dept. of Defense, United Facilities Criteria (2-4.1.14), UFC-3-400-10N (July 2006).
P - University of Illinois, Facilities Standards, Division 23, Section 23-31-00, subd. 2.2(A)(8) (2013).
Q - City of Fort Worth, Municipal Code, Section 7-42.
S - Inspectors Journal, Construction Code Communicator, Flexible Air Ducts and Flexible Air Connectors.

Cost Impact: Will not increase the cost of construction
People will claim this will increase building cost. Not true, if flex is installed as per the ADC it actually will decrease the instalation cost of HVAC systems. However when flex is installed improperly it will cost less to install a HVAC system. That is typical practice today do not follow the code or guidelines.
Understand the code today says how to intal flex duct and not one study has found a place where flex is installed properly.
2015 International Mechanical Code

Revise as follows:

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material and shall comply with UL 181. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*. The air temperature within nonmetallic ducts shall not exceed 250°F (121°C). Flexible air duct shall not be installed upstream of a variable air volume box.

Reason: Follow ASHRAE design guide

Bibliography: ASHRAE design guide, Chapter 3 page 24 reference why flex should not be used before the VAV box.

Cost Impact: Will not increase the cost of construction
Installing flex vs metal duct has no cost difference when installing both products as per current codes.
2015 International Mechanical Code

Revise as follows:

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material and shall comply with all UL 181 duct tests. Fibrous duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards. The air temperature within nonmetallic ducts shall not exceed 250°F (121°C).

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3 and 603.6.4. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.4.

Delete without substitution:

603.6.2.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

Revise as follows:

603.6.3 Air temperature. The design temperature of air to be conveyed in flexible air ducts and flexible air connectors shall be less than 250°F (121°C).

603.6.4 Flexible air duct and air connector clearance. Flexible air ducts and air connectors shall be installed with a minimum clearance to an appliance as specified in the appliance manufacturer's installation instructions.

Reason: Follow ASHRAE Design guide

Bibliography: ASHRAE Design guide chapter 3 page 24

Cost Impact: Will not increase the cost of construction

Air connectors and flexible air ducts have the same cost

M 87-15 : 603.5-HAMILTON5028
2015 International Mechanical Code

Revised as follows:

603.5 Nonmetallic ducts. Nonmetallic ducts, other than plastic ducts, shall be constructed with Class 0 or Class 1 duct material and shall comply with UL 181. Fibrous duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards. The air temperature within nonmetallic ducts, other than plastic ducts, shall not exceed 250°F (121°C). Plastic ducts shall comply with section 603.8.3.

603.8.3 Plastic ducts and fittings. Plastic ducts and fittings shall be constructed of PVC or PE having a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent deflection when tested in accordance with ASTM D 2412. Plastic duct fittings shall be constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be utilized in underground installations only. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C). Plastic duct systems for underground applications shall be listed for such use.

Reason: Plastic duct systems are currently only allowed for use in underground locations per section 603.8.3. There has been some confusion regarding the application of this section in regard to the need for plastic ducts to comply with the flame and smoke requirements of UL 181. This proposal would bring needed clarity. Recently in 2014, UL has issued an interpretation (attached) stating that "The scope and original intent of UL 181, Factory Made Air Ducts and Air Connectors does not specifically cover factory made air ducts intended for installation underground. The requirements within UL 181 were not developed with the intent of addressing construction, performance, or other requirements for underground duct applications". Within the letter, UL recognizes that there are specific requirements for underground ducts in the marketplace, namely ICC ES PMG LC1014.

Because there was not a standard specific to underground ducts, ICC ES PMG created PMG Listing Criteria for Underground Plastic Ducts (LC1014) to address underground ducts specifically. The LC requires testing to meet related standards, IMC code provisions as well as specific provisions of UL 181 for underground ducts and exempts the flame and smoke provisions when installed underground. Multiple manufacturers of PVC and PE have tested and are listed to meet the requirements of ICC’s LC, multiple standards as well as their intended application in the IMC and UMC.

Bibliography: [PMG Listing Criteria for Underground Plastic Ducts] [LC1014 Reference EG290] [ICC] [2008 Revised 2014]

Cost Impact: Will not increase the cost of construction

By clarifying the proper criteria required to test, list and install plastic ducts underground, cost of construction could potentially be reduced.
M 89-15
603.5.2 (New), CHAPTER 15

Proponent: Eli Howard, SMACNA, representing SMACNA (ehoward@smacna.org)

2015 International Mechanical Code

Add new text as follows:

603.5.2 Phenolic ducts. Nonmetallic phenolic ducts shall be constructed in accordance with the SMACNA Phenolic Duct Construction Standards.

Add new standard(s) as follows:
SMACNA Phenolic Duct Construction Standard 1st edition 2015

Reason: Phenolic duct is a new air distribution material not presently covered in the IMC for commercial systems. The inclusion of the SMACNA Phenolic Duct Construction Standards will address this issue.


Cost Impact: Will not increase the cost of construction
The standard provides means/methods for phenolic duct construction.

Analysis: A review of the standard proposed for inclusion in the code, SMACNA Phenolic Duct Construction Standards, 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 April 2, 2015.
Proponent: John Hamilton, TABB, representing TABB (jhamilton@tabbcertified.org)

2015 International Mechanical Code
Revise as follows:

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3 and 603.6.4. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.4. Flexible air ducts shall not be installed in inaccessible spaces or wall cavities.

Reason: Allowing the use of flex duct in inaccessible areas of a building should not be allowed because it is not cleanable. If any type of event happens such as high humidity, flood, hazardous product in the air, flex duct can not be cleaned. It is a temporary duct compared to metal ducts. Future cost to replace flex in inaccessible places is a huge burden many building owners face today. It should not be allowed in non-accessible areas because of documents rodent problems chewing holes in the flex. When flex is installed in concealed places using nylon straps the straps are failing and allowing the HVAC air to escape into the wall cavity. This is being found with the use of infrared cameras.

Bibliography: The Air Diffusion Council
Flexible Duct Performance & Installation Standards
Fifth Edition

Cost Impact: Will not increase the cost of construction
When flex is installed as per the ADC manual it is more expensive to install than sheet metal ducts.
603.6.1 Flexible air ducts. Flexible air ducts, both metallic and nonmetallic, shall be tested in accordance with UL 181. Such ducts shall be listed and labeled as Class 0 or Class 1 flexible air ducts and shall be installed in accordance with Section 304.1. Screws shall not penetrate the inside liner of flexible air ducts.

Reason: The Air Diffusion Council (ADC) does not allow screws to penetrate the inside liner of flex duct. I cannot find one manufacture who allows screws to penetrate the inside liner of flex duct.

Bibliography: From the FAQ section of the ADC:
Can screws be used to fasten Flexible Air Duct core?
ADC does not recommend the use of metal screws for making connections and splices with non-metallic flexible air ducts. Procedures and materials (tapes, mastic, fasteners) for connecting and splicing non-metallic flexible ducts are evaluated using UL181B Standard which does not address the use of metal screws. Potentially, metal screws can damage the components in some non-metallic flexible ducts.
ADC does recommend the use of sheet metal screws for making connections and splices with Metallic flexible air ducts.
http://www.flexibleduct.org/ADC_FAQs.asp

Cost Impact: Will not increase the cost of construction
Not allowing screws to penetrate the inside liner of flex duct would decrease construction cost because less labor would be used.
2015 International Mechanical Code

Delete without substitution:

603.6.1.1 Duct length. Flexible air ducts shall not be limited in length.

Reason: Flexible air ducts are limited in length by the ADC and manufactures. This code leads to improper installation practices. Example: Installing contractor says I use a whole box 25' of flex to make a 5 foot connection because it is cheaper to install it this way. The way this code reads the installer can do this because the code says flex duct length shall not be limited. That language makes the ADC and manufactures installation guides useless. Operation cost will go down

Bibliography: ASHRAE RP-1333 on flex duct

Cost Impact: Will not increase the cost of construction
Operation cost will go down when less flex and proper installation is done.
Proponent: Charles Stock, Spunstrand Inc., representing Spunstrand Inc.

2015 International Mechanical Code

Revised as follows:

603.8 Underground ducts. Ducts shall be approved for underground installation. Metallic ducts not having an approved protective coating shall be completely encased in not less than 2 inches (51 mm) of concrete. Nonmetallic and plastic ducts shall comply with UL 181.

603.8.3 Plastic ducts and fittings. Plastic ducts shall be constructed only of PVC having a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent deflection when tested in accordance with ASTM D 2412. Plastic duct fittings shall be constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be utilized in underground installations only and all exposed surfaces shall have a Class 0 or Class 1 flame and smoke rating in accordance with UL 181. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C).

Reason: The further clarification in section 603.8 and the addition of section 603.8.3 are mainly intended to insure that the use of improper materials does not slip through the code cracks. This should eliminate the use of highly flammable and excessive smoke-generating materials in an HVAC duct system regardless of its installation location above or below ground. All duct and fittings used for HVAC systems in the Uniform Mechanical Code and the International Mechanical Code call for the interior of the duct and plenums to be rated Class 0 or Class 1 per UL 181, which is a flame spread of 25 and a smoke development of 50 or less. These standards are used for ducts and plenums for both safety and liability concerns which should apply to underground duct and fittings as well. The indication that PVC or HDPE, which do not meet Class 1 or Class 0 per UL 181, can be used solely because it is buried seems to drastically contradict the other code sections. Duct systems, both above and below ground, should comply with applicable UL 181 standards. It should also be noted that the maximum temperature rating for PVC and HDPE is usually 140deg F. Limit switches on residential and commercial air handlers are normally set at 160deg F and air temperatures in the ductwork can often run up to 140deg F. If a $25 limit switch fails, the temperatures can then easily exceed 140deg F. It is inappropriate to install a material in a duct system in which the air exceeds the ducts maximum temperature rating with no safety factor.

Cost Impact: Will not increase the cost of construction

Any products that are not completely code compliant, meeting UL 181 and ASTM C-518, were not and should not be considered in determining the cost impact of these proposed changes. With that said, there would be no cost impact as there are currently three U.S. manufacturers providing code approved product with numerous others who could if they are willing to enter the market.
M 94-15

603.8.2

Proponent: Jay Peters, Codes and Standards International, representing AQC Industries
(peters.jay@me.com)

2015 International Mechanical Code

Revise as follows:

603.8.2 Sealing. Ducts shall be sealed and secured and then tested with air to a pressure of not less than 2-inches water column (498 Pa) for not less than 5 minutes. Testing shall be performed in the presence of the code official and prior to pouring the encasement in concrete encasement or direct burial.

Reason: All duct leakage, whether in the envelope, in the attic or underground are of concern, but underground ducts are more likely to cause serious issues due to their location. Underground duct systems have a propensity to leak which causes air exfiltration (loss) and also duct infiltration (gain) of contaminants into the duct system and building. The leakage, in-and-out, not only causes poor air quality, duct system degradation, sick building occupants, mold, mildew and even radon contamination, but also major energy waste. Some estimate that after the combined infiltration from leaks in walls/floors/ceilings, the duct system is the next largest cause of infiltration or building leakage. Underground return ducts are of particular concern due to their intake of impurities due to the negative pressure within the system. All ducts are required to be sealed before they are encased in concrete or placed underground but the code does not designate any sort of test to prove the airtightness, and more importantly, watertightness of underground duct systems. Plastic ducts are typically not subject to concrete encasement but should also be tested for air and water tightness before buried directly into the ground.

Cost Impact: Will increase the cost of construction
This may have a minimal increase in initial cost, but could have potential savings in the long run for buildings utilizing underground duct systems.
603.8.3 Plastic ducts and fittings. Plastic ducts shall be constructed of a Class 0 or Class 1 duct material having a flame spread index of 25 or less and a smoke development index of 50 or less, when tested in accordance with ASTM E-84 or UL 723. Ducts shall have a minimum pipe stiffness of 8 psi (55 kPa) at 5-percent deflection when tested in accordance with ASTM D 2412. Plastic duct fittings shall be constructed of either PVC or high-density polyethylene. Plastic duct and fittings shall be utilized in listed and labeled for underground installations only. The maximum design temperature for systems utilizing plastic duct and fittings shall be 150°F (66°C).

Reason: Section 603.8.3 should be updated to include all listed and labeled plastic duct options. Of primary concern is the lack of requirement for a NFPA Class 1 duct material (less than 25 Flame spread, and less than 50 Smoke development) for underground HVAC duct. For Health and Safety reasons we feel that this should be a minimum requirement for all HVAC duct. Throughout the IMC there is a uniformity that requires Class 0 or Class1, listed and labeled material for nonmetallic duct components. Underground nonmetallic duct, Section 603.8.3 should not be an exception. The following sections are examples of the Class 0 or Class1 requirements: -510.8 Hazardous Exhaust - Duct construction *1 (see attachment File A) -602.2.1 Materials within plenums *2 -603.5 Nonmetallic ducts *3 -603.6.2 Flexible air connectors *4 -604.3 Coverings and Linings *5

The Uniform Mechanical Code (UMC) -2012 is also clear on requirements for Class 0 or Class 1 Duct Materials. Reference the following sections: - 506.1 Product Conveying Ducts - Materials *6 -602.2 Combustibles within Ducts or Plenums *7.

The current IMC code section 603.8.3 limits underground HVAC duct materials to PVC or HDPE, neither of which are a Class 0 or Class 1 duct material. When this code section was written these materials may have been the best choice for corrosion resistant underground duct. There are new duct products that are ICC-ES tested and listed with a PMG listing for underground duct. One of the principle ICC-ES requirements for underground nonmetallic duct is that it be ASTM E84 Class 0 or Class1 material. This code change will acknowledge these new approved materials and set standards that are consistent and as new duct materials are introduced.

After the 9/11 disaster FEMA, AWWA, NYPD and others put out independent reports on what improvements could be to the building codes in order to reduce the number of casualties in future disasters. Those organizations independently concurred that in the event of catastrophic episode, all ductwork within a building should have the capability of being used for exhaust duct. By requiring Class 0 or Class 1 duct material in section 603.8.3 this recommendation is ensured as these types of duct materials will not readily melt and collapse in fire situations. Both PVC and HDPE will readily melt and HDPE specifically has been shown to easily burn, even in underground applications.

This proposed Code change will ensure reliability, safety and uniformity with all nonmetallic duct applications.

Cost Impact: Will not increase the cost of construction

The proposed code change will have little if any effect on the cost of an installed underground duct systems. Even though the raw material cost of the called out PVC and HDPE are less than the resins used for fiberglass reinforced plastic, the installation requirements tend to even out the installed finished project cost. As an example, corrosion resistant high strength filament wound fiberglass duct does not require concrete encasement as metallic and some nonmetallic duct materials do. As HVAC design engineers are trending more and more towards designing buildings utilizing Displacement Ventilation systems, larger diameter underground ducts are required. Nonmetallic, code approved duct material options already exist that are more cost effective for large diameter duct than the section 603.8.3 mentioned PVC or HDPE. The proposed code change to Class 0 or Class1 duct material will encourage the development of even more cost effective duct materials that also incorporate this life saving requirement. The real issue is health and safety and that is hard to put a price on.

December 2014 Quoted List Pricing

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ICC COMMITTEE ACTION HEARINGS ::: April, 2015

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PVC pricing from Harrison Machine and Plastic Corporation - see attachment file * B-1 though B-5

HDPE pricing from Blue Duct - see attachment *B-6

FRP pricing from UnderDuct - see attachment * B-7
M 96-15

603.9

**Proponent:** Donald Surrena, National Association of Home Builders, representing National Association of Home Builders (dsurrena@nahb.org)

**2015 International Mechanical Code**

Revise as follows:

603.9 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible and NAIMA Fibrous Glass Duct Construction Standards. All joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked "181 A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181 B-FX" for pressure-sensitive tape or "181 B-M" for mastic. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical fasteners for use with flexible nonmetallic air ducts shall comply with UL 181B and shall be marked "181 B-C." Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions.

**Exception:** For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and buttonlock types for ducts that are located outside of conditioned spaces.

**Reason:** This proposal will reduce construction cost and still reduce energy loss that would occur due to duct leakage outside conditioned space. Low pressure longitudinal seam duct leakage is very limited and the small amount of leakage within conditioned space is still useful energy.

**Bibliography:** Estimated Costs of the 2015 IRC Codes Changes, Home Innovation Research Labs, Upper Marlboro, MD, December 2014, Report Reference No: MAT 1, Page 33

**Cost Impact:** Will not increase the cost of construction

Cost decrease of up to $314 for an average house according to research conducted by Home Innovation Research Labs.
2015 International Mechanical Code

Revise as follows:

603.5 Nonmetallic ducts. Nonmetallic ducts shall be constructed with Class 0 or Class 1 duct material and shall comply with UL 181. Fibrous duct construction shall conform to the SMACNA Fibrous Glass Duct Construction Standards or NAIMA Fibrous Glass Duct Construction Standards. Flexible air ducts and air connectors shall comply with the ADC Flexible Duct Performance & Installation Standards. The air temperature within nonmetallic ducts shall not exceed 250°F (121°C).

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall comply with Sections 603.6.1, 603.6.1.1, 603.6.3, 603.6.4, and 603.6.5. Flexible air connectors, both metallic and nonmetallic, shall comply with Sections 603.6.2 through 603.6.5.

603.6.1.1 Duct length. Flexible air ducts shall not be limited in length. Flexible air ducts shall be installed fully extended with minimal longitudinal compression. The provision of excess duct length for the purpose of possible future relocation of air terminal devices shall be prohibited.

603.6.2.1 Connector length. Flexible air connectors and multiple lengths of flexible air connector that have been joined together shall be limited in length to 14 feet (4267 mm). Flexible air connectors shall be installed fully extended with minimal longitudinal compression.

Add new text as follows:

603.5 Flexible air duct and air connector bends. Where flexible air ducts and air connectors are used in place of metallic elbows, the bend radius shall be greater than or equal to one duct diameter.

Revise as follows:

603.9 Joints, seams and connections. All longitudinal and transverse joints, seams and connections in metallic and nonmetallic ducts shall be constructed as specified in SMACNA HVAC Duct Construction Standards—Metal and Flexible, NAIMA Fibrous Glass Duct Construction Standards, or ADC Flexible Duct Performance & Installation Standards. All joints, longitudinal and transverse seams and connections in ductwork shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants or tapes. Tapes and mastics used to seal fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked “181 A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181 B-FX” for pressure-sensitive tape or “181 B-M” for mastic. Fittings used in combination with flexible air ducts and flexible air connectors shall have a flange length of not less than 2 inches (51 mm) for connection of the flexible duct. Flexible duct and air connector inner cores shall be installed at not less than 1 inch (25.4 mm) onto the fitting prior to taping and application of the mechanical fastener. Mastic shall be applied in accordance with the mastic manufacturer's instructions prior to pulling the inner core onto the fitting and applying the mechanical fastener. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Mechanical non-metallic mechanical fasteners for use with flexible metallic ducts and air duct connectors shall comply with UL 181B and shall be marked “181 B-C.” Where non-metallic mechanical fasteners are used, the fittings shall be beaded. Insulation and outer vapor barriers of flexible ducts shall be sealed to the fitting using 2 wraps of approved tape, a mechanical fastener or both. Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions.

Exception: For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and buttonlock types.

603.10 Supports. Ducts shall be supported in accordance with SMACNA HVAC Duct Construction Standards—Metal and Flexible. Factory-made ducts shall be supported in accordance with the manufacturer's instructions.

Add new text as follows:

603.10.1 Flexible Duct Supports. Flexible air ducts and air connectors shall be supported at intervals not to exceed 4 feet (1219mm) where installed horizontally and at intervals not to exceed 6 feet (1823mm) where installed as vertical risers and shall be in accordance with the manufacturer's instructions and the ADC Flexible Duct Performance & Installation Standards. Supports shall be not less than 1.5 inch (38mm) in width. Sag between supports shall not exceed 1/2 inch (13mm) for each
foot (309 mm) of duct between supports.

Add new standard(s) as follows:
Air Diffusion Council
1901 N. Roselle Road, Suite 800
Schaumburg, IL 60195
ADC Flexible Duct Performance & Installation Standards (5th Edition)

Reason: The changes and revisions included in this proposal seek to clarify important aspects of proper flexible duct installation. All of the language, to my knowledge, is currently included either within the manufacturer’s installation instructions supplied with flexible ducts that are listed and labeled to the UL181 Standard, the UL181B Standard for Closure Systems, and within the Air Diffusion Council Flexible Duct Performance & Installation Standards. Although the code language currently requires that products be installed per their listing and per the manufacturer’s installation instructions, this added text within the code sections should help clarify important aspects of proper flexible duct installations.

Cost Impact: Will not increase the cost of construction
Since the intent of the proposal is to clarify existing requirements (per the manufacturer’s installation instructions currently required), there should be no additional cost impact if these revisions are included.

Analysis: A review of the standard proposed for inclusion in the code, ADC Flexible Duct Performance & Installation Standards, 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 April 2, 2015.
604.3, 604.4

Proponent: Mike Fischer, Kellen Company, representing The Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com)

2015 International Mechanical Code

Revise as follows:

604.3 Coverings and linings. Coverings and linings, including adhesives where used, shall have a flame spread index not more than 25 and a smoke-developed index not more than 50, when tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231. Duct coverings and linings shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250°F (121°C). Coverings and linings shall be listed and labeled.

Exception: Polyurethane foam insulation that is spray applied to the exterior of ducts in attics and crawlspaces shall have a smoke-developed index not greater than 450, subject to all of the following requirements:

1. The foam plastic insulation complies with the requirements of Section 2603 of the International Building Code.
2. The foam plastic insulation is protected against ignition in accordance with the requirements of Section 2603.4.1.6 of the International Building Code.

Delete without substitution:

604.4 Foam plastic insulation. Foam plastic used as duct coverings and linings shall conform to the requirements of Section 604.

Reason: The proposal adds an exception allowing a greater smoke-developed index for some applications of foam plastic insulation on the exterior surfaces of ducts in attics or crawlspaces under certain specified conditions. The exception applies only to foam insulation meeting the requirements of IBC Section 2603 and the ignition barrier requirements in IBC Section 2603.4.1.6. This additional option is consistent with the options in Section M1601.3 of the IRC.

Additionally the proposal removes a circular reference in Section 604.4.

Cost Impact: Will not increase the cost of construction

the proposal clarifies existing requirements and adds an option consistent with the IRC; it adds no additional mandatory provisions.

M 98-15 : 604.3-FISCHER5593
604.7 Identification. External duct insulation, except spray polyurethane foam, and factory-insulated flexible duct shall be legibly printed or identified at intervals not greater than 36 inches (914 mm) with the name of the manufacturer, the thermal resistance $R$-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials. For other than reflective duct insulation, duct insulation product $R$-values shall be based on insulation only, excluding air films, vapor retarders or other duct components, and shall be based on tested $C$-values at 75°F (24°C) mean temperature at the installed thickness, in accordance with recognized industry procedures. The $R$-value for external reflective duct insulation shall be determined in accordance with ASTM C1668 and the installed thickness shall include the enclosed air spaces. The installed thickness of duct insulation used to determine its $R$-value shall be determined as follows:

1. For duct board, duct liner and factory-made rigid ducts not normally subjected to compression, the nominal insulation thickness shall be used.
2. For duct wrap, the installed thickness shall be assumed to be 75 percent (25 percent compression) of nominal thickness.
3. For factory-made flexible air ducts, the installed thickness shall be determined by dividing the difference between the actual outside diameter and nominal inside diameter by two.
4. For spray polyurethane foam, the aged $R$-value per inch, measured in accordance with recognized industry standards, shall be provided to the customer in writing at the time of foam application.

Add new definition as follows:

SECTION 202 DEFINITIONS

REFLECTIVE DUCT INSULATION A thermal insulation assembly consisting of one or more surfaces that have an emittance of 0.1 or less and that bound an enclosed air space or spaces.

Add new standard(s) as follows:


Reason: The purpose of this proposal is to provide clear and specific requirements for reflective duct insulation. This language improves the code by providing installers and building officials with a clear path on the specifications that pertain to this product, as well as adding the appropriate definition and an ASTM standard. The same definition and similar language for reflective duct insulation was approved into the 2015 IRC Section M 1601.3. Reflective duct insulation is a well-established type of material/system and it has an ASTM standard specification, namely ASTM C 1668 Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems. It has been in the market for over 10 years and has nationwide distribution and installation.
Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction. The proposal only clarifies the requirements for a type of insulation material that is currently not properly regulated by the code. It incorporates standard industry practice not presently reflected in the code, but does not make this type of insulation mandatory.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C1668, 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 April 2, 2015.
M 100-15

604.11

Proponent: Mike Fischer, Kellen Company, representing the Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com)

2015 International Mechanical Code

Revise as follows:

604.11 Vapor retarders. Where ducts used for cooling are externally insulated, the insulation shall be covered with a vapor retarder having a maximum permeance of 0.05 perm [2.87 ng/(Pa • s • m²)] or aluminum foil having a minimum thickness of 2 mils (0.051 mm). Insulations having a permeance of 0.05 perm [2.87 ng/(Pa • s • m²)] or less shall not be required to be covered. All joints and seams shall be sealed to maintain the continuity of the vapor retarder.

Exception: A vapor retarder is not required for spray polyurethane foam insulation having a water vapor permeance of not greater than of 3 perm per inch (1722 ng/(s • m² • Pa)) at the installed thickness.

Reason: The proposal adds an option to the vapor retarder requirements for duct insulation of the IMC. The proposal is consistent with the vapor retarder requirements of M1601.4.6 of the 2015 IRC.

Cost Impact: Will not increase the cost of construction

The proposal adds options for the code; does not add any new mandatory requirements.
2015 International Mechanical Code

Add new text as follows:

605.4 Bypass pathways. Air handling equipment and HVAC equipment shall be designed and installed to limit the amount of airflow that bypasses the air filters and shall comply with the following:

1. Channels, racks and other filter retaining constructions that do not seal tightly to the filter frame by means of a friction fit shall be provided with a means to seal the filter frame to the filter retaining construction.
2. Where standard size filters are installed in banks of multiple filters, gaskets shall seal the gap between the frames of adjacent filters. As an alternative to gaskets, the frames of adjacent filters shall be compressed by means of spring elements that are built into the filter retaining construction.
3. Channels, racks and other filter retaining constructions shall be sealed to the duct or housing of the HVAC equipment served by the filters.
4. Filter access doors in ducts and HVAC equipment shall be designed to limit the amount of airflow that bypasses the filters.
5. Field or shop fabricated spacers shall not be installed for the purpose of replacing the intended size filter with a smaller size filter.
6. Gaskets and seals shall be provided with access for repair, maintenance and replacement.

Reason: The proposed text is taken from the 2015 IGCC. This important fundamental requirement to prevent airflow from bypassing air filters should be a basic requirement in the IMC, not just in a high performance green building code.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact: Will increase the cost of construction
This proposal will increase the cost of construction because sealing and/or gaskets will be required beyond that which is normally provided in air handling systems.
2015 International Mechanical Code

Add new text as follows:

805.7 Insulation shield Where factory-built chimneys pass through insulated assemblies, an insulation shield constructed of steel having a thickness of not less than 0.0187 inch (0.4712 mm) (No. 26 gage) shall be installed to provide clearance between the chimney and the insulation material. The clearance shall be not less than the clearance to combustibles specified by the chimney manufacturer's installation instructions. Where chimneys pass through attic space, the shield shall terminate not less than 2 inches (51 mm) above the insulation materials and shall be secured in place to prevent displacement. Insulation shields provided as part of a listed chimney system shall be installed in accordance with the manufacturer's instructions.

Reason: The code currently requires an insulation shield for vents (802.8) to ensure proper clearance to insulation so as not to cause a fire hazard, the code should also require insulation shields for factory-built and metal chimneys as they also require clearance to insulation and represents a fire hazard when one is not installed.

Cost Impact: Will not increase the cost of construction
There technically is no cost impact since the insulation shield should already be installed where needed to ensure a proper and safe installation.
805.7 (New)

Proponent: Tom Stroud, representing Hearth, Patio & Barbecue Association (stroud@hpba.org)

2015 International Mechanical Code
Add new text as follows:

805.7 Insulation shield. Where masonry and factory-built chimneys pass through insulated assemblies, an insulation shield constructed of steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) shall be installed to provide clearance between the chimney and the insulation material. The clearance shall not be less than the clearance to combustibles specified by the chimney manufacturer's installation instructions. Where chimneys pass through attic space, the shield shall terminate not less than 2 inches (51 mm) above the insulation materials and shall be secured in place to prevent displacement. Insulation shields provided as part of a listed chimney system shall be installed in accordance with the manufacturer's installation instructions.

Reason: Insulation is currently often exceeding the lengths of protective shields and it is necessary to make sure that insulation does not contact the chimney and change the safety of the chimney by not allowing free air around the vent.

Cost Impact: Will increase the cost of construction
Cost may increase slightly for longer vent protection.
M 104-15

916.1, CHAPTER 15

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing Association of Pool & Spa Professionals (jhatfield@apsp.org)

2015 International Mechanical Code

Revise as follows:

916.1 General. Pool and spa heaters shall be installed in accordance with the manufacturer's instructions. Oil-fired pool and spa heaters shall be tested in accordance with UL 726. Electric pool and spa heaters shall be tested in accordance with UL 1261, UL 1563 or CSA C22.2 No. 218.1. Gas-fired pool heaters shall comply with ANSI Z21.56/CSA 4.7. Pool and spa heat pump water heaters shall comply with UL 1995, AHRI 1160, or CSA C22.2 No. 236.

Add new standard(s) as follows:
AHRI 1160 (I-P) -09 Performance rating of Heat Pump Pool Heaters
ANSI Z21.56a/CSA 4.7 -2013 Gas Fired Pool Heaters
CSA C22.2 No. 236-11 Cooling Equipment
CSA C22.2 No. 218.1-M89(R2011) Spas, Hot Tubs and Associated Equipment
UL 1563-2009 Standard for Electric Spas, Hot Tubs and Associated Equipment-with revisions through July 2012

Reason: This proposal is needed to ensure consistency with what standards are required for the various pool heaters in Section 316.2 and Table 316.2 of the International Swimming Pool & Spa Code. This same proposal has been submitted to Section M2006.1 of the IRC.

Bibliography: International Swimming Pool & Spa Code, Section 316.2 & Table 316.2

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction and ensures the applicable standards for the various pool heaters are provided within all the I-codes that address pool heaters.

Analysis: A review of the standard proposed for inclusion in the code, AHRI 1160 (I-P), ANSI Z21.56a/CSA 4.7, CSA C22.2 No. 236, CSA C22.2 No. 218.1, UL 1563, 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 April 2, 2015.
SECTION 929
GROUND SOURCE HEAT PUMP SYSTEMS

929.1 Design and installation of ground source heat pump systems. The design and installation of ground source heat pump systems shall conform to ANSI/CSA C448.

Reason: The CSA C448 is an ANSI designated bi-national consensus Standard for the design and installation of ground source heat pump systems. The Standard includes performance based criteria that provide a consistent application of requirements and best practices throughout the United States and Canada. This Standard will ensure that stakeholders in the ground source heat pump systems market sector will supply and receive heating / cooling systems that perform to design efficiency expectations and deliver true, long-term value. This Standard has been developed by a bi-national Technical Committee which comprised of the industry’s leaders and it provides a strong foundation for increased market penetration of this technology into the HVAC market.

The Standard harmonizes the differences between existing resources, simplifies referencing in regulations and contracts, incorporates the latest advancements, clarifies compliance using standards language, and provides credibility through an accredited neutral standards development process. This Standard includes performance based minimum requirements for industrial, commercial, institutional and residential applications and addresses the following items related to ground source heat pump systems:

- equipment and material selection
- site survey - geological and hydrogeological
- open and closed loop ground source heat pump system design / engineering
- direct expansion (DX) systems
- installation
- testing and verification
- documentation
- commissioning and decommissioning

The Standard will apply to all ground source heat pump systems using external building heat exchangers as a thermal source or sink for heating and cooling, with or without a supplementary heating or cooling source. External building heat exchangers that will be covered by this Standard include:

- ground heat exchangers - vertical and horizontal;
- open-loop systems - drilled well and surface water;
- submerged closed loop systems - fresh water and sea water;
- standing column wells

This Standard applies to new and retrofit installations in industrial, commercial, institutional and residential applications and includes thermal energy storage systems.

The bi-national Committee consisted of representatives from the following industry associations:

- American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
- Geothermal Exchange Organization (GEO)
- International Ground Source Heat Pump Association (IGSPHA)
- International Ground Source Heat Pump Association Canada (IGSPHA - Canada)
- National Ground Water Association (NGWA)
- Plastics Pipe Institute (PPI)
- Geothermal National & International Initiative (GEONII)
- Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI)

Cost Impact: Will not increase the cost of construction

The code change proposal will not increase the cost of construction of ground source heat pump systems.

Justification:

Currently, a US standard for the design and installation of ground source heat pump systems, similar to the C448, does not exist. The C448 is a system for the design and installation of ground source heat pump systems and it includes requirements and best practices related to the installation of these systems. The systems would include pumps, pipe, grout etc., which most likely have manufacturing requirements and certification requirements within other standards, but that is not within our scope. The C448 is not a certification standard for any manufactured goods.

The C448 is generally a performance based standard which contains design requirements and best practices typically accepted and used currently.
Ground source heat pump systems that adhere to C448 will be properly designed and installed to the expectation of the owner or end user and as such will represent the minimum baseline performance of such systems. In most cases, alternate materials and installation methods are allowed. Also, in some cases, alternate innovative materials are allowed if reviewed and approved by an engineer.
SECTION 929
UNVENTED ALCOHOL FUEL-BURNING DECORATIVE APPLIANCES

929.1 General Unvented alcohol fuel-burning decorative appliances shall be listed and labeled in accordance with UL 1370 and shall be installed in accordance Section 304.1.

929.2 Prohibited use Unvented alcohol fuel-burning decorative appliances shall not be used as the sole source of comfort heating in a dwelling unit.

929.3 Input rating Unvented alcohol fuel-burning decorative appliances shall not have an input rating in excess of 0.25 gallons of fuel per hour (0.95 liters per hour).

929.4 Prohibited locations Unvented alcohol fuel-burning decorative appliances shall not be installed within occupancies in Groups E and I. The location of unvented alcohol fuel-burning decorative appliances shall comply with Section 303.

929.5 Fuel Unvented alcohol fuel-burning decorative appliances shall be used only with the specific fuel marked on the appliance nameplate.

929.6 Ventilation Fresh air infiltration into the room in which the unvented alcohol fuel-burning decorative appliance is installed shall be provided in accordance with the markings on the appliance and the manufacturer's instructions.

929.7 Installation in fireplaces An unvented alcohol fuel-burning decorative appliance shall not be installed in a factory-built fireplace or masonry fireplace except where specifically identified for such use in accordance with the appliance manufacturer's installation instructions.

Add new standard(s) as follows:
UL 1370-11, Unvented Alcohol Fuel Burning Decorative Appliances, with revisions through January, 2014

Reason: This proposal provides requirements for the installation of unvented, self-contained alcohol-fuel-burning appliances. These appliances are intended for decorative purposes, though there may be limited radiant and convection-air comfort heating. They are not intended to be utilized as a primary heat source. They are not provided with means for duct connection nor is there electrical/mechanical assist of heated air movement, such as a fan-blower assembly. The basic standard used to test and list these products is UL 1370, "Unvented Alcohol Fuel Burning Decorative Appliances", which is an ANSI consensus standard. There are five manufacturers of these appliances.

Denatured alcohol is formulated for the application. As part of the requirements of UL 1370, the appliances are tested for use only with the specific fuel marked on the appliance nameplate. These appliances are limited to a maximum input rate of 0.25 gallons of fuel per hour (0.95 liters per hour). Installation is intended to be in accordance with local codes, the manufacturer's installation instructions and any markings on the appliance. These appliances may be floor mounted or wall mounted. They may be installed in a solid-fuel-burning fireplace adapted for the purpose and, when so marked, in a factory-built solid-fuel-burning fireplace in accordance with the manufacturer's instructions. They are not intended for use in bathrooms or bedrooms nor for institutional use.

Cost Impact: Will not increase the cost of construction
This would permit the use of a new type of equipment to be installed.

Analysis: A review of the standard proposed for inclusion in the code, UL 1370, 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 April 2, 2015.
202 (New), 929 (New), 929.1 (New), CHAPTER 15

Proponent: Amanda Hickman, InterCode Incorporated, representing Air Movement and Control Association International (amanda@intercodeinc.com)

2015 International Mechanical Code

Add new definition as follows:

SECTION 202 DEFINITIONS

HIGH VOLUME LOW SPEED FAN. A ceiling fan that circulates high volumes of air at low rotational speeds. Such fans are greater than 7 feet in diameter.

Add new text as follows:

SECTION 929

HIGH VOLUME LOW SPEED FANS

929.1 General. High volume low speed fans shall be tested in accordance with AMCA 230 and installed in accordance with the manufacturer's instructions.

Add new standard(s) as follows:

AMCA 230-CD1 Laboratory Methods of Testing Air Circulating Fans for Rating and Certification

Reason: The proposed language adds the appropriate test standard, installation instructions, and a definition for high volume low speed fans to the code. The definition is based on the Department of Energy’s current rule making activity on ceiling fans efficiency requirements. The test method AMCA 230 is the most current and most widely used method for fan rating and certification. The formatting used in this proposal is consistent with the formatting in Section 928.1.

Cost Impact: Will not increase the cost of construction
This code change will not increase the cost of construction because high volume low speed fans are not being made mandatory.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 230, 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 April 2, 2015.
SECTION 202 DEFINITIONS

HIGH VOLUME LARGE DIAMETER FAN. A low speed ceiling fan that circulates large volumes of air and that is greater than 7 feet (2134 mm) in diameter.

Add new text as follows:

SECTION 929
HIGH VOLUME LARGE DIAMETER FANS

929.1 General. High volume large diameter fans shall be tested in accordance with AMCA 230 and installed in accordance with the manufacturer's instructions.

Add new standard(s) as follows:
AMCA 230-CD1 Laboratory Methods of Testing Air Circulating Fans for Rating and Certification.

Reason: The proposed language adds the appropriate test standard, installation instructions, and a definition for high volume large diameter fans to the code.
The definition is based on the Department of Energy's current rule making activity on ceiling fans efficiency requirements. The test method AMCA 230 is the most current and most widely used method for fan rating and certification.
The formatting used in this proposal is consistent with the formatting in Section 928.1.

Cost Impact: Will not increase the cost of construction
The code change will not increase the cost of construction because high volume large diameter fans are not being made mandatory.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 230, 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 April 2, 2015.
Part I

2015 International Mechanical Code

Add new text as follows:

929.1 Air-handler enclosures. Where an air-handler, electric furnace or heat pump unit is installed in an enclosure with a fuel-fired appliance, the circulating air for the air-handler, furnace and heat pump shall be conveyed to the blower housing from outside of the enclosure by continuous air-tight ducts.

Part II

2015 International Fuel Gas Code

Add new text as follows:

305.13 Air handler enclosures. Where an air-handler, electric furnace or heat pump unit is installed in an enclosure with a fuel-fired appliance, the circulating air for the air-handler, furnace and heat pump shall be conveyed to the blower housing from outside of the enclosure by continuous air-tight ducts.

Part III

2015 International Residential Code

Add new text as follows:

M1602.3 Air-handler enclosures. Where an air-handler, electric furnace or heat pump unit is installed in an enclosure with a fuel-fired appliance, the circulating air for the air-handler, furnace and heat pump shall be conveyed to the blower housing from outside of the enclosure by continuous air-tight ducts.

Reason: Section 918.4 of the IMC, Section 618.7 of the IFGC and Section G2442.7 of the IRC all address this issue well for fuel-fired warm-air furnaces, but, are silent on other appliances such as fuel-fired water heaters and boilers that are likely to be in the same enclosure. Heat pump units, cooling air-handlers and electric furnaces would have the same effect on appliance vents if the return air was not ducted back to the blower housing. It is not just warm-air furnaces that the code should be concerned about. Any blower can create strong negative pressures in the enclosure where the return is pulled through louvered doors or grilles instead of ducts connected to the blower. A fuel-fired water heater or boiler in the enclosure should be addressed as well as the warm-air furnace in the same enclosure.

This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) The PMGCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes and the code content in terms of scope and application of referenced standards. The PMGCAC has held one open meeting and multiple conference calls which included members of the PMGCAC. Interested parties also participated in all conference calls to discuss and debate the proposed changes.

Cost Impact:

Part I: Will increase the cost of construction
This proposal will increase the cost of construction in those cases where the return air for an air handler, heat pump or electric furnace would have been pulled through a louvered door or grille and through the enclosure, instead of through ductwork connected directly to the unit.

Part II: Will increase the cost of construction
This proposal will increase the cost of construction in those cases where the return air for an air handler, heat pump or electric furnace would have been pulled through a louvered door or grille and through the enclosure, instead of through ductwork connected directly to the unit.

Part III: Will increase the cost of construction
This proposal will increase the cost of construction in those cases where the return air for an air handler, heat pump or electric furnace would have been pulled through a louvered door or grille and through the enclosure, instead of through ductwork connected directly to the unit.
M 110-15
1002.1, 1401.4, 1401.4.1 (New), CHAPTER 15
Proponent: Rex Gillespie (rex.gillespie@caleffi.com)

2015 International Mechanical Code
Revise as follows:

1002.1 General. Potable water heaters and hot water storage tanks shall be listed and labeled and installed in accordance with the manufacturer's instructions, the International Plumbing Code and this code. All water heaters shall be capable of being removed without first removing a permanent portion of the building structure. The potable water connections and relief valves for all water heaters shall conform to the requirements of the International Plumbing Code. Domestic electric water heaters shall comply with UL 174 or UL 1453. Commercial electric water heaters shall comply with UL 1453. Oil-fired water heaters shall comply with UL 732. Solid-fuel-fired water heaters shall comply with UL 2523. Solar thermal water heaters shall comply with Chapter 14 and UL 174 or UL 1453—SRCC 300.

1401.4 Solar energy thermal equipment and appliances. Solar energy thermal equipment and appliances shall conform to the requirements of this chapter. Solar thermal systems shall be listed and labeled in accordance with the manufacturer's instructions and SRCC 300.

Add new text as follows:

1401.4.1 Collectors and panels Solar thermal collectors and panels shall be listed and labeled in accordance with SRCC 100 or SRCC 600, as applicable.

Add new standard(s) as follows:

Reason: Updates standard citations for solar thermal water heaters. The UL 174 and UL 1453 are not appropriate standard references because they address electric water heaters. They are removed in favor of SRCC Standard 300 which addresses solar water heating systems and is also referenced in the 2015 IRC for the same purpose.
Additional references to SRCC 100 and 600 for solar collectors are added to ensure that collectors meet minimum requirements and freeing the code official from inspecting the internal components of solar collectors. Identical references to the 100 and 600 standards also appear in the 2015 IRC. These standards are already cited in most states for incentive and rebate programs, and therefore do not create an additional burden for manufacturers.

Bibliography:

Cost Impact: Will not increase the cost of construction
The proposed changes are not anticipated to impact the cost of installation. No new equipment or features are required, and no new requirements are placed on manufacturers impacting certification or manufacturing costs. Proposed provisions provide additional clarity and direction for installers and code officials at inspection.

Analysis:
A review of the standard proposed for inclusion in the code, SRCC-100, SRCC-300, SRCC-600, 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 April 2, 2015.
M 111-15
1006.6, CHAPTER 15

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

2015 International Mechanical Code

Revise as follows:

1006.6 Safety and relief valve discharge. Safety and relief valve discharge pipes shall be of rigid pipe that is approved for the temperature of the system. The discharge pipe shall be the same diameter as the safety or relief valve outlet. Safety and relief valves shall not discharge so as to be a hazard, a potential cause of damage or otherwise a nuisance. High-pressure steam safety valves shall be vented to the outside of the structure. Where a low-pressure safety valve or a temperature relief valve discharges, the discharge piping shall:

1. Not be directly connected to the drainage system.
2. Discharge through an air gap located in the installation and in the same room as the appliance.
3. Not be smaller than the diameter of the outlet of the valve served and shall conform to the air gap.
4. Serve a single relief device and shall not connect to piping serving any other relief device or equipment.
5. Discharge to the floor, to the pan serving the boiler or storage tank, to a waste receptor or to the outdoors.
6. Discharge in a manner that does not cause personal injury or structural damage.
7. Discharge to a termination point that is readily observable by the building occupants.
8. Not be trapped.
9. Be installed so as to flow by gravity.
10. Not terminate more than 6 inches (152 mm) above the floor or waste receptor.
11. Not have a threaded connection at the end of such piping.
12. Not have valves or tee fittings.
13. Be constructed of those materials listed in Section 605.4 of the International Plumbing Code, or materials tested, rated and approved for such use in accordance with ASME A112.4.1.

Add new standard(s) as follows:

ASME A112.4.1 Water Heater Relief Valve Drain Tubes

Reason: This section lacks the detail needed and doesn't paint a complete picture. Why must the user jump to another code to find and use these requirements? It's very helpful to find all the requirements in any given Section that will complete the picture of what needs to be done to complete an installation.

Cost Impact: Will not increase the cost of construction

There will be no additional cost as this is only an editorial modification and clarification which provides information from other codes. No new requirements.

Analysis: A review of the standard proposed for inclusion in the code, ASME A112.4.1, 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 April 2, 2015.
M 112-15
1006.9 (New)

Proponent: Timothy Manz, City of Blaine, representing Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

2015 International Mechanical Code

Add new text as follows:

1006.9 Boiler shutdown switch. A manually operated remote shutdown switch shall be provided and located as required by ASME CSD-1.

   Exception: A single hot water boiler with a rated input of less than 400,000 Btu/hr (117kW).

Reason: ASME CSD-1-2012, Controls and Safety Devices for Automatically Fired Boilers, is the defacto standard in the boiler industry for controls and safety devices for boilers and is adopted by reference in most state boiler inspection programs, so this provision should be included in the IMC for clarity and consistency.

Cost Impact: Will not increase the cost of construction

The code change proposal will not increase the cost of construction in states or jurisdictions that have adopted the ASME boiler codes, so in most installations there is not an increase in cost for this requirement.
M 113-15

202 (New), 1009.1, Chapter 15

Proponent: Rex Gillespie (rex.gillespie@caleffi.com)

2015 International Mechanical Code

Revise as follows:

1009.1 Where required. An expansion tank shall be installed in every hot water system. For multiple boiler installations, not less than one expansion tank is required. Expansion tanks shall be of the closed or open type. Tanks shall be rated for the pressure of the hot water system.

   Exception: Expansion tanks shall not be required in the collector loop of drain-back systems.

Add new definitions as follows:

SECTION 202 DEFINITIONS

DIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

DRAIN-BACK SYSTEM. A solar thermal system in which the fluid in the solar collector loop is gravity drained from the collector into a holding tank under prescribed circumstances.

FOOD GRADE FLUID. Potable water or a fluid containing additives listed in accordance with the Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174-186.

INDIRECT SYSTEM. A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.

NO-FLOW CONDITION. A condition where thermal energy is not transferred from a solar thermal collector by means of flow of a heat transfer fluid.

NON-FOOD GRADE FLUID. Any fluid that is not designated as a food grade fluid.

SOLAR THERMAL SYSTEM. A system that converts solar radiation to thermal energy for use in heating or cooling.

SECTION 1401

GENERAL

Revise as follows:

1401.1 Scope. This chapter shall govern the design, construction, installation, alteration and repair of solar thermal systems, equipment and appliances intended to utilize solar energy for space heating or cooling, domestic hot water heating, swimming pool heating or process heating.

1401.4 Solar energy thermal equipment and appliances. Solar energy thermal equipment and appliances shall conform to the requirements of this chapter and SRCC 300 and shall be installed in accordance with the manufacturer's instructions.

SECTION 1402

DESIGN AND INSTALLATION

Add new text as follows:

1402.1 General. The design and installation of solar thermal systems shall comply with Sections 1402.1 through 1402.8. Solar thermal systems shall be listed and labeled to SRCC 300 and shall be installed in accordance with the manufacturer's instructions and SRCC 300.

Revise as follows:

1402.2 Access. Access shall be provided to solar energy thermal equipment and appliances for maintenance. Solar thermal systems and appurtenances shall not obstruct or interfere with the operation of any doors, windows or other building components requiring operation or access. Roof-mounted solar thermal equipment shall not obstruct or interfere with the operation of roof-mounted equipment, appliances, chimneys, plumbing vents, roof hatches, smoke vents, skylights and other...
roof penetrations and openings.

**1402.5.1 Pressure and temperature.** Solar energy thermal system components containing pressurized fluids shall be protected against pressures and temperatures exceeding design limitations with pressure and temperature relief valves or pressure relief valves. Each section of the system in which excessive pressures are capable of developing shall have a relief device located so that a section cannot be valved off or otherwise isolated from working pressure rating of not less than the setting of the pressure relief device. Relief valves shall comply with the requirements of Section 1006.4 and discharge in accordance with Section 1006.6.

Add new text as follows:

**1402.3.1 Relief device.** Each section of the system in which excessive pressures are capable of developing shall have a relief device located so that a section cannot be valved off or otherwise isolated from a relief device. Relief valves shall comply with the requirements of Section 1006.6. For indirect systems, pressure relief valves in solar loops shall also comply with SRCC 300.

Revise as follows:

**1402.5.2 Vacuum.** The solar energy system components that might be subjected to a vacuum while in operation or during shutdown shall be designed to withstand such vacuum or shall be protected with vacuum relief valves.

**1402.5.3 Protection from freezing.** System components shall be protected from damage by freezing of heat transfer liquids at the lowest ambient temperatures that will be encountered during the operation of the system. Freeze protection shall be provided in accordance with SRCC 300. Drain-back systems shall be installed in compliance with Section 1402.4.1 and systems utilizing freeze protection valves shall comply with Section 1402.4.2.

Add new text as follows:

**1402.4.1 Drain-back systems.** Drain-back systems shall be designed and installed to allow for manual gravity draining of fluids from areas subject to freezing to locations not subject to freezing, and air filling of the components and piping. Such piping and components shall maintain a horizontal slope in the direction of flow of not less than one-fourth unit vertical in 12 units horizontal (2-percent slope). Piping and components subject to manual gravity draining shall permit subsequent air filling upon drainage and air storage or venting upon refilling.

**1402.4.2 Freeze protection valves.** Freeze protection valves shall discharge in a manner that does not create a hazard or structural damage.

**1402.5 Protection of potable water.** Where a solar thermal system heats potable water to supply a potable hot water distribution or any other type of heating system, the solar thermal system shall be in accordance with Sections 1402.5.1 through 1402.5.3 as applicable.

**1402.5.1 Indirect systems.** Water supplies of any type shall not be connected to the solar heating loop of an indirect solar thermal hot water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

**1402.5.2 Direct systems for potable water distribution systems.** Where a solar thermal system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of the International Plumbing Code.

**1402.5.3 Direct systems for other than potable water distribution systems.** Where a solar thermal system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012. Where solar thermal system directly heats chemically treated water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a reduced pressure principle backflow prevention assembly complying with ASSE 1013.

Revise as follows:

**1402.6 Protection of equipment.** Solar thermal equipment exposed to vehicular traffic shall be installed not less than 6 feet (1829 mm) above the finished floor.

Exception: This section shall not apply where the equipment is protected from motor vehicle impact.

Add new text as follows:

**1402.7 Protection of structure.** In the process of installing or repairing any part of a solar thermal system, the building or structure shall be left in a safe structural condition in accordance with Section 302 and Sections 1402.7.1 through 1402.7.2.

Revise as follows:
1402.3 Controlling condensation. Where attics or structural spaces are part of a passive solar system, ventilation of such spaces, as required by Section 406, is not required where other approved means of controlling condensation are provided.

1402.6 Penetrations. Roof and wall penetrations shall be flashed and sealed to prevent entry of water, rodents and insects in accordance with Section 302.

1402.8 Equipment. The solar energy-thermal system shall be equipped in accordance with the requirements of Sections 1402.5 through 1402.8.5.

Add new text as follows:

1402.8.1 Collectors and panels. Solar collectors and panels shall comply with Sections 1401.2.2.1 through 1401.2.2.3.

1402.8.1.1 Design. Solar thermal collectors and panels shall be listed and labeled in accordance with SRCC 100 or SRCC 600, as applicable.

Revise as follows:

1402.4 Collectors mounted above the roof. Roof-mounted solar thermal collectors and systems The roof shall be constructed to support the loads imposed by roof mounted solar collectors. Where mounted on or above the roof covering, the collector array and supporting construction shall be constructed of noncombustible materials or fire-retardant-treated wood conforming to the International Building Code to the extent required for the type of roof construction of the building to which the collectors are accessory.

Exception: The use of plastic solar collector covers shall be limited to those approved plastics meeting the requirements for plastic roof panels in the International Building Code.

1402.8.1.3 Roof-mounted collectors. Collectors as roof covering Roof-mounted solar collectors that also serve as a roof covering shall conform to the requirements for roof coverings in accordance with the International Building Code.

Exception: The use of plastic solar collector covers shall be limited to those approved plastics meeting the requirements for plastic roof panels in the International Building Code.

Add new text as follows:

1402.8.1.4 Collector sensors. Collector sensor installation, sensor location and the protection of exposed sensor wires from degradation shall be in accordance with SRCC 300, NFPA 70 and the collector manufacturer's instructions.

Revise as follows:

1402.8.2 Ducts. No change to text.

1402.8.2.1 Filtering. Air transported to occupied spaces through rock or dust-producing materials by means other than natural convection shall be filtered before entering the outlet from the heat storage system occupied space in accordance with Section 605.

Add new text as follows:

1402.8.3 Piping. Potable piping shall be installed in accordance with the International Plumbing Code. Hydronic piping shall be installed in accordance with Chapter 10 of this code. Mechanical system piping shall be supported in accordance with Section 305.

1402.8.3.1 Piping insulation. Piping shall be insulated in accordance with the requirements of the International Energy Conservation Code. Exterior insulation shall be protected from degradation. The entire solar loop shall be insulated. Where split-style insulation is used, the seam shall be sealed. Fittings shall be fully insulated. Insulation shall comply with Section 1204.1.

Exceptions:

1. Those portions of the piping that are used to help prevent the system from overheating shall not be required to be insulated.
2. Those portions of piping that are exposed to solar radiation, made of the same material as the solar collector absorber plate and are covered in the same manner as the solar collector absorber, or that are used to collect additional solar energy, shall not be required to be insulated.
3. Piping in solar thermal systems using unglazed solar collectors to heat a swimming pool shall not be required to be insulated.

Revise as follows:

1402.8.4 Heat exchangers. Heat exchangers used in domestic water-heating systems shall be approved for the intended use. The system shall have adequate protection to ensure that the potability of the water supply and distribution...
system is properly safeguarded.

Add new text as follows:

1402.8.4.1 Double-wall heat exchangers. Heat exchangers utilizing a non-food grade fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. The discharge location from the double-wall heat exchanger shall be visible.

1402.8.4.2 Single-wall heat exchangers. Single-wall heat exchangers shall be permitted to be used where food grade fluid is used as the heat transfer fluid.

1402.8.5 Water heaters and hot water storage tanks. Auxiliary water heaters, boilers and water storage tanks associated with solar thermal systems shall comply with Chapter 10 of this code and SRCC 300.

1402.8.8.5.1 Hot water storage tank insulation. Hot water storage tanks shall be insulated and such insulation shall have an R value of not less than R-12.5.

1402.8.5.2 Outdoor locations. Storage tanks and heating equipment installed in outdoor locations shall be designed for outdoor installation.

1402.8.5.3 Storage tank sensors. Storage tank sensors shall comply with SRCC 300.

1402.8.6 Solar loop. Solar loops shall be in accordance with Sections 1402.8.6.1 and 1402.8.6.2.

1402.8.6.1 Solar loop isolation. Valves shall be installed to allow the solar loop to be isolated from the remainder of the system.

1402.8.6.2 Drain and fill valve caps. Drain caps shall be installed on drain and fill valves.

Revise as follows:

1402.8.14 Expansion tanks. Liquid single-phase solar energy systems shall be equipped with expansion tanks sized in accordance with Section 1009, except that additional expansion tank acceptance volume equal to the total volume of liquid contained in the installed solar collectors and piping above the collectors shall be included.

SECTION 1403
HEAT TRANSFER FLUIDS

1403.1 Flash point. The flash point of the actual heat transfer fluid utilized in a solar system shall be not less than 50°F (28°C) above the design maximum nonoperating (no-flow) temperature of the fluid attained in the collector.

Add new text as follows:

1403.2 Heat transfer fluids. Heat transfer gases and liquids shall be rated to withstand the system's maximum design temperature under operating conditions without degradation. Heat transfer fluids shall be in accordance with SRCC 300.

1403.3 Food grade additives. Any food grade fluid used as a heat transfer fluid containing additives shall be third party listed by an approved agency to the appropriate section of the Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174-186.

1403.4 Toxicity. The use of toxic fluids shall comply with Title 15 of the Federal Hazardous Substances Act and Chapter 60 of the International Fire Code.

SECTION 1404
MATERIALS LABELING

Revise as follows:

1404.1 Collectors. Factory-built collectors shall be listed and labeled, and bear a label showing the manufacturer's name and address, model number, collector dry weight, collector maximum allowable operating and nonoperating temperatures and pressures, minimum allowable temperatures and the types of heat transfer fluids that are compatible with the collector. The label shall clarify that these specifications apply only to the collector serial number.

1404.2 Thermal water storage units/tanks. Pressurized thermal water storage units/tanks shall be listed and labeled, and bear a label showing the manufacturer's name and address, model number, serial number, storage unit maximum and minimum allowable operating temperatures, and storage unit maximum and minimum allowable operating pressures and the types of heat transfer fluids compatible with the storage unit. The label shall clarify that these specifications apply only to the thermal water storage units/tanks.

Add new text as follows:

1404.3 Fluid safety labeling. Drain and fill valves shall be labeled with a description and warning that identifies the fluid in that loop as "Potable Water", Food Grade Fluid", "Non-Food Grade Fluid" or "Toxic". Labeling shall also be provided that
reads as follows: “Fluid could be discharged at high temperature or pressure or both. Unauthorized alterations to this system could result in a health hazard or a hazardous condition.”

1404.4 Heat exchangers. Heat exchangers shall be labeled to indicate the heat exchanger type with one of the following:

1. “Single-wall without leak protection”
2. “Double-wall with no leak protection”
3. “Double-wall with leak protection”

Add new standard(s) as follows:
Solar Rating and Certification Corporation
400 High Point Drive, Suite 400
Cocoa, FL 32926
Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174-186.
Title 15 of the Federal Hazardous Substances Act.

Reason: The solar thermal provisions in the 2015 IRC were significantly revised by proposals submitted by a Solar Task Group working under the SEPHCAC. These same changes were not submitted for the IMC, however, due to time constraints. This proposal seeks to extend these updates to the solar thermal provisions in the IMC to align with the language that appears in the 2015. As the language currently stands there are conflicts and key differences for freeze protection, labeling, expansion tanks, pressure and temperature control and many other items. The changes add a citation to three standards from the Solar Rating and Certification Corporation (SRCC) as was done in the 2015 IRC. These standards are already cited in most states for incentive and rebate programs.

Several other improvements that do not currently appear in the IRC Chapter 23 were also proposed. Identical language was also proposed for the 2018 IRC during this cycle to ensure that they align in the next version, if approved. They include:

- Access provisions were revised to clarify that roof-mounted solar collectors and equipment should not interfere with the operation of key safety components and features from other systems. While this can reasonably assumed, providing this provisions will provide code officials more clear language to reference when inspecting installations.
- New language has been added to the freeze protection section to address specific issues with two of the most common freeze protection approaches: drainback systems and freeze protection valves. Drainback systems allow the liquid to drain from the external collector to conditioned space when flow is not occurring. As a result proper slope is critical to ensure operation. Inspection of the installation and workmanship is necessary to ensure that the slope is consistent and the freeze protection is fully functional. Freeze protection valves discharge a small amount of water in freezing conditions and therefore should be addressed in a way similar to T&P valves to ensure that the discharge does not damage the roof or create a hazard (e.g. freezing on a pedestrian walkway). Identical language has also been proposed for Chapter 14 of the IMC.
- The provisions relating to collector and hot water storage tank labeling were simplified since this information and more can be found in manuals and specifications. The language for storage units (tanks) was also revised to clarify that they are only to apply to hot water storage tanks.


Cost Impact: Will not increase the cost of construction
The proposed changes are not anticipated to raise the cost of construction. Most solar thermal systems and collectors are already certified to these standards in order to meet state requirements, those of the Internal Revenue Service for federal rebates, or to comply with the requirements of the 2015 IRC. Therefore, no additional product certifications are required. It is possible that costs reductions will result from the correlation of requirements between codes and these standards.

Analysis: A review of the standard proposed for inclusion in the code, SRCC Standard 100, SRCC Standard 300-13, SRCC Standard 600-13, Code of Federal Regulations, Title 21, Food and Drugs, Chapter 1, Food and Drug Administration, Parts 174-186. Title 15 of the Federal Hazardous Substances Act, 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 April 2, 2015.
**M 114-15**

**1101.6**

**Proponent:** Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

**2015 International Mechanical Code**

Revise as follows:

1101.6 **General.** Refrigeration systems shall comply with the requirements of this code and, except as modified by this code, ASHRAE 15. Ammonia-refrigerating systems shall comply with this code and, except as modified by this code, ASHRAE 15 and IIAR 2.

**Reason:** IIAR 2-2014 was entirely rewritten, and the standard is now a stand-alone document that no longer relies on ASHRAE 15. During the rewrite process, ASHRAE 15 was reviewed, and provisions deemed appropriate for regulating ammonia were incorporated into the IIAR 2. Therefore, the reference to ASHRAE 15 for ammonia refrigeration is no longer necessary.

**Cost Impact:** Will not increase the cost of construction

This proposal may reduce the cost of construction by simplifying the design/review process to only involve a single standard for ammonia refrigeration system installations.
1101.6, CHAPTER 15

Proponent: Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration

2015 International Mechanical Code

Revise as follows:

1101.6 General. Refrigeration systems shall comply with the requirements of this code and, except as modified by this code, ASHRAE 15. Ammonia-refrigerating systems shall comply with this code and, except as modified by this code, ASHRAE 15 and IIAR 2, IIAR 3, IIAR 4 and IIAR 5.

Add new standard(s) as follows:
IIAR 3-2012 Ammonia Refrigeration Valves
IIAR 4-2015 (pending completion) Installation of Closed-Circuit Ammonia Mechanical Refrigerating Systems
IIAR 5-2013 Start up and Commissioning of Ammonia Refrigeration Systems

Reason: These are ANSI standards that are already applicable for ammonia refrigeration facilities. Including references in the IMC will ensure that the standards can be enforced by the mechanical code official so that proper valves are used on ammonia refrigeration systems and that these systems are properly installed and commissioned.

Cost Impact: Will not increase the cost of construction
The IMC reference will correlate with what should already be industry practice.

Analysis:
A review of the standard proposed for inclusion in the code, IAR 3, IIAR 4 and IIAR 5, 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 April 2, 2015.
# Table 1103.1

Proponent: Steven Ferguson, representing ASHRAE (sferguson@ashrae.org)

2015 International Mechanical Code

Revise as follows:

<table>
<thead>
<tr>
<th>Chemical Refrigerant</th>
<th>Formula</th>
<th>Chemical Name of Blend</th>
<th>Refrigerant Classification</th>
<th>Pounds per 1000 CF of space</th>
<th>ppm</th>
<th>g/m³</th>
<th>OEL</th>
<th>[F] Degrees of Hazard</th>
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<tbody>
<tr>
<td>R-444B zeotrope</td>
<td>R-32/152a/1234ze(E) (41.5/10.0/48.5)</td>
<td>A2f</td>
<td>4.3</td>
<td>23,000</td>
<td>69</td>
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<td>R-448A zeotrope</td>
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<td>R-134a/1234ze(E) (42.0/58.0)</td>
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<td>880</td>
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<td>R-1233zd(E) CF₃CH=CHCl</td>
<td>trans-1-chloro-3,3,3-trifluoro-1-propene</td>
<td>A1</td>
<td>5.3</td>
<td>16,000</td>
<td>85</td>
<td>800</td>
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<td>R-125/134a/600 (19.5/78.8/1.7)</td>
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<td>74</td>
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<td>57,000</td>
<td>260</td>
<td>1,000</td>
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<tr>
<td>R-445A zeotrope</td>
<td>R-744/134a/1234ze(E) (6.0/9.0/85.0)</td>
<td>A2f</td>
<td>4.2</td>
<td>16,000</td>
<td>67</td>
<td>930</td>
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</tr>
<tr>
<td>R-446A zeotrope</td>
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<td>2.5</td>
<td>16,000</td>
<td>39</td>
<td>960</td>
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<td>2.6</td>
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<td>Refrigerant</td>
<td>Formula</td>
<td>Description</td>
<td>Flammability Class</td>
<td>OEL</td>
<td>ATEL</td>
<td>Toxicity Class</td>
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<td></td>
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<td>------------</td>
<td>---------</td>
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<tr>
<td>R-30</td>
<td>CH2Cl2</td>
<td>dichloromethane (methylene chloride)</td>
<td>B1</td>
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<td>CH3Cl</td>
<td>chloromethane (methyl chloride)</td>
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<tr>
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<td>methane</td>
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<td>1.700</td>
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<tr>
<td>R-444A</td>
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<td>5.1</td>
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<tr>
<td>R-445A</td>
<td>zeotrope</td>
<td>R-744/134a/1234ze(E) (6.0/9.0/85.0)</td>
<td>A2f</td>
<td>4.2</td>
<td>16.000</td>
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<td>930</td>
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<tr>
<td>R-610</td>
<td>ethoxyethane (ethyl ether) CH3CH2OCH2CH3</td>
<td>-</td>
<td>-</td>
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<td>20</td>
<td>72.000</td>
<td>320</td>
<td>650</td>
<td></td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283 m$^3$.

a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
c. For installations that are entirely outdoors, use 3-1-0.
d. Class I ozone depleting substance; prohibited for new installations.
e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the AIHA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.
f. The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.

**Reason:** The Refrigerant Classifications (except Degrees of Hazard) are determined by ASHRAE SSPC 34 and published in ASHRAE Standard 34. This proposal seeks to update the refrigerant table with the new refrigerants added to Standard 34 since the last code cycle. The reasons for the additions of new refrigerants can be found at https://www.ashrae.org/standards-research--technology/standards/addenda. The following four addenda may not be published by the time this monograph is published, so here is the information related to those refrigerants. No review comments were received during the public comment period and expected to be reviewed for publication approval at the end of January 2015.

R-451A: The recommended flammability classification 2 (2L in Standard 34 per footnote f of this table) is based on an LFL of 7.0 vol. %, a heat of combustion of 9790 kJ/kg (4209 Btu/lb), and a burning velocity less than 4 cm/s. The recommended toxicity classification A is based on an adopted OEL of 520 ppm v/v. The recommended ATEL is 100,000 ppm v/v.

R-451B: The recommended flammability classification 2 (2L in Standard 34 per footnote f of this table) is based on an LFL of 7.0 vol. %, a heat of combustion of 9790 kJ/kg (4209 Btu/lb), and a burning velocity less than 4 cm/s. The recommended toxicity classification A is based on an adopted OEL of 530 ppm v/v. The recommended ATEL is 100,000 ppm v/v.

R-513A: The recommended flammability classification is 1. The recommended toxicity classification A is based on an adopted OEL of 650 ppm v/v.
The recommended ATEL is 72,000 ppm v/v.

R-452A: The recommended flammability classification is 1. The recommended toxicity classification A is based on an adopted OEL of 780 ppm v/v. The recommended ATEL is 100,000 ppm v/v.

Additionally, three small/significant figure edits or corrections have been made to R-436B (8.1 g/m3 should be 8.2 g/m3 for consistency), R-1270 (the lbs/1000 cf changes from 0.1 to 0.11 due to significant digits in the analysis by SSPC 34), and the WEELs (workplace environmental exposure levels) which were previously issued by the American Industrial Hygiene Association (AIHA) are now set by The Toxicology Excellense for Risk Assessment (TERA) Occupational Alliance for Risk Science (see addendum d to ASHRAE Standard 34-2013 for more information).

If approved, the intent is for the refrigerants in this table to be re-organized in numerical order.

**Bibliography:** ASHRAE Standard 24-2013

**Cost Impact:** Will not increase the cost of construction

This proposal only classifies refrigerants. How a refrigerant is classified has no impact on the cost of construction.
### Table 1103.1

**REFRIGERANT CLASSIFICATION, AMOUNT AND OEL**

<table>
<thead>
<tr>
<th>CHEMICAL REFRIGERANT</th>
<th>FORMULA</th>
<th>CHEMICAL NAME OF BLEND</th>
<th>REFRIGERANT CLASSIFICATION</th>
<th>AMOUNT OF REFRIGERANT PER OCCUPIED SPACE</th>
<th>[F] DEGREES OF HAZARD a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pounds per 1,000 cubic feet</td>
<td>ppm</td>
</tr>
<tr>
<td>R-1234YF</td>
<td>CF₃CF=CH₂</td>
<td>2,3,3,3-tetrafluoro-1-propene</td>
<td>A₂⁺g₁</td>
<td>4.7</td>
<td>16,000</td>
</tr>
<tr>
<td>R-1234ZE(E)</td>
<td>CF₃CH=CHF</td>
<td>trans-1,3,3,3-tetrafluoro-1-propene</td>
<td>A₂⁺g₁</td>
<td>4.7</td>
<td>16,000</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283 m³.

a. Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.

b. Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.

c. For installations that are entirely outdoors, use 3-1-0.

d. Class I ozone depleting substance; prohibited for new installations.

e. Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the AIHA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.

f. The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2.

g. The ASHRAE Standard 34 flammability classification for this refrigerant is 2L, which is a subclass of Class 2, and the refrigerant shall be treated as a Refrigerant Class A1.

**Reason:** The proposal revises the Classification requirements for two refrigerants, R1234YF and R1234ZE to indicate that Class A1 refrigerent requirements are applicable. This change is consistent with current referenced standards discussions at ASHRAE 34; it is important to get this change in place in case the ASHRAE standard update is not ready in time for the 2018 IMC. These refrigerants may be used in air conditioning products for all applications, provided the burning velocity is below 5 cm/sec and the end use product is listed by UL or other approved agency. All other provisions for A1 refrigerants shall apply.

**Cost Impact:** Will not increase the cost of construction
The proposal increases available product options.
Proponent: Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration

2015 International Mechanical Code

Revise as follows:

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to industrial occupancies and refrigerated rooms for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Machinery rooms are Where a machinery room would otherwise be required by Section 1104.2, a machinery room shall not be required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. The floor area per occupant is not less than 100 square feet (9.3 m²) where machinery is located on floor levels with exits more than 6.6 feet (2012 mm) above the ground. Where provided with egress directly to the outdoors or into approved building exits, the minimum floor area shall not apply.
4. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.
5. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
6. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
7. All refrigerant-containing parts in systems exceeding 100 horsepower (hp) (74.6 kW) drive power, except evaporators used for refrigeration or dehumidification; condensers used for heating; control and pressure relief valves for either; and connecting piping, shall be located either outdoors or in a machinery room.

Reason: The proposal clarifies that Section 1104.2.2 only applies when a machinery room is otherwise required. As currently written, the code could be interpreted such that the special regulations in 1104.2.2 are applicable even if a machinery room weren't otherwise required, such as a case where the primary refrigerant is a brine solution. This revision will make it clear that this is not a proper application of the IMC.

Cost Impact: Will not increase the cost of construction
The proposal only clarifies the intended application of the current provisions.
202 (New), 1104.2.2

Propponent: Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

Add new definition as follows:

SECTION 202 DEFINITIONS

LOW-PROBABILITY PUMP. A pump that does not rely on a dynamic shaft seal as a singular means of containment to prevent atmospheric release of the pumped fluid.

Revise as follows:

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to industrial occupancies and refrigerated rooms for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Machinery rooms are not required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. The floor area per occupant is not less than 100 square feet (9.3 m²) where machinery is located on floor levels with exits more than 6.6 feet (2012 mm) above the ground. Where provided with egress directly to the outdoors or into approved building exits, the minimum floor area shall not apply.
4. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.
5. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
6. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
7. All refrigerant-containing parts in systems with a total connected compressor power exceeding 100 horsepower (hp) (74.6 kW) drive power, except evaporators used for refrigeration or dehumidification; condensers used for heating; control and pressure relief valves for either; low-probability pumps; and connecting piping, shall be located either outdoors or in a machinery room.

Reason: The modification of the 100 HP power threshold in Item 7 clarifies that this is compressor drive power, which is the terminology used in IIAR 2 Section 4.2.3 and ASHRAE 15 Section 7.2.2(g). The change ensures that the drive power for liquid pumps and other motorized equipment attached to the system is not improperly added.

With respect to pumps, experience has shown that pump leaks are typically associated with failed seals on rotating (dynamic) parts, which can result in events ranging from a simple nuisance release to a hazardous condition requiring an emergency response. This proposal will encourage the use of pumps that are hermetically sealed or similar in lieu of pumps that rely on dynamic seals to contain refrigerant.

Cost Impact: Will not increase the cost of construction

The proposal will not increase the cost of construction because the first portion of the change is a clarification of current provisions, and the second portion of the change is an optional path to compliance. Standard pumps will continue to be permitted when they are located in refrigerant machinery rooms.
M 120-15

1104.2.2

Proponent: Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

2015 International Mechanical Code

Revise as follows:

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to industrial occupancies and refrigerated rooms for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Machinery rooms are not required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. The floor area per occupant is not less than 100 square feet (9.3 m$^2$) where machinery is located on floor levels with exits more than 6.6 feet (2012 mm) above the ground. Where provided with egress directly to the outdoors or into approved building exits, the minimum floor area shall not apply.
4. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.
5. Surfaces having temperatures exceeding $800^\circ$F ($427^\circ$C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
6. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
7. All refrigerant-containing parts in systems exceeding 100 horsepower (hp) (74.6 kW) drive power, except evaporators used for refrigeration or dehumidification; condensers used for heating; control and pressure relief valves for either; and connecting piping, shall be located either outdoors or in a machinery room.

Reason: The section proposed for deletion is archaic, makes no sense, and doesn't typically apply because the second sentence largely negates the first. Simply by having a direct outside exit or an “approved” building exit (why would an exit not be approved, and how is a building exit different than an exit?), the occupant density limit is waived. Nevertheless, there is no logical reason for this section to establish a maximum occupancy limit based on providing a minimum floor area per occupant simply because someone is in a refrigerated area. Note that fixing a hard limit on the number of people permitted in an industrial space is very different than a typical occupant load calculation that is only for the purpose of designing the required means of egress.

Cost Impact: Will not increase the cost of construction
The proposal is unlikely to impact the cost of construction because the deleted text is probably never applied anyway.
Proponent: Jeffrey Shapiro, International Institute of Ammonia Refrigeration, representing International Institute of Ammonia Refrigeration (jeff.shapiro@intlcodeconsultants.com)

2015 International Mechanical Code

Revise as follows:

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to industrial occupancies and refrigerated rooms for manufacturing, food and beverage preparation, meat cutting, other processes and storage. Machinery rooms are not required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. The floor area per occupant is not less than 100 square feet (9.3 m$^2$) where machinery is located on floor levels with exits more than 6.6 feet (2012 mm) above the ground. Where provided with egress directly to the outdoors or into approved building exits, the minimum floor area shall not apply.
4. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.

   **Exceptions:**
   1. Refrigerant detectors are not required in unoccupied areas that contain only continuous piping that does not include valves, valve assemblies, equipment, or equipment connections.
   2. Where approved alternatives are provided, refrigerant detectors are not required for rooms or areas that are always occupied, and for rooms or areas that have high humidity or other harsh environmental conditions that are incompatible with detection devices.

5. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
6. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
7. All refrigerant-containing parts in systems exceeding 100 horsepower (hp) (74.6 kW) drive power, except evaporators used for refrigeration or dehumidification; condensers used for heating; control and pressure relief valves for either; and connecting piping, shall be located either outdoors or in a machinery room.

**Reason:** The proposed exceptions are derived from IIAR 2. In areas that only contain fixed piping, there are no expected leak sources, so detection is unnecessary regardless of the refrigerant type. This is not unlike how the IFC and IBC don't count quantities of some materials in piping systems towards MAQ amounts. The proposed exception recognizing alternative detection protocols for ammonia in areas that are continuously occupied and areas where the environmental conditions would damage or diminish the reliability of fixed detectors provides flexibility for the mechanical code official and the designer to accommodate conditions that sometimes arise for specific applications and facilities. Because of ammonia's strong self-alarming odor, it is common for facilities to have emergency plans in place that respond to an ammonia odor, which is detectable at a fraction of the thresholds at which a health or fire hazard may occur.

**Cost Impact:** Will not increase the cost of construction

The proposed exceptions are optional. Therefore the will never increase the cost of construction. The cost of construction may decrease depending on whether the exceptions provide a more cost effective option for leak detection.
2015 International Mechanical Code

Delete without substitution:

SECTION 202 DEFINITIONS

REFRIGERATED ROOM OR SPACE.

A room or space in which an evaporator or brine coil is located for the purpose of reducing or controlling the temperature within the room or space to below 68°F (20°C).

Revise as follows:

1104.2.2 Industrial occupancies and refrigerated rooms. This section applies only to rooms and spaces that are within industrial occupancies, that contain a refrigerant evaporator, that are maintained at temperatures below 68°F (20°C) and refrigerated rooms that are used for manufacturing, food and beverage preparation, meat cutting, other processes and storage.

Machinery rooms are not required where all of the following conditions are met:

1. The space containing the machinery is separated from other occupancies by tight construction with tight-fitting doors.
2. Access is restricted to authorized personnel.
3. The floor area per occupant is not less than 100 square feet (9.3 m²) where machinery is located on floor levels with exits more than 6.6 feet (2012 mm) above the ground. Where provided with egress directly to the outdoors or into approved building exits, the minimum floor area shall not apply.
4. Refrigerant detectors are installed as required for machinery rooms in accordance with Section 1105.3.
5. Surfaces having temperatures exceeding 800°F (427°C) and open flames are not present where any Group A2, B2, A3 or B3 refrigerant is used (see Section 1104.3.4).
6. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.
7. All refrigerant-containing parts in systems exceeding 100 horsepower (hp) (74.6 kW) drive power, except evaporators used for refrigeration or dehumidification; condensers used for heating; control and pressure relief valves for either; and connecting piping, shall be located either outdoors or in a machinery room.

Reason: The definition that is proposed for deletion only applies to Section 1104.2.2, and it makes more sense to incorporate the criteria of the definition into the section than to have them remotely located in Chapter 2. There is a related requirement in IBC Section 1006.2.3, and the IBC approach of incorporating the criteria into the code text vs. using a definition is the approach modeled by this proposal. From a technical perspective, this change eliminates the mentioning of brine solution as being the source of temperature control for application of IMC 1104.2.2. UBC 1006.2.3 mentions only evaporators as a source for temperature control, not brine, and this makes sense given that brine is simply a salt water solution and doesn't present a hazard that warrants any special controls from a code/safety perspective.

Cost Impact: Will not increase the cost of construction

The proposal is simply a clean up of code text and a correlation of the IMC to the IBC. It will not increase the cost of construction.
**M 123-15**

**1105.6.1.1 (New)**

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

### 2015 International Mechanical Code

Add new text as follows:

**1105.6.1.1 Indoor exhaust opening location.** Indoor mechanical exhaust intake openings shall be located where refrigerant leakage is likely to concentrate based on the refrigerant's relative density to air. Air current paths and machinery location shall be accounted for in locating such intake openings.

**Reason:** Although the code addresses openings when equipment is located outdoors, it is silent where dealing with exhaust duct opening locations inside the machinery room. This will be very helpful to inspectors providing guidance when they examine openings in the machinery room. Similar language can be found in ASHRAE-15.

**Cost Impact:** Will not increase the cost of construction

There will be no additional cost as this is only an editorial modification and clarification. This proposal contains no new requirements.
**2015 International Mechanical Code**

Revise as follows:

**1105.6.3 Ventilation rate.** For other than ammonia systems, the mechanical ventilation systems shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions, as required by Sections 1105.6.3.1 and 1105.6.3.2. The minimum required emergency ventilation rate for ammonia shall be 30 air changes per hour in accordance with IIAR2. Multiple fans or multispeed fans shall be allowed to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

*Reason:* Clarifies that the 30 air change per hour ventilation rate for ammonia is the emergency ventilation rate.

*Cost Impact:* Will not increase the cost of construction

The proposal is a clarification of the current requirements and will not affect the cost of construction.
2015 International Mechanical Code

Revise as follows:

1105.8 Ammonia discharge. Pressure relief valves for ammonia systems shall discharge in accordance with ASHRAE 15-IIAR 2.

Reason: IIAR 2-2014 was entirely rewritten, and the standard is now a stand-alone document that no longer relies on ASHRAE 15. During the rewrite process, ASHRAE 15 was reviewed, and provisions deemed appropriate for regulating ammonia were incorporated into the IIAR 2. That includes provisions for ammonia discharge. Therefore, the reference to ASHRAE 15 for ammonia refrigeration is no longer necessary.

Cost Impact: Will not increase the cost of construction
This proposal may reduce the cost of construction by simplifying the design/review process to only involve a single standard for ammonia refrigeration system installations.
2015 International Mechanical Code

Add new text as follows:

1107.9 Vibration Refrigerant piping and joints shall be designed and installed so as to prevent damaging vibration and stress.

**Reason:** This code change addresses an important element of the design and installation and needs to be part of the code. The code change is needed to address design and installation of refrigerant piping to avoid refrigerant piping vibration & stress problems. It is a requirement in the adopted standard of ASME B31.5

Section 501.5.4 “Piping shall be arranged and supported with consideration to vibration.” The Standard is lengthy the practice of isolating the refrigerant line for vibration is often overlooked.

The majority of Equipment Manufactureres Installation Instructions have for the last 4 years already required isolation of the refrigerant piping in their installation instructions to prevent vibration damage and for noise reduction.

Structural and acoustical resonances as well as forced vibration like Gas pulsation-driven vibration can cause various vibration problems that can result fatigue and broken refrigerant lines. Leaking refrigerant is not only a safety and health issue but an environment issue as well. The expense of leaked refrigerant is costly and an economic reason as well.

In a study by the Institute of Refrigeration in 2009, it listed Vibration as one of the most common causes associated with Refrigeration leakage. "Causes of vibration in discharge lines can be separated primarily into the following categories: one, Structural resonances; two, forced vibration; and three, acoustical resonances. Of the causes of vibration, structural resonances are the most common, followed by forced vibration and acoustical resonances. Multiple combinations of the three also can cause vibration."

"Gas pulsation-driven vibration is the most common cause of forced vibration. Pulsation-driven vibration does not mean that the compressor is emitting such high pulsations that it forces the line to vibrate regardless of the piping geometry. All reciprocating compressors emit discharge gas pulsations (a reciprocating compressor generates a constant stream of pulsating flow). When discharge gas pulsations react with the piping system geometry in such a way as to set up an oscillating force, discharge pipe vibration may occur. Condensations and refractions are clusters of various lengths of sound waves that catch up with each other within the piping system. This causes the amplitude of the sound level to increase, causing loud disturbing pulsating harmonic sounds. An example of this is when the discharge line comes off the compressor service valve and enters one, two, three or more elbows. Picture the pulsating discharge gas flowing from the compressor through the first straight section of discharge pipe. The discharge gas then hits the first elbow and bounces into the next section of straight pipe. An oscillation in the gas already has started and each elbow may increase the oscillation, creating a significant amount of line vibration. Designing the discharge piping as straight as possible will reduce the chances of pulsation- driven vibration occurring."

"April 2006 ~ RSES Journal Wes Taylor,"

**Cost Impact:** Will not increase the cost of construction

This will not increase cost as it has been part of the adopted standard for design and installation.
2015 International Mechanical Code

Revise as follows:

1107.2 Piping location. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7 feet 3 inches (2210 mm) above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has openings to living quarters or to means of egress. Refrigerant piping shall not be installed in an enclosed public stairway, exit stairway landing or means of egress, ramp or an exit passageway.

Reason: The current text prohibiting refrigerant piping from the means of egress essentially prohibits refrigerant piping from anywhere in a building because the means of egress, by definition, includes the exit access. It seems that the intent of this section is to prohibit the installation of refrigerant piping in a required exit enclosure, and the proposed text, which applies the text to exit stairs and ramps and exit passageways accomplishes that intent with clarity.

Cost Impact: Will not increase the cost of construction

The proposal should not impact the cost of construction, but might reduce the cost in cases where the location of refrigerant piping is overly restricted based on the existing text.
Proponent: Maureen Traxler, Seattle Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee (maureen.traxler@seattle.gov)

2015 International Mechanical Code

Revise as follows:

1107.2 Piping location. Refrigerant piping that crosses an open space that affords passageway in any building shall be not less than 7 feet 3 inches (2210 mm) above the floor unless the piping is located against the ceiling of such space. Refrigerant piping shall not be placed in any of the following:

1. a fire-resistance-rated exit access corridor.
2. an interior exit stairway.
3. an interior exit ramp.
4. an exit passageway.
5. an elevator, dumbwaiter or other shaft containing a moving object or in any shaft that has one or more openings into a dwelling unit or sleeping unit.
6. a shaft that has one or more openings into a fire-resistance-rated exit access corridor, interior exit stairway landing or ramp, or means of egress exit passageway.

Reason: The current code prohibits refrigerant piping in "means of egress" and in shafts with openings into "means of egress." The IBC definition is "A continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building or structure to a public way...." In other words, the means of egress includes all occupied spaces in a building, so prohibiting refrigerant piping in the means of egress means it's prohibited almost everywhere. Section 1107.2 is copied from ASHRAE 15 but this proposal gives it a reasonable interpretation that identifies specific locations where refrigerant piping is prohibited, and allows it to be installed in occupied buildings. This proposal is meant as an interpretation of the term "means of egress" as used in the ASHRAE language, without changing the intended meaning of the term.

Cost Impact: Will not increase the cost of construction
This proposal does not increase the cost of construction because it merely interprets an ambiguous term that is in the current code.
M 129-15
1107.9.1 (New)

Proponent: Howard Ahern, representing Airex Mfg. (howard@plumberex.com)

2015 International Mechanical Code

Add new text as follows:

1107.9.1 Exterior wall penetrations. Refrigerant piping penetrating an exterior wall shall be isolated and supported to prevent damaging vibration.

Reason: This code change is needed to create consistency for installation with this code and equipment manufactureres installation instructions for isolation of refrigerant piping to prevent vibration damage. Refrigerant piping must be isolated and supported to eliminate vibration transfer to the exterior wall specifically from the penetration of refrigerant piping. The majority of Equipment manufactureres installation instructions already require isolation of the refrigerant piping in their installation instructions to prevent vibration damage. Isolation of the piping is also need to prevent damage to the piping from contact with hard surfaces and to eliminate stress from vibration which can cause piping and joint fatigue that could lead to leaking refrigerant.

This code change also address the problem with refrigerant piping wall penetrations that are often are overlooked as a vibration path. Significant acoustic energy can pass through a small opening in a wall. The Exterior wall is most critical for its close proximity to the equipment and is the first wall of the building that is penetrated.

The code has already recognizes the problems associated with piping vibration as required in The IMC Section 1107.2.1 for concrete floors. The Exterior wall is often the closest to the equipment and the first wall of the building that is penetrated."

"The only sure way to cut off the path of objectionable vibration is with an isolation system. Vibration will take the path of least resistance." If the connected pipe is not isolated, then unwanted vibration may bleed through to the structure."

Complaints by building occupants are usually of either a high level of vibration that is disturbing or unacceptable noise from the piping or transmitted to the building. Depending on the sensitivity to vibration or vibration noise some building such as hospital, office building, and concert halls etc. noise reduction is critical. Classroom acoustics are very important (especially in early primary education) as studies show a link between learning and good room acoustics. Hotels, Dormitories, and Apartments all need to minimize unacceptable and disturbing noises due to Vibration."

"An isolation system is the best inexpensive insurance against unwanted vibration."

"Vibration isolator is defined as a resilient material placed between the equipment and the structure to create a low natural frequency support system for the equipment. Some common materials are elastomeric pads or mounts, helical steel springs, wire rope springs, and air springs". Retrofitting after complaints develop is often far more expensive than an original installation."

"Vibration Isolation By Robert Simmons, P.E., ASHRAE Journal 2009"

Cost Impact: Will not increase the cost of construction

This will not increase cost as design and installation of piping to account for vibration has been part of the adopted standard for design and installation.
**2015 International Mechanical Code**

Revise as follows:

1107.5.2 Copper and brass copper-alloy pipe. Standard iron-pipe size, copper and red brass (copper-alloy (not less than 80-percent copper)) pipe shall conform to ASTM B 42 and ASTM B 43.

**Reason:** The proposal removes brass because brass is a copper alloy.

**Cost Impact:** Will not increase the cost of construction

This proposal is updating the name of the materials used in the field and will not impact the cost of construction.
1107.5.3 COPPER TUBE

Copper tube used for refrigerant piping erected on the premises shall be seamless copper tube of Type ACR (hard or annealed) complying with ASTM B 280 and ASTM B819. Where approved, copper tube for refrigerant piping erected on the premises shall be seamless copper tube of Type K, L or M (drawn or annealed) in accordance with ASTM B 88. Annealed temper copper tube shall not be used in sizes larger than a 2-inch (51 mm) nominal size. Mechanical joints shall not be used on annealed temper copper tube in sizes larger than \( \frac{7}{8} \) inch (22.2 mm) OD size.

ADDITIONAL STANDARDS

Add new standard(s) as follows:

**ASTM B819−00 (R2011) Standard Specification for Seamless Copper Tube for Medical Gas Systems**

**Reason:** Registered design professionals would like to be able to specify ASTM B819 tube in type K wall thickness for use in systems utilizing 410A refrigerant. The pressure/temperature rating of ASTM B280 tube is not high enough in some cases and sizes to accommodate the increased pressures exhibited by the saturation pressure of 410A refrigerant at some of the temperatures.

With respect to material, the internal cleanliness requirements ASTM B280 and B819 are fundamentally equal. They both are required to meet strict internal cleanliness and allowable particulate requirements as part of their respective ASTM standards. The difference between the two is that ASTM B280 tube is manufactured in one size ACR (type L) measured by actual outside diameter and ASTM B819 tubes types K and L tube are measured by actual outside diameter plus 1/8-inch, making it larger than the standard size designation. Type K and L, are only available in hard temper. And ASTM B819 tube is identified as OXY/ACR, ACR/MED with either green or blue ink stripes to identify type K or type L wall thickness.

**Cost Impact:** Will not increase the cost of construction

The proposed change will not increase the cost of construction, as it is adding a standard that is used in refrigeration systems..

**Analysis:** A review of the standard proposed for inclusion in the code, ASTM B819, 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 April 2, 2015.
2015 International Mechanical Code

Revise as follows:

1107.5.3 Copper tube. Copper tube used for refrigerant piping erected on the premises shall be seamless copper tube of Type ACR (hard or annealed) complying with ASTM B 280. Where approved, copper tube for refrigerant piping erected on the premises shall be seamless copper tube of Type K, L or M (drawn or annealed) in accordance with ASTM B 819. Annealed temper copper tube shall not be used in sizes larger than a 2-inch (51 mm) nominal size. Mechanical joints shall not be used on annealed temper copper tube in sizes larger than 7/8-inch (22.2 mm) OD size.

Add new standard(s) as follows:
ASTM B819-00 (R2011) Standard Specification for Seamless Copper Tube for Medical Gas Systems

Reason: I am deleting the where approved sentence, because it is confusing and may cause issues for the refrigeration system. ASTM B88 tube is not cleaned or capped by the manufacture and it would not be specified by a registered design professional. It would only be used as a repair or quick fix and not inspected.

Cost Impact: Will not increase the cost of construction
This proposal is adding a standard that is used in the field and will have no impact on the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM B819, 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 April 2, 2015.
2015 International Mechanical Code

Revise as follows:

1107.5.3 Copper tube. Copper tube used for refrigerant piping erected on the premises shall be seamless copper tube of Type ACR (hard or annealed) complying with ASTM B 280. Where approved, copper tube for refrigerant piping erected on the premises shall be seamless copper tube of Type K, L or M (drawn or annealed) in accordance with ASTM B 88. Annealed temper copper tube shall not be used in sizes larger than a 2-inch (51 mm) nominal size. Mechanical joints, other than press-connect joints, shall not be used on annealed temper copper tube in sizes larger than 7/8-inch (22.2 mm) OD size.

Reason: Press-connect joints and fittings specifically manufactured for refrigerant pipe and tube connections (including soft annealed copper) have been tested by Underwriters Laboratories (UL) on sizes larger than 7/8" to meet UL 207, already referenced in the IMC. This technology is listed by both ICC ES PMG and UL to meet the requirements of the International Mechanical Code and the Uniform Mechanical Code. The term was changed to match the terminology used in the industry and the ASTM standard from press joint to press-connect joint. A proposal to edit the definition to match this term has also been proposed to the IMC.

Cost Impact: Will not increase the cost of construction
This new technology has great potential to save construction costs by drastically reducing labor costs as well as potential damage caused by typical brazing and soldering flames.
Add new text as follows:

1201.4 Installation. Hydronic heating systems shall comply with the requirements of CSA B214.

Add new standard(s) as follows:

Reason: CSA B214-12 contains additional requirements and information regarding the installation of the systems that are not covered within the IMC such as Oxygen Permeation for closed systems, additives added to the water, labels and tags for identifying those additives, and prevention of stagnation which can lead to Legionella bacteria exposure.

Cost Impact: Will not increase the cost of construction
Will not increase the cost of construction since this document is only for additional installation guidance not currently covered under Chapter 12 of the IMC.

Analysis: A review of the standard proposed for inclusion in the code, CSA B214, 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 April 2, 2015.
**M 135-15**

Table 1202.4, Table 1210.4

**Proponent:** Mike Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

2015 International Mechanical Code

Revise as follows:

**TABLE 1202.4**

**HYDRONIC PIPE**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-linked polyethylene (PEX) tubing</td>
<td>ASTM F 876; ASTM F 877</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

**TABLE 1210.4**

**GROUND-SOURCE LOOP PIPE**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-linked polyethylene (PEX)</td>
<td>ASTM F 876; ASTM F 877; CSA B137.5</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

**Reason:** ASTM F877 has been revised a few years ago to remove the redundant pipe/tubing dimensional and performance specifications which are otherwise specified in ASTM F876. F877 remains a PEX fitting and PEX system materials and performance standard exclusive for use with ASTM F876 piping/tubing.

**Cost Impact:** Will not increase the cost of construction

This proposal simply deletes a standard that is no longer pipe or tubing related from the code. The piping material is now covered by a different standard, and as such, the option is not deleting or adding a material. Thus the code with this proposal added will not cause the cost of construction to increase. ASTM F877 is already in the code.
M 136-15
Table 1202.4, Table 1210.4, Chapter 15

Proponent: Larry Gill, representing IPEX USA LLC (larry.gill@ipexna.com)

2015 International Mechanical Code

Revise as follows:

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM F 2623; ASTM F 2769; CSA B137.18</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM F 2623; ASTM F 2769; CSA B137.18</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

Add new standard(s) as follows:
CSA B137.18 - 13 Polyethylene of raised temperature resistance (PE-RT) tubing systems for pressure applications.

Reason: CSA B137.18 - Polyethylene of raised temperature resistance (PE-RT) tubing systems for pressure applications is a new consensus standard for tubing and fittings. The scope of the standard includes ground source geothermal systems and hydronic heating systems. ASTM F2769 is a standard for PE-RT systems which is currently referenced in the IMC for other applications and can be used for ground source loop pipe and hydronic pipe.

Cost Impact: Will not increase the cost of construction
This change is to simply add reference to a new standard to the Code. There is no cost impact in adding the new standard. This change just permits an option to meet a different standard then the current reference standards.

Analysis: A review of the standard proposed for inclusion in the code, CSA B137.18, 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 April 2, 2015.
**Proponent:** William Chapin, Professional Code Consulting, LLC, representing Professional Code Consulting, LLC (bill@profcc.us)

2015 International Mechanical Code

**Revised as follows:**

**TABLE 1202.5**

**HYDRONIC PIPE FITTINGS**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper and copper alloys</td>
<td>ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.26; ASTM F 1974; ASTM B16.24; ASME B16.51; ASSE 1061</td>
</tr>
<tr>
<td>Ductile iron and gray iron</td>
<td>ANSI/AWWA C110/A21.10; AWWA C153/A21.53; ASTM A 395; ASTM A 536; ASTM F 1476; ASTM F 1548</td>
</tr>
<tr>
<td>Ductile iron</td>
<td>ANSI/AWWA C153/A21.53</td>
</tr>
<tr>
<td>Gray iron</td>
<td>ASTM A 126</td>
</tr>
<tr>
<td>Malleable iron</td>
<td>ASME B16.3</td>
</tr>
<tr>
<td>PE-RT fittings</td>
<td>ASTM F 1807; ASTM F 2098; ASTM F 2159; ASTM F 2735; ASTM F 2769; ASSE 1061</td>
</tr>
<tr>
<td>PEX fittings</td>
<td>ASTM F 877; ASTM F 1807; ASTM F 2159; ASSE 1061</td>
</tr>
<tr>
<td>Plastic</td>
<td>ASTM D 2466; ASTM D 2467; ASTM F 438; ASTM F 439; ASTM F 877; ASTM F 2389; ASTM F 2735</td>
</tr>
<tr>
<td>Steel</td>
<td>ASME B16.5; ASME B16.9; ASME B16.11; ASME B16.28; ASTM A 53; ASTM A 106; ASTM A 234; ASTM A 420; ASTM A 536; ASTM A 395; ASTM F 1476; ASTM F 1548</td>
</tr>
</tbody>
</table>

**Add new standard(s) as follows:**

ASSE 1061-2011 Performance Requirements for Push Fit Fittings.

**Reason:** ASSE 1061 Performance Requirements for Push Fit Fittings was originally published in 2006 and referenced in the 2009 IPC. These fittings have been used in the industry for over 15 years.
Cost Impact: Will not increase the cost of construction
Proposal addresses fittings and methods already used in the industry.

Analysis: A review of the standard proposed for inclusion in the code, ASSE-1061, 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 April 2, 2015.
### M 138-15

**Table 1202.5, Table 1210.5, Chapter 15**

**Proponent:** Larry Gill, representing IPEX USA LLC (larry.gill@ipexna.com)

2015 International Mechanical Code

Revise as follows:

#### TABLE 1202.5

**HYDRONIC PIPE FITTINGS**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE-RT fittings</td>
<td>ASTM F 1807; ASTM F 2098; ASTM F 2159; ASTM F 2735; ASTM F 2769; ASTM D3261; CSA B137.18; CSA B137.1</td>
</tr>
</tbody>
</table>

(Portions of table not shown remain unchanged)

#### TABLE 1210.5

**GROUND-SOURCE LOOP PIPE FITTINGS**

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM D 3261; ASTM F 1807; ASTM F 2159; CSA B137.1; ASTM F2098; ASTM F2735; ASTM F2769; CSA B137.18</td>
</tr>
</tbody>
</table>
Add new standard(s) as follows:
CSA B137.18 - 13 Polyethylene of raised temperature resistance (PE-RT) tubing systems for pressure applications.

**Reason:** CSA B137.18 - Polyethylene of raised temperature resistance (PE-RT) tubing systems for pressure applications is a new consensus standard for tubing and fittings is being added to Tables 1202.5 and 1210.5. The scope includes fittings for these applications. CSA B137.1 and ASTM D3261 are being added to Table 1202.5 and are already included in other tables in the IMC and can be used for this application as well. ASTM F2098, ASTM F2735, and ASTM F2769 are being added to Table 1210.5 and are already referenced in the IMC for PERT fittings for other applications and can be used for this application as well.

**Cost Impact:** Will not increase the cost of construction
This proposal simply adds an alternative standard for fittings. The actual fittings are similar or the same as the current standards for fittings. No impact on cost.

**Analysis:** A review of the standard proposed for inclusion in the code, CSA B137.18, 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 April 2, 2015.
**M 139-15**

**Table 1202.5**

**Proponent:** Gary Morgan, Viega LLC, representing Viega LLC (gary.morgan@viega.us)

**2015 International Mechanical Code**

Revise as follows:

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEX fittings</td>
<td>ASTM F 877; ASTM F 1807; ASTM F 2159; <strong>ASTM F1960</strong>; ASTM F2080</td>
</tr>
</tbody>
</table>

*(Portions of table not shown remain unchanged)*

**Reason:** Added two additional commonly used PEX fitting standards, F1960 and F2080, to the Table 1202.5. This has clearly been a long-standing oversight.

**Cost Impact:** Will not increase the cost of construction

Addition of two more fitting standards to this table has absolutely no impact on the cost of construction.
Proponent: Tim Earl, GBH International, representing The Oatey Company (tearl@gbhinternational.com)

2015 International Mechanical Code
Revise as follows:

1203.3.3 Soldered joints. Joint surfaces shall be cleaned. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32. The base material for tinning fluxes, excluding the tinning powder, shall meet the criteria of ASTM B 813.

Reason: Tinning fluxes have been shown in several studies to create a stronger and more consistently water-tight connection when using low-lead fittings. This means less rework on the job site and less likelihood of joint failure. With the federal mandate of low-lead in 2014, this has become a significant issue and the codes need to reflect this need. We are pursuing changes to the referenced ASTM standard as well, however these will not be completed in time for this code cycle and we feel that it is important to make this change as it has the potential to save money related to rework and repair. Once the standard is altered, we would support removing the language being proposed.

Cost Impact: Will not increase the cost of construction
Will not increase cost, as it simply adds another option.
2015 International Mechanical Code

Revise as follows:

1203.3.3 Soldered joints. Joint surfaces shall be cleaned and made in accordance with ASTM B828. Cut tube ends shall be reamed to the full inside diameter of the tube end. A flux conforming to ASTM B 813 shall be applied. The joint shall be soldered with a solder conforming to ASTM B 32.

Add new standard(s) as follows:
ASTM B828 Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

Reason: This change creates consistency between the IMC and the IPC. The proposed language is identical to that in IPC 605.13.3. As often mechanical and plumbing contractors can be one and the same, this creates uniform practice in the industry.

Cost Impact: Will not increase the cost of construction
This proposal simply clarifies surface preparation, which will not increase cost.

Analysis: A review of the standard proposed for inclusion in the code, ASTM B828, 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 April 2, 2015.
1203.3.4 Solvent-cemented joints. Joint surfaces shall be clean and free of moisture. An approved primer shall be applied to CPVC and PVC pipe-joint surfaces. Joints shall be made while the cement is wet. Solvent cement conforming to the following standards shall be applied to all joint surfaces:

1. ASTM D 2235 for ABS joints.
2. ASTM F 493 for CPVC joints.
3. ASTM D 2564 for PVC joints.

CPVC joints shall be made in accordance with ASTM D 2846.

**Exception:**

1. For CPVC pipe joint connections, a primer is not required where all of the following conditions apply:
   1.1. The solvent cement used is third-party certified as conforming to ASTM F 493.
   1.2. The solvent cement is yellow in color.
   1.3. The solvent cement is used only for joining 1/2-inch (12.7 mm) through 2-inch (51 mm) diameter CPVC pipe and fittings.
   1.4. The CPVC pipe and fittings are manufactured in accordance with ASTM D 2846.
2. A primer is not required where the manufacturer's instructions for the solvent cement do not require the application of a primer for that application.

**Reason:** The marketplace has already begun using these fast setting orange CPVC cements as a one-step application where local inspectors allow. This simply meets a market condition and gives broader authority for these applications to occur. A work item is being created in ASTM to create a standard practice for this, but is at least this code cycle away from being completed. Once that is complete we would support removing this from the code should it be allowed. However, in the interim we again ask that the practice be allowed to help meet market demand. This would also be consistent with language in the IRC (P2906.9.1.2) and a similar proposal as this in the IPC.

**Cost Impact:** Will not increase the cost of construction
Will not impact cost as this proposal would simply allow another option for CPVC cement.
2015 International Mechanical Code

Add new text as follows:

1203.8.1 Pre-heat treatment. The area of the tube that will receive the formed tee branch opening shall be annealed prior to forming the tee branch opening where any of the following apply:

1. The tube size is greater than 2 inches.
2. The tee branch opening size is the same size as the tube in which such opening is formed.
3. The manufacturer of the tee branch forming equipment specifies that the tube be annealed.

Reason: Full size outlets and large bore tubing must be annealed before it undergoes extrusion. Annealing copper tubing prior to forming a tee outlet is standard procedure in the field, but like any good practice, it is not always followed. Annealing the tubing increases ductility and formability. The process of annealing allows the tube to undergo deformation without fracture. The result is a sound joint.

Bibliography:
http://www.copper.org/applications/plumbing/cth/extruded-outlets/cth_14mech_install.html
http://www.t-drill.com/prodthe area of the tube to be utilized for forming a tee outlet shall be annealed prior to forming the tee outlet uct.asp?su=2l=9&s=5<nav=5002006
http://www.t-drill.com
See page 61

Cost Impact: Will increase the cost of construction
The practice of annealing tubing prior to forming a tee outlet is supposed to be standard procedure in the field, but like many requirements, it is not always followed. Annealing the tubing increases ductility and workability, and the result is a better joint. Since annealing of full size branches and tubing larger than 2" are manufacturer's requirements, it will not impact cost. By adding the language to the code, it will, however, help to ensure that the joints are properly made. Short cuts will be avoided.
M 144-15
1203.5, 1203.6

Proponent: Pennie L Feehan, Copper Development Association, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code
Delete without substitution:

1203.5 Brass pipe. Joints between brass pipe or fittings shall be brazed, mechanical, threaded or welded joints conforming to Section 1203.3.

1203.6 Brass tubing. Joints between brass tubing or fittings shall be brazed, mechanical or soldered joints conforming to Section 1203.3.

Reason: Brass is a copper alloy and is covered by section 1203.7 & 1203.8

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction as this change is to remove language covered in section 1203.7 & 1203.8.
2015 International Mechanical Code

Revise as follows:

SECTION 202 DEFINITIONS

PRESS-CONNECT JOINT. No change to text.

1203.8 Copper or copper-alloy tubing. Joints between copper or copper-alloy tubing or fittings shall be brazed, mechanical or soldered joints conforming to Section 1203.3, flared joints conforming to Section 1203.8.1, push-fit joints conforming to Section 1203.8.2 or press-type press-connect type joints conforming to Section 1203.8.3.

1203.8.3 Press-connect joints. Press-connect joints shall be installed in accordance with the manufacturer's instructions.

Reason: Harmonize the designation and definition of PRESS-CONNECT fittings and joints throughout the code. Both referenced standards (ANSI LC-4/CSA 6.32 and ASME B16.51) listed in the code use the designation "press-connect" in the title and body of the standard as well as code sections IPC 605.14.5, IRC P2906.18 and IRC G2414.10.2.

Cost Impact: Will not increase the cost of construction
Change is simply for clarity of what is already included.
M 146-15
1206.12 (New)

Proponent: Timothy Manz, representing Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

2015 International Mechanical Code
Add new text as follows:

1206.12 Prohibited tee applications. Fluid in the supply side of a hydronic system shall not enter a tee fitting through the branch opening. Fluid from two returns shall not enter on the run of the same tee.

Reason: This language prohibits bullhead tees, which should not be used in hydronic systems as they create noise and turbulence and also waste circulator head.

Cost Impact: Will not increase the cost of construction
This new provision will not increase the cost of construction because it is a basic design consideration that can be easily incorporated into the layout of the piping system.
Proponent: Timothy Manz, representing Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

2015 International Mechanical Code

Add new text as follows:

1206.12 Mixing of radiation. Except where part of an engineered design, radiation elements having different rates of heat transfer shall not be intermixed in the same heating zone.

Reason: Using different types of radiation in the same heating zone results in poorly operating systems and wastes energy.

Cost Impact: Will not increase the cost of construction
This provision will not increase the cost of the installation if the appropriate types of radiation are used in each heating zone in accordance with commonly-accepted design practices.
2015 International Mechanical Code

Add new text as follows:

**1206.13 Draining and venting.** Hydronic piping shall be installed so that the pipes can be drained and so that air can be completely removed from the system during filling.

**Reason:** It is a basic fundamental of piping design to provide for draining and venting of hydronic systems, so it should be a minimum code requirement.

**Cost Impact:** Will increase the cost of construction
This provision will slightly increase the cost of installation, but it is well worth the minimal cost to have a system that can be drained and allow for the air to be completely removed during filling.
M 149-15
1207.3 (New)

**Proponent:** Timothy Manz, representing Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

2015 International Mechanical Code

Add new text as follows:

1207.3 **Freeze protection.**

Where hydronic piping systems are subject to freezing temperatures, the transfer fluid in such systems shall be protected from freezing by means of antifreeze solutions.

**Reason:** This requirement is a necessity in a cold climate like Minnesota to prevent damage that can occur as a result of freezing piping and components of the hydronic system when not adequately protected.

**Cost Impact:** Will increase the cost of construction

Even though this provision will increase the cost of construction in northern climates, the cost to incorporate antifreeze into the design of the hydronic system is minimal compared to the damage that can occur if not protected in freezing conditions.
M 150-15
1208.1

Proponent: Mike Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservnet.com)

2015 International Mechanical Code

Revise as follows:

1208.1 General. Hydronic piping systems shall be tested hydrostatically at one and one-half times the maximum system design pressure, but not less than 100 psi (689 kPa). The duration of each test shall be not less than 15 minutes.

Exception: For plastic piping systems, testing with a compressed gas shall be an alternative to hydrostatic testing where compressed air or other gas pressure testing is specifically authorized by all of the manufacturer's instructions for the plastic pipe and fitting products installed at the time the system is being tested, and compressed air or other gas testing is not otherwise prohibited by applicable codes, laws or regulations outside of this code.

Reason: PPFA has a new air testing policy, which allows for some limited air testing of plastic piping systems, if a number of conditions are met.

Compressed air or any other compressed gases should not be used for pressure testing plastic plumbing systems.

EXCEPTIONS:
1.) With trap seal pull testing, where a completed DWV system is vacuum tested with all of its traps filled with water, and the trap seals are tested with a vacuum typically between one and two inches of water column.
2.) For plastic piping systems specifically designed for use with compressed air or gasses;

- Manufacturers’ instructions must be strictly followed for installation, visual inspection, testing and use of the systems,
  (and)
- Compressed air or other gas testing is not prohibited by the authority having jurisdiction (AHJ).
3.) When compressed air or other gas pressure testing is specifically authorized by the applicable written instructions of the manufacturers of all plastic pipe and plastic pipe fittings products installed at the time the system is being tested and compressed air or other gas testing is not prohibited by the authority having jurisdiction (AHJ).

The manufacturer should be contacted if there is any doubt as to how a specific system should be tested.

Cost Impact: Will not increase the cost of construction
This proposal simply adds another option for air testing some specific piping materials into the code and as such, the option is not requiring that this method be chosen. Thus the code with this proposal added will not cause the cost of construction to increase.
Proponent: Gary Morgan, Viega LLC, representing Viega LLC (gary.morgan@viega.us)

2015 International Mechanical Code
Revise as follows:

1208.1 General. Hydronic system piping systems shall be tested hydrostatically with either water or, for piping systems other than plastic, by air at one and one-half times the maximum system design pressure, but not less than 100 psi (689 kPa). The duration of each test shall be not less than 15 minutes.

Exception: For plastic piping systems, testing with a compressed gas shall be an alternative to hydrostatic testing where compressed air or other gas pressure testing is specifically authorized by all of the manufacturer's instructions for the plastic pipe and fittings products installed at the time the system is being tested, and compressed air or other gas testing is not otherwise prohibited by applicable codes, laws, or regulations outside of this code.

Reason: PPFA (Plastic Pipe and Fittings Association) has a new air testing policy which allows for some limited air testing of plastic piping systems if certain conditions are met. The vast majority of plastic pipe used in hydronic applications pose no more of a safety concern than does air testing of metallic piping systems. The proposed language is also consistent with new language being proposed by PPFA in the IPC and IRC-P.

Cost Impact: Will not increase the cost of construction
If anything, allowance of air testing vs. hydrostatic testing will save time and expense typically.
2015 International Mechanical Code

Revise as follows:

SECTION 1209
EMBEDDED PIPING

1209.1 **Materials.** *No change to text.*

1209.2 **Pressurizing during installation.** *No change to text.*

1209.3 **Embedded joints.** Joints of pipe or tubing that are embedded in a portion of the building, such as concrete or plaster, shall be in accordance with the requirements of Sections 1209.3.1 through 1209.3.5.

1209.3.1 **Steel pipe joints.** *No change to text.*

1209.3.2 **Copper tubing joints.** *No change to text.*

1209.3.3 **Polybutylene joints.** *No change to text.*

1209.3.4 **Polyethylene of raised temperature (PE-RT) joints.** PE-RT tubing shall be installed in continuous lengths or shall be joined by hydronic fittings listed in Table 1202.5.

1209.3.5 **Cross-linked polyethylene (PEX) joints.** PEX tubing shall be installed in continuous lengths or shall be joined by hydronic fittings listed in Table 1202.5.

**Reason:** Addition of the PEX joints section is necessary to be consistent with the previous sections and to be consistent with the allowances given in the PE-RT joints section, 1209.3.4.

**Cost Impact:** Will not increase the cost of construction
This addition has no impact whatsoever on the cost of construction.
2015 International Mechanical Code

Revise as follows:

1209.5 Thermal barrier required. Radiant floor heating systems shall be provided with a thermal barrier in accordance with Sections 1209.5.1 through 1209.5.4 and 1209.5.2. Insulation R-values for slab-on-grade and suspended floor installation shall be in accordance with the International Energy Conservation Code.

Exception: Insulation shall not be required in engineered systems where it can be demonstrated that the insulation will decrease the efficiency or have a negative effect on the installation.

Delete without substitution:

1209.5.1 Slab-on-grade installation. Radiant piping utilized in slab-on-grade applications shall be provided with insulating materials installed beneath the piping having a minimum $R$-value of 5.

1209.5.2 Suspended floor installation. In suspended floor applications, insulation shall be installed in the joist bay cavity serving the heating space above and shall consist of materials having a minimum $R$-value of 11.

Reason: Insulation R-values should be located in the IECC, not the IMC. A search shows these are the only R-values specified in the IMC. Design professionals, code officials, contractors, developers, virtually all involved in the building process look to the IECC for specific thermal performance values. Locating these two sub-sections in the IMC has created considerable confusion. A similar proposal will be submitted in Group B, to add these sub-sections into the IECC where they belong.

Cost Impact: Will not increase the cost of construction

This proposal will not increase the cost of construction as it is the first step in re-locating an existing insulation requirement from the IMC to the IECC. There is no increase in the $R$-value of the insulation or the installation labor.
**Proponent:** Jeremy Brown, representing NSF International

### 2015 International Mechanical Code

Revise as follows:

#### TABLE 1210.4
GROUND-SOURCE LOOP PIPE

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated polyvinyl chloride (CPVC)</td>
<td>ASTM D 2846; ASTM F 441; ASTM F 442</td>
</tr>
<tr>
<td>Cross-linked polyethylene (PEX)</td>
<td>ASTM F 876; ASTM F 877; CSA B137.5</td>
</tr>
<tr>
<td>Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe</td>
<td>ASTM F 1282; CSA B137.9</td>
</tr>
<tr>
<td>High-density polyethylene (HDPE)</td>
<td>ASTM D 2737; ASTM D 3035; ASTM F 714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1</td>
</tr>
<tr>
<td>Polypropylene (PP-R)</td>
<td>ASTM F 2389; CSA B137.11; NSF 358-2</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>ASTM D 1785; ASTM D 2241</td>
</tr>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM F 2623</td>
</tr>
</tbody>
</table>

#### TABLE 1210.5
GROUND-SOURCE LOOP PIPE FITTINGS

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated polyvinyl chloride (CPVC)</td>
<td>ASTM D 2846; ASTM F 437; ASTM F 438; ASTM F 439; CSA B137.6</td>
</tr>
<tr>
<td>Cross-linked polyethylene (PEX)</td>
<td>ASTM F 877; ASTM F 1807; ASTM F 1960; ASTM F 2080; ASTM F 2159; ASTM F 2434; CSA B137.5</td>
</tr>
<tr>
<td>Polyethylene/aluminum/polyethylene (PE-AL-PE)</td>
<td>ASTM F 1282; ASTM F 2434; CSA B137.9</td>
</tr>
<tr>
<td>High Density Polyethylene (HDPE)</td>
<td>ASTM D 2683; ASTM D 3261; ASTM F 1055; CSA B137.1; CSA C448; NSF 358-1</td>
</tr>
<tr>
<td>Polypropylene (PP-R)</td>
<td>ASTM F 2389; CSA B137.11; NSF 358-2</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>ASTM D 2464; ASTM D 2466; ASTM D 2467; CSA B137.2; CSA B137.3</td>
</tr>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM D 3261; ASTM F 1807; ASTM F 2159; CSA B137.1</td>
</tr>
</tbody>
</table>

Add new standard(s) as follows:

NSF 358-2-2012 Polypropylene Pipe & fittings for water-based ground-source "geothermal" heat pump systems
**Reason:** NSF 358-2 Polypropylene Pipe & fittings for water-based ground-source "geothermal" heat pump systems is the American National standard and should be included in these tables. This standard has requirements for material suitability, performance, chemical resistance long term strength and quality assurance requirements related to geothermal products. A copy of this standard will be provided to the committee and may be obtained by anyone else by emailing brown@nsf.org.

**Cost Impact:** Will not increase the cost of construction
Providing an additional option will not increase the cost of construction.

**Analysis:** A review of the standard proposed for inclusion in the code, NSF 358-2, 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 April 2, 2015.
Table 1210.4, Table 1210.5, CHAPTER 15

Proponent: Jeremy Brown, representing NSF International

2015 International Mechanical Code
Revise as follows:

### TABLE 1210.4
GROUND-SOURCE LOOP PIPE

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated polyvinyl chloride (CPVC)</td>
<td>ASTM D 2846; ASTM F 441; ASTM F 442</td>
</tr>
<tr>
<td>Cross-linked polyethylene (PEX)</td>
<td>ASTM F 876; ASTM F 877; CSA B137.5; NSF 358-3</td>
</tr>
<tr>
<td>Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe</td>
<td>ASTM F 1282; CSA B137.9</td>
</tr>
<tr>
<td>High-density polyethylene (HDPE)</td>
<td>ASTM D 2737; ASTM D 3035; ASTM F 714; AWWA C901; CSA B137.1; CSA C448; NSF 358-1</td>
</tr>
<tr>
<td>Polypropylene (PP-R)</td>
<td>ASTM F 2389; CSA B137.11</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>ASTM D 1785; ASTM D 2241</td>
</tr>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM F 2623</td>
</tr>
</tbody>
</table>

### TABLE 1210.5
GROUND-SOURCE LOOP PIPE FITTINGS

<table>
<thead>
<tr>
<th>PIPE MATERIAL</th>
<th>STANDARD (see Chapter 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorinated polyvinyl chloride (CPVC)</td>
<td>ASTM D 2846; ASTM F 437; ASTM F 438; ASTM F 439; CSA B137.6</td>
</tr>
<tr>
<td>Cross-linked polyethylene (PEX)</td>
<td>ASTM F 877; ASTM F 1807; ASTM F 1960; ASTM F 2080; ASTM F 2159; ASTM F 2434; CSA B137.5; NSF 358-3</td>
</tr>
<tr>
<td>Polyethylene/aluminum/polyethylene (PE-AL-PE)</td>
<td>ASTM F 1282; ASTM F 2434; CSA B137.9</td>
</tr>
<tr>
<td>High Density Polyethylene (HDPE)</td>
<td>ASTM D 2683; ASTM D 3261; ASTM F 1055; CSA B137.1; CSA C448; NSF 358-1</td>
</tr>
<tr>
<td>Polypropylene (PP-R)</td>
<td>ASTM F 2389; CSA B137.11</td>
</tr>
<tr>
<td>Polyvinyl chloride (PVC)</td>
<td>ASTM D 2464; ASTM D 2466; ASTM D 2467; CSA B137.2; CSA B137.3</td>
</tr>
<tr>
<td>Raised temperature polyethylene (PE-RT)</td>
<td>ASTM D 3261; ASTM F 1807; ASTM F 2159; CSA B137.1</td>
</tr>
</tbody>
</table>

Add new standard(s) as follows:

NSF 358-3 Cross-linked Polyethylene (PEX) Pipe and Fittings for Water-Based Ground-Source (Geothermal) Heat Pump
Reason: NSF 358-3 Cross-linked Polyethylene (PEX) Pipe and Fittings for Water-Based Ground-Source (Geothermal) Heat Pump Systems is currently under development as of the submittal deadline. This will be the American National Standard for PEX system components used in geothermal systems and when completed should be referenced in this table. This standard will have geothermal specific requirements above and beyond the ASTM standards for PEX. This standard is expected to be completed in 2015. A draft may be obtained from Jeremy Brown at brown@nsf.org.

Cost Impact: Will not increase the cost of construction
Adding another option for standards will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, NSF 358-3, 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 April 2, 2015.
M 156-15
1302.7, CHAPTER 15

Proponent: Jeanne Murck, Core Engineered Solutions, Inc., representing Core Engineered Solutions, Inc. (jmurck@core-es.com)

2015 International Mechanical Code
Delete and substitute as follows:

1302.7 Pumps. Pumps that are not part of an appliance shall be of a positive-displacement type. The pump shall automatically shut off the supply when not in operation. Pumps shall be listed and labeled in accordance with UL 343.

1302.7 Pumps Pumps that are not part of an appliance shall automatically shut off the supply when not in operation. Pumps shall be listed and labeled for use with combustible liquids in accordance with UL 343 or UL 79.

Add new standard(s) as follows:
UL 79-2005 Standard for Safety for Power-Operated Pumps for Petroleum Dispensing Products

Reason: UL 79 is titled Power-Operated Pumps for Petroleum Dispensing Products and is more often used for fuel oil applications due to the increased use of aboveground fuel storage tanks and tanks installed in locations remote for the fuel oil generator. UL 79 pumps are approved for use with flammable and combustible liquids and is a safety listing that meets and exceeds the UL 343 currently in the text. UL 79 pumps are also not necessarily positive displacement (they can be submerged /centrifugal pumps) that is why positive displacement pump requirement needs to be removed from that section.

UL 343 pumps are generally small and may not have the pumping capacity required for applications requiring greater flow and tank locations. UL 79 and the ability of the AHJ to accept an alternate listing in the last section of the sentence allows for greater flexibility and fuel flow capabilities.

Cost Impact: Will not increase the cost of construction
There is no cost impact for this change. UL 79 pumps and UL 343 pumps are very similar in cost.

Analysis: A review of the standard proposed for inclusion in the code, UL 79, 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 April 2, 2015.
Proponent: Pennie L Feehan, Copper Development Association, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code

Revise as follows:

1303.1.1 Joints between different piping materials. Joints between different piping materials shall be made with approved adapter fittings. Joints between different metallic piping materials shall be made with approved dielectric fittings or brass copper-alloy converter fittings.

Reason: The proposal removes brass because brass is a copper-alloy and copper-alloy is the term used to identify materials manufactured where copper is the base metal and includes brass and bronze.

Cost Impact: Will not increase the cost of construction
This proposal will not impact the cost of construction, as the change is only to update the name of the material.
PropONENT: Pennie L Feehan, Copper Development Association, representing Copper Development Association (penniefeehan@me.com)

2015 International Mechanical Code
Delete without substitution:

1303.4 Brass pipe. Joints between brass pipe or fittings shall be brazed, mechanical, threaded or welded joints complying with Section 1303.3.

1303.5 Brass tubing. Joints between brass tubing or fittings shall be brazed or mechanical joints complying with Section 1303.3.

Reason: The proposal removes brass section because brass is a copper-alloy and copper-alloy is used to identify materials manufactured where copper is the base metal including brass and bronze. The brass sections are not necessary because the joining types are the same in the copper and copper-alloy pipe and tubing sections.

Cost Impact: Will not increase the cost of construction
This proposal will not impact the cost of construction as it is updating the name of the material.
2015 International Mechanical Code

Revise as follows:

1402.4 Roof-mounted collectors. Roof-mounted solar collectors that also serve as a roof covering shall conform to the requirements for roof coverings in accordance with the International Building Code.

   **Exception:** The use of plastic solar collector covers shall be limited to those approved light transmitting plastics meeting the requirements for plastic roof panels in Section 2609 of the International Building Code.

1402.4.1 Collectors mounted above the roof.
Where mounted on or above the roof covering, the collector array and supporting construction shall be constructed of noncombustible materials or fire-retardant-treated wood conforming to the International Building Code to the extent required for the type of roof construction of the building to which the collectors are accessory.

   **Exception:** The use of plastic solar collector covers shall be limited to those approved light transmitting plastics meeting the requirements for plastic roof panels in Section 2609 of the International Building Code.

**Reason:** Plastic roof panels are regulated by section 2609 of the IBC and that section addresses "light transmitting plastic" roof panels. As light transmitting materials the plastics need to meet section 2606 of the IBC and the fire properties need to comply with Class CC1 or CC2 of section 2606.4. This proposal ties in with the change to the definition of "plastic, approved" to "light transmitting plastic, approved" in the IBC.

**Cost Impact:** Will not increase the cost of construction

**Clarification**
M 160-15

Part I:
602.2.1.6 (New), 602.2.1.6, 602.2.1.6.1 (New), 602.2.1.6.1, 602.2.1.6.2, 602.2.1.6.2 (New), 602.2.1.6.3, 602.2.1.6.3 (New)

Part II:
2603.7 (New), 2603.7, 2603.7.1 (New), 2603.7.1, 2603.7.2, 2603.7.2 (New), 2603.7.3 (New), 2604.1

THIS IS A 2 PART PROPOSAL. BOTH PARTS WILL BE HEARD BY THE IMC COMMITTEE. PLEASE SEE THE TENTATIVE HEARING ORDER FOR THE IBC FIRE SAFETY COMMITTEE.

Proponent: Rob Brooks, Rob Brooks & Associates, LLC representing The Dow Chemical Company, representing The Dow Chemical Company (rob.brooks.mail@gmail.com)

Part I

2015 International Mechanical Code

Add new text as follows:

602.2.1.6 Foam plastic in plenums as interior finish, interior trim, or duct insulation. Where foam plastic insulation or foam plastic interior finish is a component of a plenum enclosure, or is located in a plenum, the foam plastic shall comply with Section 602.2.1.6.1 or 602.2.1.6.2, as applicable. Where foam plastic interior trim is located in a plenum, the foam plastic shall comply with Sections 602.2.1.6.1, 602.2.1.6.2 and Section 2604.2 of the International Building Code. Where foam plastic is used as duct insulation and is located in a plenum, the foam plastic shall comply with Section 602.2.1.6.3.

Delete without substitution:

602.2.1.6 Foam plastic insulation. Foam plastic insulation used in plenums as interior wall or ceiling finish or as interior trim shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall also comply with one or more of Sections 602.2.1.6.1, 602.2.1.6.2 and 602.2.1.6.3.

Add new text as follows:

602.2.1.6.1 Exposed to airflow. Where the foam plastic is exposed to the airflow in a plenum, the foam plastic shall comply with both of the following:

1. The foam plastic shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use.
2. The foam plastic shall be tested in accordance with NFPA 286 and shall comply with the acceptance criteria of Section 803.1.2.1 of the International Building Code.

Delete without substitution:

602.2.1.6.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code and shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

602.2.1.6.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 of the International Building Code when tested in accordance with NFPA 286.

The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9 of the International Building Code.

Add new text as follows:

602.2.1.6.2 Not exposed to airflow. Where foam plastic located in the plenum is not exposed to the airflow, the foam plastic shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use and shall comply with one of the following:

1. The foam plastic shall be separated from the airflow in the plenum by a thermal barrier complying with Section 2603.4 of the International Building Code.
2. The foam plastic shall be separated from the airflow in the plenum by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm).
3. The foam plastic shall be separated from the airflow in the plenum by not less than a 1-inch (25 mm) thickness of masonry or concrete.

Delete without substitution:

602.2.1.6.3 Covering. The foam plastic insulation shall be covered by corrosion resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm) and shall exhibit a flame spread index of 75 or less and a smoke developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

Add new text as follows:

602.2.1.6.3 Foam plastic insulation on exterior of ducts in plenums. Duct insulation and any associated coverings, linings and adhesives, that are located in a plenum and are exposed to the plenum airflow shall have a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723, using the specimen preparation and mounting procedures of ASTM E 2231. Duct insulation, coverings and lining shall not flame, glow, smolder or smoke when tested in accordance with ASTM C 411 at the temperature to which they are exposed in service. The test temperature shall not fall below 250 F (121 C). Duct insulation, coverings and linings shall be listed and labeled.

Part II

2015 International Building Code

Add new text as follows:

2603.7 Foam plastic in plenums as interior finish, interior trim, or duct insulation. Where foam plastic insulation or foam plastic interior finish is a component of a plenum enclosure, or is located in a plenum, the foam plastic shall comply with Section 2603.7.1 or 2603.7.2, as applicable. Where foam plastic interior trim is located in a plenum, the foam plastic shall comply with Sections 2603.7.1, 2603.7.2 and 2604.2. Where foam plastic is used as duct insulation in a plenum, the foam plastic shall comply with Section 2603.7.3.

Delete without substitution:

2603.7 Foam plastic insulation used as interior finish or interior trim in plenums. Foam plastic insulation used as interior wall or ceiling finish or as interior trim in plenums shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 and shall comply with one or more of Sections 2603.7.1, 2603.7.2 and 2607.9.

Add new text as follows:

2603.7.1 Exposed to airflow. Where the foam plastic is exposed to the airflow in a plenum, the foam plastic shall comply with both of the following:

1. The foam plastic shall exhibit a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use.
2. The foam plastic shall be tested in accordance with NFPA 286 and shall comply with the acceptance criteria of Section 803.1.2.1.

Delete without substitution:

2603.7.1 Separation required. The foam plastic insulation shall be separated from the plenum by a thermal barrier complying with Section 2603.4 and shall exhibit a flame spread index of 75 or less and a smoke developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use.

2603.7.2 Approval. The foam plastic insulation shall exhibit a flame spread index of 25 or less and a smoke developed index of 50 or less when tested in accordance with ASTM E 84 or UL 723 at the thickness and density intended for use and shall meet the acceptance criteria of Section 803.1.2 when tested in accordance with NFPA 286. The foam plastic insulation shall be approved based on tests conducted in accordance with Section 2603.9.

Add new text as follows:

2603.7.2 Not exposed to airflow. Where foam plastic located in a plenum is not exposed to the airflow, the foam plastic shall exhibit a flame spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 or UL 723 at the maximum thickness and density intended for use and shall comply with one of the following:

1. The foam plastic shall be separated from the airflow in the plenum by a thermal barrier complying with Section 2603.4.
2. The foam plastic shall be separated from the airflow in the plenum by corrosion-resistant steel having a base metal thickness of not less than 0.0160 inch (0.4 mm).
3. The foam plastic shall be separated from the airflow in the plenum by a minimum 1-inch (25 mm) thickness of masonry or concrete.
2603.7.3 Foam plastic insulation on exterior of ducts in plenums. Duct insulation and any associated coverings, linings, and adhesives that are located in a plenum and are exposed to the plenum airflow shall have a flame spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84 or UL 723, using the specimen preparation and mounting procedures of ASTM E2231. Duct insulation, coverings and lining shall not flame, glow, smolder or smoke when tested in accordance with ASTM C411 at the temperature at which they are exposed in service. The test temperature shall not fall below 250 F (121 C). Duct insulation, coverings and linings shall be listed and labeled.

Revise as follows:

2604.1 General. Plastic materials installed as interior finish or trim shall comply with Chapter 8. Foam plastics shall only be installed as interior finish where approved in accordance with the special provisions of Section 2603.9. Foam plastics that are used as interior finish shall also meet the flame spread and smoke-developed index requirements for interior finish in accordance with Chapter 8. Foam plastics installed as interior trim shall comply with Section 2604.2. Foam plastic installed in plenums shall comply with Section 2603.7.

Add new standard(s) as follows:
ASTM E2231-09 Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics

Reason:

Part I:(IMC) This is a companion proposal with Section 2603.7 of the International Building Code. This code change proposal reorganizes Section 602.2.1.6 without modifying technical requirements. The need for reorganization came from confusion in the marketplace regarding foam plastic qualification testing requirements and approved barriers, when used in one or more of the following applications:

1) Foam plastic insulation or interior finish installed as part of a wall that forms the plenum enclosure, where the foam plastic is exposed to the airflow (602.2.1.6.1). Requires flame spread of 25, smoke developed index of 50 and a NFPA 286 test.

2) Foam plastic insulation or interior finish installed as part of a wall that is inside the plenum, when the foam plastic is not exposed to the airflow due to a protective barrier. (602.2.1.6.2). Requires flame spread of 75, smoke-developed index of 450 and a barrier - either a thermal barrier, corrosion-resistant steel or masonry or concrete (per IBC 2603.4.1.1 of the International Building Code).

3) Foam plastic used as interior trim within a plenum and exposed to the airflow. Requires compliance to Sections 602.2.1.6.1 and 602.2.1.6.2 (same as above) but also requires compliance to Section 2604.2 of the International Building Code.

4) Foam plastic used as duct insulation, where the duct insulation is exposed to the plenum airflow shall meet the requirements of 602.2.1.6.3 (which is based on Section 604.3 in the Mechanical Code).

Where applicable, the words "within plenum" have been changed to "in plenum" to be consistent with the wording in Section 602.2 of the Mechanical Code.

The use of the term "exposed to airflow" is consistent with existing language in Section 602 of the Mechanical Code.

The above changes bring needed clarification regarding the approved barriers and corresponding fire test requirements for foam plastic used at various locations within plenums. The section titles "Exposed to airflow" and "Not exposed to airflow" state the intent of the code and are designed to simplify enforcement of this section.

Part II:(IBC) This is a companion proposal with Section 602.2.1.6 of the Mechanical Code. This code change proposal reorganizes Section 2603.7 without modifying technical requirements. The need for reorganization came from confusion in the marketplace regarding foam plastic qualification testing requirements and approved barriers, when used in one or more of the following applications:

1) Foam plastic insulation or interior finish installed as part of a wall that forms the plenum enclosure, where the foam plastic is exposed to the airflow (2603.7.1). Requires flame spread of 25, smoke developed index of 50 and a NFPA 286 test.

2) Foam plastic insulation or interior finish installed as part of a wall that is inside the plenum, when the foam plastic is not exposed to the airflow due to a protective barrier. (2603.7.2). Requires flame spread of 75, smoke developed index of 450 and a barrier - either a thermal barrier, corrosion-resistant steel or masonry or concrete (per IBC 2603.4.1.1).

3) Foam plastic used as interior trim within a plenum and exposed to the airflow. Requires compliance to Sections 2603.7.1 and 2603.7.2 (same as above) but also requires compliance to Section 2604.2.
4) Foam plastic used as duct insulation, where the duct insulation is exposed to the plenum airflow shall meet the requirements of Section 2603.7.3 (which is a replication of Section 604.3 in the Mechanical Code).

Where applicable, the words "within plenum" have been changed to "in plenum" to be consistent with the wording in Section 602.2 of the Mechanical Code.

The use of the term "exposed to airflow" is consistent with existing language in Section 602 of the Mechanical Code.

A Section 2603.7 reference is added to Section 2604.1 to clarify plenum requirements as needed.

The above changes bring needed clarification regarding the approved barriers and corresponding test requirements for foam plastic used at various locations within plenums. The section titles "Exposed to airflow" and "Not exposed to airflow" state the intent of the code and are designed to simplify enforcement of this section.

Cost Impact:

Part I: Will not increase the cost of construction
There are no proposed changes in technical requirements, and this is simply a reorganization of existing requirements.

Part II: Will not increase the cost of construction
There are no proposed changes in technical requirements, and this is simply a reorganization of the existing requirements.

Analysis:

Part II: A review of the standards proposed for inclusion in the code, ASTM C411 & ASTM E2231, 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 April 2, 2015.
M 161-15

1101.6

(hank@bonarengineering.com)

2015 International Mechanical Code

Revise as follows:

1101.6 General. Refrigeration systems shall comply with the requirements of this code and, except as modified by this code, ASHRAE 15. Ammonia-refrigerating systems shall comply with this code and, except as modified by this code, ASHRAE 15 and/or IIAR 2.

Reason: While the IIAR 2 is well intended, several recent changes, including the way machinery room ventilation is calculated, by volume, are encouraging designers to lower the roofs and ceilings of machinery rooms. The use of square feet of machinery room, as ASHRAE 15 has used for 50+ years, encourages higher machinery room ceilings, which is the most effective way of venting lighter-than-air ammonia. The higher ceilings also encourage the use of vertical refrigeration vessels in lieu of horizontal vessels. Vertical vessels have proven to be far more reliable in enhancing the safety of ammonia refrigeration systems. As a practicing professional engineer specializing in ammonia system refrigeration design for 40+ years and registered in 33 states, we strongly recommend the continued use of ASHRAE 15 for safety reasons.

Cost Impact: Will not increase the cost of construction
This will decrease the cost of OSHA and EPA fines for the many machinery rooms which conform to ASHRAE 15 but not to IIAR 2.