

M3-12

202

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

EXTRA-HEAVY-DUTY COOKING APPLIANCE. Extra-heavy-duty cooking appliances are those include appliances utilizing open flame combustion of solid fuel at any time. such as wood, charcoal and briquettes, and mesquite to provide all or part of the heat source for cooking.

HEAVY-DUTY COOKING APPLIANCE. Heavy-duty cooking *appliances* include electric under-fired broilers, electric chain (conveyor) broilers, gas under-fired broilers, gas chain (conveyor) broilers, gas open-burner ranges (with or without oven), electric and gas wok ranges, smokers, smoker ovens, and electric and gas over-fired (upright) broilers and salamanders.

Reason: The definition of Extra-heavy-duty appliances does not appear to address smokers and smoker grills. The wood is not burned to contribute heat for cooking in these appliances, so these appliances seem to fall through the crack. Smokers would appear to require hoods based on Section 507.2.4. By defining smokers as "Heavy-duty" instead of "Extra-heavy-duty," they can be placed under a Type I hood with other heavy-, medium- and light-duty appliances. There is no apparent reason for them to be under an independent exhaust system as is required for appliances that have open flame combustion. As revised, the definition distinguishes between appliances that produce only smoke and those that actually combust the solid fuel for heat.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

202-HEAVY DUTY COOKING APPLIANCES (NEW)-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County, Virginia, representing the Virginia Plumbing and Mechanical Inspectors Association (VPMIA), and the Virginia Building Code and Officials Association (VBCOA) requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

EXTRA-HEAVY-DUTY COOKING APPLIANCE. Extra-heavy-duty cooking appliances are those utilizing open flame combustion of solid fuel at any time.

HEAVY-DUTY COOKING APPLIANCE. Heavy-duty cooking *appliances* include electric under-fired broilers, electric chain (conveyor) broilers, gas under-fired broilers, gas chain (conveyor) broilers, gas open-burner ranges (with or without oven), electric and gas wok ranges, ~~smokers, smoker ovens,~~ and electric and gas over-fired (upright) broilers and salamanders.

Commenter's Reason: By adding "smokers" and "smoker ovens" to the Heavy-duty cooking appliance definition, two things happen. First, this definition is now conflicting with the definition of Extra-heavy-duty cooking appliance. The process of initiating the "smoking" in one of these appliances will require that the cooking appliance utilize "open flame combustion of solid fuel" to begin this process ("at any time"). Second, all solid fuel (wood or coal) cooking appliances, including smokers and smoker ovens, have one thing in common that should mandate more stringent code requirements (such as independent, Type I hood exhaust systems and higher exhaust flow rates). They all create highly combustible creosote ! Electric and gas fired cooking appliances do not produce this product. By allowing smokers and smoker ovens to be defined as Heavy-duty cooking appliances, safe-guard provisions provided by the IMC for open flame combustion of solid fuel in cooking appliances is compromised.

M3-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M16-12

Table 305.4

Proposed Change as Submitted

Proponent: Larry Gill, P. Eng., IPEX USA LLC (larry.gill@ipexna.com)

Revise as follows:

**TABLE 305.4
PIPING SUPPORT SPACING^a**

| PIPING MATERIAL | MAXIMUM HORIZONTAL SPACING (feet) | MAXIMUM VERTICAL SPACING (feet) |
|-------------------|--------------------------------------|------------------------------------|
| <u>PE-RT ≤ 1"</u> | <u>2 ⅔ (32 inches)</u> | <u>4</u> |
| <u>PE-RT ≥ 1¼</u> | <u>4</u> | <u>4</u> |

Reason: Add support dimensions for polyethylene of raised temperature (PE-RT). PE-RT is already in the International Codes and adding the support spacing will provide additional information for installation. All other dimensions in the table remain unchanged.

Cost Impact: The proposed change will not increase the cost of construction.

T305.4-M-GILL.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Larry Gill, IPEX USA LLC requests Approval as Modified by this Public Comment.

**TABLE 305.4
PIPING SUPPORT SPACING**

| PIPING MATERIAL | MAXIMUM HORIZONTAL SPACING (feet) | MAXIMUM VERTICAL SPACING (feet) |
|-----------------|--------------------------------------|------------------------------------|
| PE-RT ≤ 1" | 2 ⅔ (32 inches) | 4- 10 ^c |
| PE-RT ≥ 1 ¼ | 4 | 4- 10 ^c |

Commenter's Reason: The value of 4 feet for the vertical spacing was submitted in error. The format of the horizontal value should match the current table.

M16-12

Final Action:

AS

AM

AMPC_____

D

M23-12

307.2.3

Proposed Change as Submitted

Proponent: Richard Grace, Fairfax County, Virginia Plumbing and Mechanical Inspectors Association, Virginia Building Code Officials Association

Revise as follows:

307.2.3 Auxiliary and secondary drain systems. In addition to the requirements of Section 307.2.1, where damage to any building components could occur as a result of overflow from the *equipment* primary condensate removal system, one of the following auxiliary protection methods shall be provided for each cooling coil or fuel-fired *appliance* that produces condensate:

(1. thru 3. No change)

4. A water level detection device conforming to UL 508 shall be provided that will shut off the equipment served in the event that the primary drain is blocked. The device shall be installed in ~~the primary drain line,~~ the overflow drain line, or in the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

Reason: When these devices are installed in the primary drain line, they are not typically installed where the primary line connects to the equipment supplied drain pan. They are typically installed in the uppermost vertical level above the P-trap (approximately 6 or so inches horizontal of the unit itself). If a blockage occurs at the connection point of the primary line to the equipment supplied drain pan, or within the 6" piece of horizontal pipe between the unit and the detection device, the pan will fill and overflow without detection.

Cost Impact: The code change proposal will not increase the cost of construction.

307.2.3-M-GRACE.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing Rectorseal Corporation, requests Disapproval

Commenter's Reason: The reason for this public comment is overturn the committee's recommendation for the original code change proposal to be approved as submitted. The original code change eliminated the option to install a water level detection device in the primary drain line. The code section states that the water level detection device will shut off the equipment when the **primary** drain is blocked. The logical way to monitor the primary drain line is to install a water level detection device in the primary drain line.

The original reason statement is flawed logically. It states that if blockage occurs at the connection point of the primary line to the equipment supply drain pan then the water level detection device will not trigger and pan will fill and overflow.

The flaw in the logic is that if the overflow drain line is blocked between the water level detection device and the pan, the pan will fill and overflow anyway. Arbitrarily removing the water level detection device in the primary drain line but not the overflow drain line is not logical. Properly installing a water level detection device in either a primary drain or an overflow drain line would be sufficient and the choice should be permitted. There is no technical merit for allowing a device to be installed in one drain line and not the other.

M23-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M26-12

202 (NEW), Section 307.2.3.1

Proposed Change as Submitted

Proponent: Timothy Burgos, InterCode Incorporated, representing Rectorseal Corporation and Ken Sagan, NRG Code Advocates, representing self
(ken@nrgcodeadvocates.com)

Add new definition as follows:

DUCTLESS MINI-SPLIT SYSTEM. A heating and cooling system that is comprised of one or multiple indoor evaporator/air handler units and an outdoor condensing unit that is connected by refrigerant piping and electrical wiring. A ductless mini-split system is capable of cooling or heating one or more rooms without the use of a traditional ductwork system.

Revise as follows:

307.2.3.1 Water-level monitoring devices and condensate pumps. On down-flow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the *equipment* served in the event that the primary drain becomes restricted. Devices installed in the drain line shall not be permitted. For ductless mini-split equipment that is not able to drain condensate from the unit by gravity, a condensate pump shall be installed to remove water from the *equipment*. The condensate pump shall be powered by the same power supply that powers the *equipment* being served and shall be capable of shutting off the equipment served in the event of failure of the pump to remove condensate.

Reason: Ductless mini-split systems have existed for more than 50 years and have been available for more than 30 years in the United States HVAC residential and/or light commercial markets. Most American consumers, however, are unaware of these products. A ductless mini-split system is not a window unit; it is a permanently installed mechanical system used in new construction, additions, multi-family (condo/apartment) housing, and to improve comfort in poorly conditioned spaces.

Ductless Mini-split equipment must follow the same code requirements as other condensate producing equipment due to the potential damage and health risk associated with uncontrolled condensation. Ductless mini-split units also do not have provisions for a secondary drain, or auxiliary drain pans to prevent condensation from overflowing the primary drain pan. Currently it is unclear in the code if ductless mini-split units require water-level monitoring devices. In installations where gravity drains condensation removal is impossible, a condensate pump must be installed that communicates with the ductless mini-split to stop the equipment if there is a failure of the condensate removal system. Power for the condensate pump should be provided from the mini-split equipment and not from a separate power source. The danger of using a separate power supply is that if the circuit that supplies power to the condensate pump fails, but the circuit providing power to the mini split equipment remains active, the pump will not operate and the equipment will produce excessive condensation without shutting down. This code change addresses the condensate requirement and allows simplicity in code compliance.

Cost Impact: The code change proposal will not increase the cost of construction.

202-DUCTLESS MINI SPLIT SYSTEM (NEW) #2-M-BURGOS-SAGAN.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal as follows:

DUCTLESS MINI-SPLIT SYSTEM. A heating and cooling system that is comprised of one or multiple indoor evaporator/air handler units and an outdoor condensing unit that is connected by refrigerant piping and electrical wiring. A ductless mini-split system is capable of cooling or heating one or more rooms without the use of a traditional ductwork system.

Revise as follows:

307.2.3.1 Water-level monitoring devices and condensate pumps. On down-flow units and all other coils that do not have a secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside

the primary drain pan. This device shall shut off the *equipment* served in the event that the primary drain becomes restricted. Devices installed in the drain line shall not be permitted. For ductless mini-split equipment that is not able to drain condensate from the unit by gravity, a condensate pump shall be installed to remove water from the *equipment*. The condensate pump shall be powered by the same power supply that powers the *equipment* being served and shall be capable of shutting off the equipment served in the event of failure of the pump to remove condensate.

Committee Reason: Approval is based upon the proponent's published reason. The modification deletes proposed text that is redundant with the manufacturer's instructions.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing Rectorseal Corporation, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

307.2.5 Ductless mini split system water-level monitoring devices and condensate pumps. A water-level monitoring device shall be installed inside of the main drain pan of ductless mini split system equipment. Such device shall shut off the equipment served in the event that the primary drain becomes restricted. For ductless mini split equipment that cannot drain condensation from the unit by gravity, a separate condensate pump shall be installed to remove water from the equipment. The condensate pump shall be capable of shutting off the equipment in the event that the condensate removal system has failed and shall be connected to the same electrical branch circuit as the equipment being served.

(Portions of proposal not shown are unaffected by this Public Comment.)

Commenter's Reason: The committee recommended approved as modified for this code change proposal. The committee modified the proposal to accept the definition for ductless mini-split system but not the remaining text. They stated that the text is redundant with the manufacturer's instructions. Respectively, we disagree with the committee's reason statement. The blanket statement of "follow the manufacturer's instructions" could be used for any product and the code would not be necessary. However, the code is necessary and language for ductless mini split system water-level monitoring devices and condensate pumps should be included.

The reason for this public comment is to separate water-level monitoring devices and condensate pumps requirements for ductless mini split systems from other types of cooling systems.

Because of the unique design of ductless mini split systems and the limited capacity condensate pan, a water-level monitoring device is essential to help ensure the ductless mini split system will not be damaged if condensate cannot be properly drained.

Additionally, the ductless mini split system needs to be shut down if the condensate pump fails.

M26-12

Final Action:

AS

AM

AMPC_____

D

M29-12

202, 307.2.4.1

Proposed Change as Submitted

Proponent: Timothy Burgos, InterCode Incorporated, representing Rectorseal Corporation and Ken Sagan, NRG Code Advocates, representing self

Add new definition as follows:

DUCTLESS MINI-SPLIT SYSTEM. A heating and cooling system that is comprised of one or multiple indoor evaporator/air handler units and an outdoor condensing unit that is connected by refrigerant piping and electrical wiring. A ductless mini-split system is capable of cooling or heating one or more rooms without the use of a traditional ductwork system.

Add new text as follows:

307.2.4.1 Ductless Mini-Split Traps. Ductless mini split equipment that produces condensation shall be provided with an inline check valve located in the drain line instead of a trap.

Reason: Ductless mini-split condensate lines are direct openings for unconditioned outside air, contaminants, insects and other undesirable materials to enter the conditioned space and should be trapped using an inline check valve as a preventative measure.

Ductless mini-split systems have existed for more than 50 years and have been available for more than 30 years in the United States HVAC residential and/or light commercial markets. Most American consumers, however, are unaware of these products. A ductless-mini split system is not a window unit; it is a permanently installed mechanical system used in new construction, additions, multi-family (condo/apartment) housing, and to improve comfort in poorly conditioned spaces. Since mini-splits require no ducts and indoor components are mounted directly on interior ceiling, walls, or on the floor, they avoid the energy losses associated with ductwork of central forced air systems. Duct losses can account for more than 30% of energy consumption for space conditioning, especially if the ducts are in an unconditioned space such as an attic.

Ductless mini-split heating and cooling systems are highly efficient products that deliver warm or cool air directly into different zones in a building instead of through ducts. They are also called mini-split, multi-split, or variable refrigerant flow (VRF) heat pump systems. They are an increasingly popular and cost-effective solution to replace inefficient baseboard electric heating and window air conditioners in existing homes.

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

A ductless mini-split system is comprised of an indoor unit called the evaporator and an outdoor unit called the condenser. The evaporator is connected to the condensing unit by copper tubing and electrical wiring which is passed through a 2 ½" – 4" hole. Basically, it is a small central air unit with the flexibility of cooling or heating one or more room.

The advantages of installing a ductless mini-split over a central air system.

The main advantages of a ductless mini-split are their small size and flexibility for zoning or heating and cooling individual rooms. Models can have as many as four indoor air handling units (for four zones or rooms) connected to one outdoor unit. The number of units is determined by how much heating or cooling is required for the building or each zone (which in turn is affected by the properties of the building envelope). Since each of the zones has its own thermostat, the space can be conditioned only when occupied saving energy and money.

1. With Central Air, an entire home must be cooled when only one room may be occupied. Ductless mini-splits cool only the areas that require conditioning.
2. 18,000 BTU is a typical minimum central air unit: ductless mini-splits are available beginning at 9,000 or 12,000 BTUs.
3. Typical homes requiring 3-ton HVAC units may not be zoned or require complex zoning systems that are very expensive for the homeowner. With ductless mini-splits, multiple evaporators make zoning as simple as setting a remote control.
4. Energy wasted in long lengths of uninsulated ductwork means higher energy bills. Less than 5% cooling loss occurs in insulated refrigerant lines compared with up to 25% through ducts.
5. Retrofitting existing homes with whole house air conditioning requires cutting holes in walls, floors, ceilings or decreasing closet space with ducts.
6. Ductless mini-splits require just a 2 ½ or 4" diameter hole in the outside wall meaning less mess and better home aesthetics.

Most systems now incorporate inverter-driven compressors, which allow for system ramp-up until the desired set temperature is met, then permit the system to modulate its operation so that a comfortable temperature is maintained. This operation avoids the abrupt and energy-consuming start and stop exhibited by traditional HVAC systems.

Ductless mini-split systems are also often easier to install than other types of space conditioning systems. For example, the hook-up between the outdoor and indoor units generally requires only a three inch (~8 centimeter [cm]) hole through a wall for the conduit. Also, most manufacturers of this type of system can provide a variety of lengths of connecting conduits. So, if necessary, you can locate the outdoor unit as far away as 50 feet (~15 meters [m]) from the indoor evaporator. This makes it possible to cool rooms on the front side of a building with the compressor in a more appropriate or inconspicuous place on the outside of the building.

Indoor air handlers can be suspended from a ceiling, flush-mounted in a drop ceiling, or hung on a wall. Floor-standing models are also available. Many offer a remote control to make control of high mounted units easier. Split systems can also contribute to the security of a building by eliminating the need for larger openings required for through-the-wall units or unsecured windows housing window-mounted units –openings that can provide easy access for intruders

Ductless mini-split equipment must follow the same code requirements as other condensate producing equipment due to the potential damage and health risk associated with uncontrolled condensation. Ductless mini-split units also do not have provisions for a secondary drain, or auxiliary drain pans to prevent condensation from overflowing the primary drain pan. Currently it is unclear in the code if ductless mini-split units require water-level monitoring devices. In installations where gravity drains condensation removal is impossible, a condensate pump must be installed that communicates with the ductless mini-split to stop the equipment if there is a failure of the condensate removal system. Power for the condensate pump should be provided from the mini-split equipment and not from a separate power source. The danger of using a separate power supply is that if the circuit that supplies power to the condensate pump fails, but the circuit providing power to the mini split equipment remains active, the pump will not operate and the equipment will produce excessive condensation without shutting down.

Cost Impact: The code change proposal will not increase the cost of construction.

202-DUCTLESS MINI SPLIT SYSTEM (NEW)-M-BURGOS.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There is no need to mandate a check valve as the only means. Manufacturers vary and this should be left to the manufacturers to decide.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing Rectorseal Corporation, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

307.2.4.1 Ductless Mini Split System Traps. Ductless mini split equipment that produces condensation shall be provided with an inline check valve located in the drain line ~~instead of~~ or a trap.

(Portions not shown are unaffected by this Public Comment.)

Commenter's Reason: The committee had an issue with the original proposal because it was too limiting for what could be used as trap. We agree with their reason. The reason for this public comment is to give an option of either using an inline check valve or a traditional trap when installing a ductless mini split system.

One of the advantages of a ductless mini split system is the ability to install a cooling system in a limited space. However, if the space is limited, a traditional trap may not be practical and an inline check should be used.

M29-12

Final Action:

AS

AM

AMPC_____

D

M32-12

307.2.5 (New)

Proposed Change as Submitted

Proponent: Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing self (tfkolter@gmail.com/tom.kolter@yahoo.com)

Add new text as follows:

307.2.5 Cleanouts. Condensate drains shall be provided with a means to allow cleaning of the drain and clearing of blockages without having to cut or disassemble the piping.

Reason: Drain line stoppages in evaporative coils drain pan drain lines are unavoidable and common occurrences requiring clearing the drain line. Clearing these lines almost always involves cutting the drain line itself, causing water to leak into the attic or closet where the drain is located, possible collected in a bucket or soaked up with rags or paper towels. Then the technician blows compressed air through the drain line in both directions from the cut. The cut must be repaired by resealing the drain line with a PVC coupling and solvent.

This process exposes the surrounding area to water leakage and spilling with the risk of damage, mold, spilling, as well as the extra time and effort of carrying extra equipment, parts and flammable solvent. The process takes extra time and costs the homeowner more money.

With a device that permits the introduction of compressed air or nitrogen directly into the drain system permitting clearing in both directions, there is no spillage of water, no cost for the couplings or solvent and no risk of water damage or mold. The entire process requires less than five minutes.

Typically the cost of clearing a drain equipped with such a device is at least 50% less to the homeowner than the cost of clearing a blockage through the common method of cutting the pipe, attempting to collect the condensate water and repairing the cut in the drain line.

Each time a drain line is cleared though the cutting/repair process, the repair could be accomplished by installing a \$15.00 line clearing device rather than a simple coupling.

Also, if clearing the drain lines were part of regular maintenance, line blockages could largely be prevented in the first place.

Cost Impact: The code change will increase the cost of construction, totaling an estimated \$15.00 per unit.

307.2.3-M-JONES.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The words "a means" are not defined. It may not be safe to pressurize drains with nitrogen. The proposed text may preclude the use of unions to allow disassembly.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Andrew S. Jones, State of Texas, representing A Better Deal Heating and Air Conditioning, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

307.2.5 Cleanouts. Condensate drains shall be provided with a means to allow cleaning of the drain and clearing of blockages without having to cut or disassemble the piping.

307.2.5 Cleanouts. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

Commenter's Reason: Stoppages in drain lines from evaporative coil drain pans are a common problem, often causing substantial damage to structures and property.

M32-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M38-12, Part I

401.2, 401.3 (New), IBC 1203.1

Proposed Change as Submitted

Proponent: Craig Conner, representing self.

BOTH PARTS I AND II OF THIS CODE CHANGE WILL BE HEARD BY THE IMC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Part I – IMC

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 in a dwelling unit is less than 5 air changes per hour when tested with a blower door with a pressure of 0.2 in. W.C. (50 Pa) in accordance with Section 402.4.1.2~~ Where a dwelling unit complies with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the *International Energy Conservation Code*, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403.

Add new text as follows:

401.3 Backdrafting elimination. Dwelling units that comply with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the *International Energy Conservation Code*, shall comply with at least one of the following options:

- 1) Space heating appliances, boilers, water heating appliances, wood stoves, and fireplaces in the conditioned space of the dwelling unit shall be of the direct-vent, induced-draft, or power-vented type.
- 2) Mechanical ventilation for the conditioned space, exhaust systems, clothes dryers and central vacuum systems shall not contribute to depressurization. Systems that provide *makeup air* at a rate approximately equal to or greater than the *exhaust air* rate, that are equipped with a means of closure, and that are automatically controlled to start and operate simultaneously with the exhaust system shall not be deemed to contribute to depressurization.
- 3) Testing demonstrates compliance with the CAN/CGSB 51.71-2005 depressurization test. Where required by the code official, testing shall be performed by an approved third party.
- 4) The registered design professional demonstrates in an approved manner that backdrafting will not occur.

Reason: Backdrafting combustion appliances can lead to serious health consequences, occasionally including death. This change is designed to greatly reduce the likelihood of backdrafting. This change is also intended to remove the apparent requirement to apply a residential air tightness test to commercial spaces, and remove redundancy in the IBC and IMC.

The 2012 I-codes and common practices are increasing the potential for backdrafting in dwelling units. Back drafting is most likely if three things are true- construction is airtight, exhaust-only ventilation is used, and atmospherically vented (natural draft) combustion appliances are in conditioned spaces. New construction is required by the 2012 IECC to be much more airtight (C402.4.1 for commercial, R402.4.1.2 for residential). Mechanical ventilation is required by the 2012 I-codes in dwelling units, with the least expensive form of mechanical ventilation being the exhaust-only ventilation fans already in common use. The energy code no longer encourages more efficient condensing furnaces by recognizing their high energy efficiency; thereby, removing some of the motivation for condensing furnaces. The trend towards large exhaust fans, such as kitchen hoods, also contributes to the problem. This combination is a recipe for back drafting problems.

The proposed change gives several options. The first two options prevent back drafting by eliminating at least one of major contributor, either the natural draft (atmospherically vented) combustion appliances, or exhaust-only ventilation. The third option is a "Depressurization Test" (standard CAN/CGSB 51.71-2005), which tests for excessive depressurization levels in dwelling units. If a vented combustion appliance using combustion air from the conditioned space experiences strong enough depressurization, the flue gases will spill into the home. Anything more than a brief reverse flow can be serious. The fourth option could be used in situations where the registered design professional can show backdrafting is not a problem without doing a full depressurization test.

Confusion on when the 2012 IBC and IMC require mechanical ventilation in dwelling units is corrected by this change. The IBC and IMC partially, but not completely, repeat air tightness requirements from the IECC. The existing IBC and IMC can be read to require the residential criteria be applied to portions of commercial buildings, whereas the commercial portion of the IECC has its own air tightness criteria. Does a new dwelling unit in a commercial building that meets the 2012 IECC commercial air tightness requirements also require mechanical ventilation? In the 2012 IBC and IMC the answer is unclear unless the residential test is also performed, a test which may be difficult for some commercial buildings. Dwelling units which meet the relatively air tight 2012 IECC commercial criteria should require mechanical ventilation. This proposed change clarifies the IBC and IMC by simply referencing the IECC for air tightness requirements.

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

Analysis: A review of the standard proposed for inclusion in the code, [CAN/CGSB 51.71-2005] 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, 2012.

401.2-M-CONNER.DOC

Public Hearing Results

PART I – IMC

Committee Action:

Disapproved

Committee Reason: The proposed text is too prescriptive and all methods may not be viable. Item 4 of proposed Section 401.3 is redundant with Section 105.2. The new section 401.3 belongs in Section 403.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self, and Mike Moore, Newport Ventures, representing Broan NuTone, request Approval as Modified by this Public Comment.

Part I – IMC

Modify the proposal 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 a dwelling unit complies with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the International Energy Conservation Code, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Group R-2, R-3, and R-4 occupancies three stories or less in height above grade plane shall be ventilated by mechanical means in accordance with Section 403.~~

401.3 Backdrafting elimination Appliance venting. Dwelling units that comply with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the ~~International Energy Conservation Code, in~~ Group R-2, R-3, and R-4 occupancies three stories or less in height above grade plane shall comply with at least one of the following options.

- 1 Space heating appliances, boilers, ~~and~~ water heating appliances, wood stoves, and fireplaces ~~located within~~ in the conditioned space of the ~~a~~ dwelling unit's air barrier shall be ~~of the~~ direct-vent type, induced-draft, or power-vented type.
- 2 Space heating appliances and water heating appliances located within a dwelling unit's air barrier shall be of the direct-vent or mechanical draft type. Makeup air shall be provided for each of the dwelling unit's three largest exhaust systems at a rate approximately equal to or greater than the exhaust rate and shall be permitted to be a combination of outdoor air and transfer air. Makeup air systems shall be equipped with a means of closure, and shall be automatically controlled to start and operate simultaneously with the exhaust systems.
- 3 Space heating appliances and water heating appliances shall not be located within a dwelling unit's air barrier.
- 2 Mechanical ventilation for the conditioned space, exhaust systems, clothes dryers and central vacuum systems shall not contribute to depressurization. Systems that provide makeup air at a rate approximately equal to or greater than the exhaust air rate, that are equipped with a means of closure, and that are automatically controlled to start and operate simultaneously with the exhaust system shall not be deemed to contribute to depressurization.
- 3 4 Testing demonstrates compliance with the CAN/CGSB 51.71-2005 depressurization test. Where required by the code official, testing shall be performed by an approved third party. Tested depressurization shall be within the limits specified by an approved test.

4—The registered design professional demonstrates in an approved manner that backdrafting will not occur.

Exception: This section shall not apply to the replacement of appliances in existing buildings.

Commenter's Reason: Several changes were made to M38 based on discussions with other stakeholders and the committee direction. Promoting combustion safety by reducing the potential for back drafting remains the goal of M38.

Two committee comments were integrated into the modified change. Per the committee request, the description of the buildings covered was aligned with M39 to cover "Group R-2, R-3, and R-4 occupancies three stories or less in height ..." Per the committee request, item 4 of proposed Section 401.3 is redundant with Section 105.2 and was removed.

The options in the first three items were clarified to be 1) use only direct-vent systems, or 2) use only direct-vent or mechanically vented with makeup air for the three largest exhausts, or 3) locate combustion appliances outside the dwelling unit's air barrier. Item 3 would permit a mechanical room separated by an air barrier from the conditioned space to include any type of combustion device otherwise permitted by the code.

The use of makeup air was clarified. Makeup air was clarified to include transfer air as a method of indirectly bringing in outdoor air, as is approved by Section 403.4.

The referenced standard was changed to be any approved depressurization testing. A variety of testing procedures are in use in different jurisdictions.

M38-12, Part I

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M38-12, Part II

401.2, 401.3 (New), IBC 1203.1

Proposed Change as Submitted

Proponent: Craig Conner, representing self.

BOTH PARTS I AND II OF THIS CODE CHANGE WILL BE HEARD BY THE IMC COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.

Part II – IBC-GENERAL

Revise as follows:

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *International Mechanical Code*.

~~Dwelling units that comply with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the *International Energy Conservation Code*, where the air infiltration in a dwelling unit is less than 5 air changes per hour when tested with a blower door with a pressure of 0.2 inc W.C. (50 Pa) in accordance with Section 402.4.1.2 of the *International Energy Conservation Code*, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.~~

Add new standard to Chapter 15 as follows:

CAN/CGSB 51.71-2005 Depressurization Test

Reason: Backdrafting combustion appliances can lead to serious health consequences, occasionally including death. This change is designed to greatly reduce the likelihood of backdrafting. This change is also intended to remove the apparent requirement to apply a residential air tightness test to commercial spaces, and remove redundancy in the IBC and IMC.

The 2012 I-codes and common practices are increasing the potential for backdrafting in dwelling units. Back drafting is most likely if three things are true- construction is airtight, exhaust-only ventilation is used, and atmospherically vented (natural draft) combustion appliances are in conditioned spaces. New construction is required by the 2012 IECC to be much more airtight (C402.4.1 for commercial, R402.4.1.2 for residential). Mechanical ventilation is required by the 2012 I-codes in dwelling units, with the least expensive form of mechanical ventilation being the exhaust-only ventilation fans already in common use. The energy code no longer encourages more efficient condensing furnaces by recognizing their high energy efficiency; thereby, removing some of the motivation for condensing furnaces. The trend towards large exhaust fans, such as kitchen hoods, also contributes to the problem. This combination is a recipe for back drafting problems.

The proposed change gives several options. The first two options prevent back drafting by eliminating at least one of major contributor, either the natural draft (atmospherically vented) combustion appliances, or exhaust-only ventilation. The third option is a "Depressurization Test" (standard CAN/CGSB 51.71-2005), which tests for excessive depressurization levels in dwelling units. If a vented combustion appliance using combustion air from the conditioned space experiences strong enough depressurization, the flue gases will spill into the home. Anything more than a brief reverse flow can be serious. The fourth option could be used in situations where the registered design professional can show backdrafting is not a problem without doing a full depressurization test.

Confusion on when the 2012 IBC and IMC require mechanical ventilation in dwelling units is corrected by this change. The IBC and IMC partially, but not completely, repeat air tightness requirements from the IECC. The existing IBC and IMC can be read to require the residential criteria be applied to portions of commercial buildings, whereas the commercial portion of the IECC has its own air tightness criteria. Does a new dwelling unit in a commercial building that meets the 2012 IECC commercial air tightness requirements also require mechanical ventilation? In the 2012 IBC and IMC the answer is unclear unless the residential test is also performed, a test which may be difficult for some commercial buildings. Dwelling units which meet the relatively air tight 2012 IECC commercial criteria should require mechanical ventilation. This proposed change clarifies the IBC and IMC by simply referencing the IECC for air tightness requirements.

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

Analysis: A review of the standard proposed for inclusion in the code, [CAN/CGSB 51.71-2005] 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, 2012.

401.2-M-CONNER.DOC

Public Hearing Results

PART II – IBC GENERAL Committee Action:

Disapproved

Committee Reason: M39-12 is the preferred approach.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Craig Conner, Building Quality, representing self, and Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Modified by this Public Comment.

PART II – IBC GENERAL

Modify the proposal as follows:

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *International Mechanical Code*.

~~Dwelling units that comply with the air tightness requirements in Section C402.4.1 or R402.4.1.2 of the *International Energy Conservation Code* Group R-2, R-3, and R-4 occupancies three stories or less in height above grade plane~~ shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.

Commenter's Reason: This change is to ensure consistency with the IECC, which requires mechanical ventilation for these occupancies. Per the committee request, the description of the buildings covered was aligned with M39 to cover "Group R-2, R-3, and R-4 occupancies three stories or less in height above grade plane."

M38-12, Part II

Final Action:

AS

AM

AMPC_____

D

M39-12, Part I

401.2, IBC 1203.1

Proposed Change as Submitted

Proponent: Mike Moore, Newport Ventures, representing Broan NuTone
(mmoore@newportpartnersllc.com)

THIS IS A 2 PART CODE CHANGE, BOTH PARTS WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THIS COMMITTEE

PART I – IMC

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 402.4.1.2 of the International Energy Conservation Code, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403. Group R-2, R-3, and R-4 buildings three stories or less in height above grade plane shall be ventilated by mechanical means in accordance with Section 403.~~

Cost Impact: There is no expected increase to the cost of construction, as this is simply a clarification of existing requirements.

401.2-M-MOORE.DOC

Public Hearing Results

PART I – IMC

Committee Action:

Disapproved

Committee Reason: Natural ventilation should not be precluded.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approved as Submitted.

Commenter's Reason: This change ensures consistency across the IMC and IECC. The IECC requires that ALL R-2, R-3, and R-4 buildings that are three stories or less in height above grade plane be provided with mechanical ventilation. This is shown as follows:

1. Definition of Residential Building in the 2012 IECC: ***“RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane.”***
2. Requirement for Mandatory Mechanical Ventilation in Section R403.5, which applies to Residential Buildings, as defined above: ***“R403.5 Mechanical ventilation (Mandatory). The building shall be provided with ventilation that meets the***

requirements of the International Residential Code or International Mechanical Code, as applicable, or with other approved means of ventilation..."

Based on this rationale, the IECC obviously requires mechanical ventilation for all R-2, R-3, and R-4 buildings that are three stories or less in height above grade plane. This proposal short cuts the burdensome cross reference that currently exists in the IMC and IBC and ensures consistency across I-codes.

Cost Impact: Because the requirement for mechanical ventilation already exists for these buildings, this change will not increase the cost of construction.

M39-12, Part I

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M39-12, Part II

401.2, IBC 1203.1

Proposed Change as Submitted

Proponent: Mike Moore, Newport Ventures, representing Broan NuTone
(mmoore@newportpartnersllc.com)

THIS IS A 2 PART CODE CHANGE, BOTH PARTS WILL BE HEARD BY THE MECHANICAL CODE COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDERS FOR THIS COMMITTEE

PART II – IBC GENERAL

Revise as follows:

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1203.4, or mechanical ventilation in accordance with the *International Mechanical Code*. ~~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 0.2 inch w.c. (50 Pa) in accordance with Section 402.4.1.2 of the *International Energy Conservation Code*, the dwelling unit shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.~~ Group R-2, R-3, and R-4 buildings three stories or less in height above grade plane shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*.

Reason: To identify the mechanical ventilation requirements of dwelling units, designers are now required to cross reference the 2012 IECC, determine if the dwelling unit is within a building that is covered within the scope of Chapter 4 or Chapter 5 of the IECC, and then determine if the air tightness level of the unit is sufficiently tight to require mechanical ventilation per Section 401.2 of the IMC.

This proposal short cuts this burdensome circuit by clearly stating what the designer would find if he or she were to go through this exercise – that mechanical ventilation is required by the overlap of the 2012 IECC and 2012 IMC for R-2, R-3, and R-4 buildings. The reason for this is as follows:

1. The 2012 IMC 401.2 requires dwelling units with an air infiltration rate less than 5 ACH 50 (air changes per hour at 50 Pa, as confirmed by a blower door test in accordance with 2012 IECC Section 402.4.1.2) to be provided with mechanical ventilation.
2. The scope of Chapter 4 of the 2012 IECC overlaps with that of the IMC for R-2, R-3, and R-4 buildings three stories or less above grade plane (see the definition of Residential within Chapter 2 of the IECC).
3. 2012 IECC 402.4.1.2 requires that the air leakage rate for all buildings or dwelling units within its scope be less than or equal to 5 air changes per hour when tested with a blower door at a pressure of 0.2 inch water column (50 Pa).
4. The net result is that R-2, R-3, and R-4 buildings three stories or less in height above grade plane are required to be ventilated by mechanical means in accordance with Section 403 of the IMC.
5. Additionally, 2012 IECC 403.5 reads: "Mechanical Ventilation (Mandatory). The building shall be provided with ventilation that meets the requirements of the International Residential Code or International Mechanical Code, as applicable, or with other approved means of ventilation."

Combined, the overlap of the two codes requires that mechanical ventilation should be provided in accordance with Section 403. This proposal is needed to clarify this requirement and remove ambiguity in the code. Note that there is a companion code change proposed for Section 1203.1 of the IBC.

Cost Impact: There is no expected increase to the cost of construction, as this is simply a clarification of existing requirements.

401.2-M-MOORE.DOC

Public Hearing Results

PART II – IBC GENERAL
Committee Action:

Disapproved

Committee Reason: Natural ventilation should not be precluded.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Submitted.

Commenter's Reason: This change ensures consistency across the IMC and IECC. The IECC requires that ALL R-2, R-3, and R-4 buildings that are three stories or less in height above grade plane be provided with mechanical ventilation. This is shown as follows:

1. Definition of Residential Building in the 2012 IECC: "**RESIDENTIAL BUILDING.** For this code, includes detached one- and two-family dwellings and multiple single family dwellings (townhouses) as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane."
2. Requirement for Mandatory Mechanical Ventilation in Section R403.5, which applies to Residential Buildings, as defined above: "**R403.5 Mechanical ventilation (Mandatory).** The building shall be provided with ventilation that meets the requirements of the International Residential Code or International Mechanical Code, as applicable, or with other approved means of ventilation..."

Based on this rationale, the IECC obviously requires mechanical ventilation for all R-2, R-3, and R-4 buildings that are three stories or less in height above grade plane. This proposal short cuts the burdensome cross reference that currently exists in the IMC and IBC and ensures consistency across I-codes.

Cost Impact: Because the requirement for mechanical ventilation already exists for these buildings, this change will not increase the cost of construction.

M39-12, Part II

Final Action:

AS

AM

AMPC_____

D

M40-12

401.2.1 New

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Add new text as follows:

401.2 .1 Dwelling unit mechanical ventilation. The mechanical ventilation required for dwelling units by Section 401.2 shall be provided by means of one or more supply or exhaust fans or one or more local supply or exhaust fans. Outdoor air ducts connected to the return side of an air handler shall be considered as providing supply ventilation where utilized in conjunction with exhaust fans.

Reason: Section 401.2 requires mechanical ventilation in dwelling units under specified conditions, but unlike the IRC, it does not provide any guidance as to how this is to be accomplished. The proposed text is borrowed from the IRC.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

401.2.1-M-STRAUSBAUGH-PMGCAC.DOC

Public Hearing Results

M40-12

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

James L. Aycock, representing Field Controls LLC, requests Disapproval.

Commenter's Reason: M40 appears to eliminate a common and useful method of ventilation. "Outdoor air ducts connected to the return side of an air handler" [second sentence of M40] are also known as Central-Fan-Integrated Ventilation (CFIV) systems. M40 requires the CFIV be "utilized in conjunction with exhaust fans", apparently requiring the CFIV be directly linked or under a common set of controls with exhaust fans.

The M40 reason statement says "the proposed text is borrowed from the IRC". However, the IRC does not have the requirement to link the CFIV with exhaust fans. Other standards, such as ASHRAE 62.2-2010, also recognize CFIV to provide ventilation, but do not require the CFIV to be directly linked to exhaust fans.

Several companies, including my company, produce Central-Fan-Integrated Ventilation systems. CFIV systems are an existing, common, and cost-effective method of whole house ventilation that should not be eliminated by M40.

Public Comment 2:

Craig Conner, Building Quality, representing self, requests Disapproval.

Commenter's Reason: The language and requirements of M40 are unclear. The first sentence has 5 "or"s in it. In the second sentence "utilized in conjunction" is unclear. Does "utilized in conjunction" mean used in the same building? Or maybe "utilized in conjunction" means interconnected through some kind of common control system that makes all the fans operate together? To be "utilized in conjunction" do the volumes of the supply and exhaust fans have to be controlled to be equal? Although the M40 reason says the requirements are taken from the IRC (mostly section M1507.3.1) there are important differences between M40 and the IRC

M40-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M42-12

403, 403.3 (NEW), 403.3.1 (New), 403.3.2 (New), 403.3.2.1 (New), 403.3.2.1.1 (New), 403.3.2.2 (New), 403.3.2.3 (New), 403.3.2.4 (New)

Proposed Change as Submitted

Proponent: Mike Moore, Newport Ventures, representing Broan NuTone
(mmoore@newportpartnersllc.com)

Revise as follows:

403.1 Ventilation system. Except as required by Section 403.1.1, mechanical ventilation shall be provided by a method of supply air and return or exhaust air. 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.

403.1.1 R-2, R-3 and R-4 occupancies. Mechanical ventilation air requirements for R-2, R-3, and R-4 buildings three stories or less in height above grade plane shall be provided by an exhaust system, supply system, or combination thereof.

403.2 Outdoor air required. The minimum outdoor airflow rate shall be determined in accordance with Section 403.3. ~~Ventilation supply systems shall be designed to deliver the required rate of outdoor airflow to the breathing zone within each occupiable space.~~

Exception: Where the registered design professional demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.

403.2.1 Recirculation of air. The outdoor air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.
2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
3. Where mechanical exhaust is required by Note b in Table 403.3.1.1, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.1.1.
4. Where mechanical exhaust is required by Note g in Table 403.3.1.1, mechanical exhaust is required and recirculation is prohibited where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by Table 403.3.1.1, air transferred from occupiable spaces is not prohibited from serving as makeup air for required exhaust systems in such spaces as kitchens, baths, toilet rooms, elevators and smoking lounges. The amount of transfer air and exhaust air shall be sufficient to provide the flow rates as specified in Section 403.3.1.1. The required outdoor airflow rates specified in Table 403.3.1.1 shall be introduced directly into such spaces or into the occupied spaces from which air is transferred or a combination of both.

In R-2, R-3, and R-4 occupancies three stories or less in height, measures shall be taken to minimize air movement across envelope components separating dwelling units including sealing penetrations in the common walls, ceilings, and floors of each unit, and by sealing vertical chases adjacent to the units. Doors between dwelling units and common hallways shall be gasketed or otherwise made airtight.

403.3 Outdoor air and local exhaust airflow rates. R-2, R-3, and R-4 buildings three stories or less in height above grade plane 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 R-2, R-3 and R-4 three stories or less above grade plane, shall comply with this section.

403.3.1.1 Outdoor airflow rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate, determined in accordance with this section. Ventilation supply systems shall be designed to deliver the required rate of outdoor airflow to the breathing zone within each occupiable space. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3.1.1. Ventilation rates for occupancies not represented in Table 403.3.1.1 shall be those for a listed occupancy classification that is most similar in terms of occupant density, activities and building construction; or shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

With the exception of smoking lounges, the ventilation rates in Table 403.3.1.1 are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table 403.3.1.1 in accordance with accepted engineering practice.

Exception: The occupant load is not required to be determined based on the estimated maximum occupant load rate indicated in Table 403.3.1.1 where approved statistical data document the accuracy of an alternate anticipated occupant density.

(Renumber current sections as indicated in table)

| Old Section Numbering | New Section Numbering | Section Heading |
|-----------------------|-----------------------|-------------------------------------|
| 403.3 | 403.3.1.1 | Outdoor airflow rate |
| 403.3.1 | 403.3.1.1.1 | Zone outdoor airflow |
| 403.3.1.1 | 403.3.1.1.1.1 | Breathing zone outdoor airflow |
| 403.3.1.2 | 403.3.1.1.1.2 | Zone air distribution effectiveness |
| 403.3.1.3 | 403.3.1.1.1.3 | Zone outdoor airflow |
| 403.3.2 | 403.3.1.1.2 | System outdoor airflow |
| 403.3.2.1 | 403.3.1.1.2.1 | Single zone systems |
| 403.3.2.2 | 403.3.1.1.2.2 | 100-percent outdoor air systems |
| 403.3.2.3 | 403.3.1.1.2.3 | Multiple zone recirculating systems |
| 403.3.2.3.1 | 403.3.1.1.2.3.1 | Primary outdoor air fraction |
| 403.3.2.3.2 | 403.3.1.1.2.3.2 | System ventilation efficiency |
| 403.3.2.3.3 | 403.3.1.1.2.3.3 | Uncorrected outdoor air intake |
| 403.3.2.3.4 | 403.3.1.1.2.3.4 | Outdoor air intake flow rate |
| 403.4 | 403.3.1.2 | Exhaust ventilation |
| 403.5 | 403.3.1.3 | System operation |
| 403.6 | 403.3.1.4 | Variable air volume system control |
| 403.7 | 403.3.1.5 | Balancing |

403.3.2 R-2, R-3, and R-4 buildings three stories or less in height above grade plane. The design of local exhaust systems and ventilation systems for outdoor air in R-2, R-3, and R-4 occupancies three stories and less in height above grade plane shall comply with sections 403.3.2.1 through 403.3.2.4.

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system, or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate is specified in Equation 4-1.

$$Q_{OA} = 0.03A_{floor} + 7.5(N_{br} + 1) \quad \text{(Equation 4-1)}$$

where

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exception: The outdoor air ventilation system shall be permitted to be designed to operate intermittently where the system has controls that enable operation for not less than 25-percent of each 4-hour segment and the outdoor airflow rate prescribed by Equation 4-1 is multiplied by the factor determined in accordance with Table 403.3.2.1. This factor shall be applied after the outdoor airflow rate is adjusted for occupant density in accordance with Section 403.3.2.1.1.

TABLE 403.3.2.1
INTERMITTENT OUTDOOR AIR RATE FACTORS^{a,b}

| RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT | 25% | 33% | 50% | 66% | 75% | 100% |
|--|-----|-----|-----|-----|-----|------|
| Factor ^a | 4 | 3 | 2 | 1.5 | 1.3 | 1.0 |

403.3.2.1.1 Occupant density. Equation 4-1 assumes that there are two occupants in a studio or one-bedroom dwelling unit and an additional occupant for each additional bedroom. Where higher occupant densities are known, the outdoor airflow rate shall be increased by 7.5 cfm for each additional occupant. Lower occupant densities shall not be used except where approved by the code official.

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 ft² of floor area.

403.3.2.3 Local exhaust. Local exhaust systems shall be provided in kitchens, bathrooms, and toilet rooms, and shall have the capacity to exhaust the minimum airflow rate determined in accordance with Table 403.3.2.3.

TABLE 403.3.2.3
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR R-2, R-3, AND R-4 OCCUPANCIES

| AREA TO BE EXHAUSTED | EXHAUST RATE CAPACITY |
|------------------------|---|
| Kitchens | 100 cfm intermittent or 25 cfm continuous |
| Bathrooms-Toilet Rooms | 50 cfm intermittent or 20 cfm continuous |

403.3.2.4. System controls. Local exhaust systems and ventilation systems for outdoor air shall be provided with controls that enable manual override.

Reason: Historically, the basis of the mechanical ventilation requirements for all buildings within the scope of the IMC has been ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality. However, the scope of ASHRAE Standard 62.1 does not address R-2, R-3, and R-4 buildings with a height of three stories or less above grade plane. Instead, mechanical ventilation requirements for these buildings fall under the scope of ASHRAE Standard 62.2, *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*. This proposal seeks to align the mechanical ventilation requirements for R-2, R-3, and R-4 buildings of three stories or less above grade plane with the latest requirements of ASHRAE 62.2, while retaining common elements with the 2012 IRC mechanical ventilation requirements in Section M1507 wherever possible (e.g., Table 403.3.2.3 is the same as M1507.4; Table 403.3.2.1 is the same as M1507.3.3(2)).

This proposal makes no changes to the mechanical ventilation requirements of buildings other than R-2, R-3, and R-4 buildings of three stories or less above grade plane (note that the text removed from 403.2 has simply been reinserted in 403.3.1.1).

The effect of this proposal will be to simplify and clarify mechanical ventilation requirements for R-2, R-3, and R-4 buildings with a height of three stories or less above grade plane, ensuring that the IMC requirements are aligned with the latest ASHRAE standard that addresses these building types. Note that the latest ASHRAE 62.2 requirements addressing R-2, R-3, and R-4 buildings are found in addendum j to the 2010 edition. To receive a complimentary copy of addendum j, contact ASHRAE at (404) 636-8400.

Cost Impact: There is no expected increase to the cost of construction.

403.1-M-MOORE.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There would be a significant cost impact if such text was approved. Proposed Section 403.3.2.1.1 makes assumptions. Enforcement of the proposed text would be difficult. ASHRAE 62.2 has no history of implementation on which to judge its acceptability. M40-12 was approved and approval of M42-12 would cause a clash between Sections 401.2.1 and 403.3.2.1, respectively.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

403.1 Ventilation system. Except as required by Section 403.1.1, 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 or less in height above grade plane 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.

403.1.1 R-2, R-3 and R-4 occupancies. Mechanical ventilation air requirements for R-2, R-3, and R-4 buildings three stories or less in height above grade plane shall be provided by an exhaust system, supply system, or combination thereof.

403.2 Outdoor air required. The minimum outdoor airflow rate shall be determined in accordance with Section 403.3.

Exception: Where the registered design professional demonstrates that an engineered ventilation system design will prevent the maximum concentration of contaminants from exceeding that obtainable by the rate of outdoor ventilation determined in accordance with Section 403.3, the minimum required rate of outdoor air shall be reduced in accordance with such engineered system design.

403.2.1 Recirculation of air. The outdoor air required by Section 403.3 shall not be recirculated. Air in excess of that required by Section 403.3 shall not be prohibited from being recirculated as a component of supply air to building spaces, except that:

1. Ventilation air shall not be recirculated from one dwelling to another or to dissimilar occupancies.
2. Supply air to a swimming pool and associated deck areas shall not be recirculated unless such air is dehumidified to maintain the relative humidity of the area at 60 percent or less. Air from this area shall not be recirculated to other spaces where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.
3. Where mechanical exhaust is required by Note b in Table 403.3.1.1, recirculation of air from such spaces shall be prohibited. All air supplied to such spaces shall be exhausted, including any air in excess of that required by Table 403.3.1.1.
4. Where mechanical exhaust is required by Note g in Table 403.3.1.1, mechanical exhaust is required and recirculation is prohibited where more than 10 percent of the resulting supply airstream consists of air recirculated from these spaces.

403.2.2 Transfer air. Except where recirculation from such spaces is prohibited by Table 403.3.1.1, air transferred from occupiable spaces is not prohibited from serving as makeup air for required exhaust systems in such spaces as kitchens, baths, toilet rooms, elevators and smoking lounges. The amount of transfer air and exhaust air shall be sufficient to provide the flow rates as specified in Section 403.3.1.1. The required outdoor airflow rates specified in Table 403.3.1.1 shall be introduced directly into such spaces or into the occupied spaces from which air is transferred or a combination of both.

In R-2, R-3, and R-4 occupancies three stories or less in height, measures shall be taken to minimize air movement across envelope components separating dwelling units including sealing penetrations in the common walls, ceilings, and floors of each unit, and by sealing vertical chases adjacent to the units. Doors between dwelling units and common hallways shall be gasketed or otherwise made airtight.

403.3 Outdoor air and local exhaust airflow rates. Group R-2, R-3, and R-4 occupancies three stories or less in height above grade plane 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 R-2, R-3 and R-4 three stories or less above grade plane, shall comply with this section.

403.3.1.1 Outdoor airflow rate. Ventilation systems shall be designed to have the capacity to supply the minimum outdoor airflow rate determined in accordance with this section. Ventilation supply systems shall be designed to deliver the required rate of outdoor airflow to the breathing zone within each occupiable space. The occupant load utilized for design of the ventilation system shall not be less than the number determined from the estimated maximum occupant load rate indicated in Table 403.3.1.1. Ventilation rates for occupancies not represented in Table 403.3.1.1 shall be those for a listed occupancy classification that is most similar in terms of occupant density, activities and building construction; or shall be determined by an approved engineering analysis. The ventilation system shall be designed to supply the required rate of ventilation air continuously during the period the building is occupied, except as otherwise stated in other provisions of the code.

With the exception of smoking lounges, the ventilation rates in Table 403.3.1.1 are based on the absence of smoking in occupiable spaces. Where smoking is anticipated in a space other than a smoking lounge, the ventilation system serving the space shall be designed to provide ventilation over and above that required by Table 403.3.1.1 in accordance with accepted engineering practice.

Exception: The occupant load is not required to be determined based on the estimated maximum occupant load rate indicated in Table 403.3.1.1 where approved statistical data document the accuracy of an alternate anticipated occupant density.

(Renumber current sections as indicated in table)

| Old Section Numbering | New Section Numbering | Section Heading |
|-----------------------|-----------------------|-------------------------------------|
| 403.3 | 403.3.1.1 | Outdoor airflow rate |
| 403.3.1 | 403.3.1.1.1 | Zone outdoor airflow |
| 403.3.1.1 | 403.3.1.1.1.1 | Breathing zone outdoor airflow |
| 403.3.1.2 | 403.3.1.1.1.2 | Zone air distribution effectiveness |
| 403.3.1.3 | 403.3.1.1.1.3 | Zone outdoor airflow |
| 403.3.2 | 403.3.1.1.2 | System outdoor airflow |
| 403.3.2.1 | 403.3.1.1.2.1 | Single zone systems |
| 403.3.2.2 | 403.3.1.1.2.2 | 100-percent outdoor air systems |
| 403.3.2.3 | 403.3.1.1.2.3 | Multiple zone recirculating systems |
| 403.3.2.3.1 | 403.3.1.1.2.3.1 | Primary outdoor air fraction |
| 403.3.2.3.2 | 403.3.1.1.2.3.2 | System ventilation efficiency |
| 403.3.2.3.3 | 403.3.1.1.2.3.3 | Uncorrected outdoor air intake |
| 403.3.2.3.4 | 403.3.1.1.2.3.4 | Outdoor air intake flow rate |
| 403.4 | 403.3.1.2 | Exhaust ventilation |
| 403.5 | 403.3.1.3 | System operation |
| 403.6 | 403.3.1.4 | Variable air volume system control |
| 403.7 | 403.3.1.5 | Balancing |

403.3.2 R-2, R-3, and R-4 buildings three stories or less in height above grade plane. The design of local exhaust systems and ventilation systems for outdoor air in R-2, R-3, and R-4 occupancies three stories and less in height above grade plane shall comply with sections 403.3.2.1 through 403.3.2.4.

403.3.2.1 Outdoor air for dwelling units. An outdoor air ventilation system consisting of a mechanical exhaust system, supply system, or combination thereof shall be installed for each dwelling unit. Local exhaust or supply systems, including outdoor air ducts connected to the return side of an air handler, are permitted to serve as such a system. The outdoor air ventilation system shall be designed to provide the required rate of outdoor air continuously during the period that the building is occupied. The minimum continuous outdoor airflow rate is specified in Equation 4-1.

$$Q_{OA} = 0.03 \underline{1}A_{floor} + 7.5(N_{br} + 1) \quad \text{(Equation 4-1)}$$

where

Q_{OA} = outdoor airflow rate, cfm

A_{floor} = floor area, ft²

N_{br} = number of bedrooms; not to be less than one

Exception: The outdoor air ventilation system shall be permitted to be designed to operate intermittently where the system has controls that enable operation for not less than 25-percent 1 hour of each 4-hour segment and period. The average outdoor airflow rate over the 4-hour period shall be not less than that prescribed by Equation 4-1 is multiplied by the factor determined in accordance with Table 403.3.2.1. This factor shall be applied after the outdoor airflow rate is adjusted for occupant density in accordance with Section 403.3.2.1.1.

TABLE 403.3.2.1
INTERMITTENT OUTDOOR AIR RATE FACTORS^{a,b}

| RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT | 25% | 33% | 50% | 66% | 75% | 100% |
|--|-----|-----|-----|-----|-----|------|
| Factor ^a | 4 | 3 | 2 | 1.5 | 1.3 | 1.0 |

403.3.2.1.1 Occupant density. Equation 4-1 assumes that there are two occupants in a studio or one-bedroom dwelling unit and an additional occupant for each additional bedroom. Where higher occupant densities are known, the outdoor airflow rate shall be increased by 7.5 cfm for each additional occupant. Lower occupant densities shall not be used except where approved by the code official.

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 ft² of floor area.

403.3.2.3 Local exhaust. Local exhaust systems shall be provided in kitchens, bathrooms, and toilet rooms, and shall have the capacity to exhaust the minimum airflow rate determined in accordance with Table 403.3.2.3.

TABLE 403.3.2.3
MINIMUM REQUIRED LOCAL EXHAUST RATES FOR GROUP R-2, R-3, AND R-4 OCCUPANCIES

| AREA TO BE EXHAUSTED | EXHAUST RATE CAPACITY |
|------------------------|---|
| Kitchens | 100 cfm intermittent or 25 cfm continuous |
| Bathrooms-Toilet Rooms | 50 cfm intermittent or 20 cfm continuous |

403.3.2.4. System controls. Local exhaust systems and ventilation systems for outdoor air shall be provided with controls that enable manual override.

Commenter's Reason: The comment and proposal are intended to clarify and simplify the mechanical ventilation compliance path for R-2, R-3, and R-4 buildings three stories or less in height above grade plane to be consistent with those in the 2012 IRC and ASHRAE 62.2 as much as possible. The reason for this is that these buildings more closely match the scope of ASHRAE 62.2 than ASHRAE 62.1, and so they should not be subject to the rigor of the design calculations of ASHRAE 62.1/IMC Section 403 (Note that ASHRAE 62.1 serves as the precedent for IMC Section 403, and the requirements are very similar). One big advantage gained by aligning the mechanical ventilation path for these buildings with ASHRAE 62.2 and the 2012 IRC Section M1507 is that only one equation is necessary in the proposed comment instead of the eight equations that a designer could have to solve if she were to follow the prescriptive requirements of Section 403, which applies to all commercial buildings. Further, the proposed text does not reference ASHRAE 62.2, so the path is simplified by not requiring the user to reference any external standards or codes.

Significant changes in the comment that provide improvements to the original proposal include:

- Outdoor air flow rates are now in accordance with ASHRAE 62.2-2010 and 2012 IRC M1507
- Removed requirement for manual override control (doesn't really make sense for hotels)
- Removed requirement to adjust flow rate when future occupancy rates are known (this is rarely the case and is unenforceable)
- Removed language to require air sealing of individual units (unenforceable in its proposed format; also this is already covered within the IECC)
- Removed the intermittent ventilation table while retaining the option to provide intermittent outdoor air (simplified and consistent with 2012 IRC M1507.3.3)

Addressing the committee objections:

1. Committee: There would be a significant cost impact if such text was approved. ANSWER: Not true, since the IECC already requires mechanical ventilation for these occupancies. Further, these systems are typically provided with an upgraded bathroom exhaust fan, so the marginal cost of a system is typically \$100-\$150 versus an entry level bath fan.
2. Committee: Proposed Section 403.3.2.1.1 makes assumptions. Enforcement of the proposed text would be difficult. ANSWER: I agree, and have removed this text.
3. Committee: The latest ASHRAE 62.2 addenda on which part of this proposal was based has no history of implementation on which to judge its acceptability. ANSWER: I agree, and have removed the parts of the proposal that were based on requirements in the addenda.

4. Committee: M40-12 was approved and approval of M42-12 would cause a clash between Sections 401.2.1 and 403.3.2.1, respectively. ANSWER: There is no clash between the two sections. Rather, Section 403.3.2.1 provides greater clarification for code officials and designers on what a compliant system looks like, to remove confusion that could otherwise result from just having M40-12 and no complementary text.

Cost impact: This proposal will not increase the cost of construction. If anything, it will reduce the cost of construction by simplifying system design.

M42-12

Final Action: AS AM AMPC____ D

M50-12

403

Proposed Change as Submitted

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers

Revise as follows:

403.3.1.1 Breathing zone outdoor airflow. The outdoor airflow rate required in the *breathing zone* (V_{bz}) of the occupiable space or spaces in a zone shall be not less than the value determined in accordance with Equation 4-1.

$$V_{bz} = R_p P_z + R_a A_z \quad (\text{Equation 4-1})$$

Where:

A_z = *zone floor area*: the net occupiable floor area of the space or spaces in the zone.

P_z = *zone population*: the number of people in the space or spaces in the zone as determined by Section 403.3.1.4.

R_p = *people outdoor air rate*: the outdoor airflow rate required per person from Table 403.3

R_a = *area outdoor air rate*: the outdoor airflow rate required per unit area from Table 403.3

403.3.1.2 Zone air distribution effectiveness. The *zone air distribution effectiveness* (E_z) shall be not greater than the value determined using Table 403.3.1.2.

403.3.1.4 Design Zone Population. Design zone population (P_z) shall equal the largest (peak) number of people expected to occupy the *ventilation zone* during typical usage.

Exceptions:

1. Where the number of people expected to occupy the *ventilation zone* fluctuates, a *zone population* equal to the average number of people shall be permitted to be used,
2. Where the largest or average number of people expected to occupy the *ventilation zone* cannot be established for a specific design, an estimated value for *zone population* shall be permitted to be used, provided that such value is the product of the *net occupiable area* of the *ventilation zone* and the occupant density listed in Table 403.3.

403.3.2 System outdoor airflow. The outdoor air required to be supplied by each ventilation system shall be determined in accordance with Section 403.3.2.1 through 403.2.3 as a function of system type and zone outdoor airflow rates.

403.3.2.1 Single zone systems. ~~When~~ For *ventilation* systems wherein one or more air handler supplies a mixture of outdoor air and recirculated return air to only one zone, the system *outdoor air intake flow rate* (V_{ot}) shall be determined in accordance with Equation 4-3.

$$V_{ot} = V_{oz} \quad (\text{Equation 4-3})$$

403.3.2.2 100% outdoor air systems. ~~When~~ For *ventilation* systems wherein one or more air handler supplies only outdoor air to one or more zones, the system *outdoor air intake flow rate* (V_{ot}) shall be determined using Equation 4-4.

$$V_{ot} = \sum \text{all zones } V_{oz} \quad (\text{Equation 4-4})$$

403.3.2.3 Multiple zone recirculating systems. Where one air handler supplies a mixture of outdoor air and recirculated return air to more than one zone, the system outdoor air intake flow rate (V_{of}) shall be determined in accordance with Sections 403.3.2.3.1 through 403.3.2.3.4.

$$Z_p = V_{of} / V_{pz} \quad (\text{Equation 4-5})$$

Where

V_{pz} = Primary airflow: The airflow rate supplied to the zone from the air-handling unit at which the outdoor air intake is located. It includes outdoor intake air and recirculated air from that air-handling unit but does not include air transferred or air recirculated to the zone by other means. For design purposes, V_{pz} shall be the zone design primary airflow rate, except for zones with variable air volume supply and V_{pz} shall be the lowest expected primary airflow rate to the zone when it is fully occupied.

**TABLE 403.3
MINIMUM VENTILATION RATES**

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ² ^a | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT ² ^a | EXHAUST AIRFLOW RATE CFM/FT ² ^a |
|--|---|--|--|--|
| Correctional facilities | | | | |
| Cells without plumbing fixtures | 25 | <u>510</u> | 0.12 | — |
| with plumbing fixtures ⁹ | 25 | <u>510</u> | 0.12 | 1.0 |
| Dining halls (see food and beverage service) | — | — | — | — |
| Guard stations | 15 | 5 | 0.06 | — |
| Day room | 30 | 5 | 0.06 | — |
| Booking/waiting | 50 | 7.5 | 0.06 | — |
| Dry cleaners, laundries | | | | |
| Coin-operated dry cleaner | 20 | 15 | — | — |
| Coin-operated laundries | 20 | 7.5 | 0.06 <u>0.12</u> | — |
| Commercial dry cleaner | 30 | 30 | — | — |
| Commercial laundry | 10 | 25 | — | — |
| Storage, pick up | 30 | 7.5 | 0.12 | — |
| Education | | | | |
| Auditoriums | 150 | 5 | 0.06 | — |
| Corridors (see public spaces) | — | — | 0.06 | — |
| Media center | 25 | 10 | 0.12 | — |
| Sports locker rooms ⁹ | — | — | — | 0.5 |
| Music/theater/dance | 35 | 10 | 0.06 | — |
| Smoking lounges ^b | 70 | 60 | — | — |
| Day care (through age 4) | 25 | 10 | 0.18 | — |
| Classrooms (ages 5-8) | 25 | 10 | 0.12 | — |

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ^{2 a} | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _a CFM/FT ^{2 a} | EXHAUST AIRFLOW RATE CFM/FT ^{2 a} |
|--|--|---|--|--|
| Classrooms (age 9 plus) | 35 | 10 | 0.12 | — |
| Lecture classroom | 65 | 7.5 | 0.06 | — |
| Lecture hall (fixed seats) | 150 | 7.5 | 0.06 | — |
| Art classroom ^g | 20 | 10 | 0.18 | 0.7 |
| Science laboratories ^g | 25 | 10 | 0.18 | 1.0 |
| Wood/metal shops ^g | 20 | 10 | 0.18 | 0.5 |
| Computer lab | 25 | 10 | 0.12 | — |
| Multiuse assembly | 100 | 7.5 | 0.06 | — |
| Locker/dressing rooms ^g | — | — | — | 0.25 |
| Food and beverage service | | | | |
| Bars, cocktail lounges | 100 | 7.5 | 0.18 | — |
| Cafeteria, fast food | 100 | 7.5 | 0.18 | — |
| Dining rooms | 70 | 7.5 | 0.18 | — |
| Kitchens (cooking) ^b | <u>—20</u> | <u>—7.5</u> | <u>—0.12</u> | 0.7 |
| Hospitals, nursing and convalescent homes | | | | |
| Autopsy rooms ^b | — | — | — | 0.5 |
| Medical procedure rooms | 20 | 15 | — | — |
| Operating rooms | 20 | 30 | — | — |
| Patient rooms | 10 | 25 | — | — |
| Physical therapy | 20 | 15 | — | — |
| Recovery and ICU | 20 | 15 | — | — |
| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ^{2 a} | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _a CFM/FT ^{2 a} | EXHAUST AIRFLOW RATE CFM/FT ^{2 a} |
| Hotels, motels, resorts and dormitories | | | | |
| Multipurpose assembly | <u>120</u> | 5 | 0.06 | — |
| Bathrooms/toilet—private ^g | | — | — | 25/50 ^f |
| Bedroom/living room | <u>10</u> | 5 | 0.06 | — |
| Conference/meeting | <u>50</u> | 5 | 0.06 | — |
| Dormitory sleeping areas | | 5 | 0.06 | — |
| Gambling casinos | <u>120</u> | 7.5 | 0.18 | — |
| Lobbies/prefunction | <u>120</u> | 7.5 | 0.06 | — |
| Offices | | | | |
| Conference rooms | 50 | 5 | 0.06 | — |
| Office spaces | 5 | 5 | 0.06 | — |
| Reception areas | 30 | 5 | 0.06 | — |
| Telephone/data entry | 60 | 5 | 0.06 | — |

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ² ^a | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _a CFM/FT ² ^a | EXHAUST AIRFLOW RATE CFM/FT ² ^a |
|--|--|---|---|---|
| Main entry lobbies | 10 | 5 | 0.06 | — |
| Private dwellings, single and multiple | | | | |
| Garages, common for multiple units ^b | — | — | — | 0.75 |
| Garages, separate for each dwelling ^b | — | — | — | 100 cfm per car |
| Kitchens ^b | — | — | — | 25/100 ^f |
| Living areas ^c | Based upon number of bedrooms. First bedroom, 2; each additional bedroom, 1 | 0.35 ACH but not less than 15 cfm/person | — | — |
| Toilet rooms and bathrooms ^g | — | — | — | 20/50 ^f |
| Public spaces | | | | |
| Corridors | — | — | 0.06 | — |
| Elevator car | — | — | — | 1.0 |
| Shower room (per shower head) ^g | — | — | — | 50/20 ^f |
| Smoking lounges ^b | 70 | 60 | — | — |
| Toilet rooms — public ^g | — | — | — | 50/70 ^e |
| Places of religious worship | 120 | 5 | 0.06 | — |
| Courtrooms | 70 | 5 | 0.06 | — |
| Legislative chambers | 50 | 5 | 0.06 | — |
| Libraries | 10 | 5 | 0.12 | — |
| Museums (children's) | 40 | 7.5 | 0.12 | — |
| Museums/galleries | 40 | 7.5 | 0.06 | — |
| Retail stores, sales floors and showroom floors | | | | |
| Sales (except as below) | 15 | 7.5 | 0.12 | — |
| Dressing rooms | — | — | — | 0.25 |
| Mall common areas | 40 | 7.5 | 0.06 | — |
| Shipping and receiving | <u>—2</u> | <u>—10</u> | 0.12 | — |
| Smoking lounges ^b | 70 | 60 | — | — |
| Storage rooms | — | — | 0.12 | — |
| Warehouses (see storage) | — | <u>—10</u> | <u>—0.06</u> | — |

**TABLE 403.3—continued
MINIMUM VENTILATION RATES**

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ² ^a | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _a CFM/FT ² ^a | EXHAUST AIRFLOW RATE CFM/FT ² ^a |
|---|---|---|---|---|
| Specialty shops | | | | |
| Automotive motor-fuel dispensing stations ^b | — | — | — | 1.5 |
| Barber | 25 | 7.5 | 0.06 | 0.5 |
| Beauty salons ^b | 25 | 20 | 0.12 | 0.6 |
| Nail salons ^{b,h} | 25 | 20 | 0.12 | 0.6 |
| Embalming room ^b | — | — | — | 2.0 |
| Pet shops (animal areas) ^b | 10 | 7.5 | 0.18 | 0.9 |
| Supermarkets | 8 | 7.5 | 0.06 | — |
| Sports and amusement | | | | |
| Disco/dance floors | 100 | 20 | 0.06 | — |
| Bowling alleys (seating areas) | 40 | 10 | 0.12 | — |
| Game arcades | 20 | 7.5 | 0.18 | — |
| Ice arenas without combustion engines | — | — | 0.30 | 0.5 |
| Gym, stadium, arena (play area) | — | — | 0.30 | — |
| Spectator areas | 150 | 7.5 | 0.06 | — |
| Swimming pools (pool and deck area) | — | — | 0.48 | — |
| Health club/aerobics room | 40 | 20 | 0.06 | — |
| Health club/weight room | 10 | 20 | 0.06 | — |
| Storage | | | | |
| Repair garages, enclosed parking garages ^{b,d} | — | — | — | 0.75 |
| Warehouses | — | —10 | 0.06 | — |
| Theaters | | | | |
| Auditoriums (see education) | — | — | — | — |
| Lobbies | 150 | 5 | 0.06 | — |
| Stages, studios | 70 | 10 | 0.06 | — |
| Ticket booths | 60 | 5 | 0.06 | — |
| Transportation | | | | |
| Platforms | 100 | 7.5 | 0.06 | — |
| Transportation waiting | 100 | 7.5 | 0.06 | — |
| Workrooms | | | | |
| Bank vaults/safe deposit | 5 | 5 | 0.06 | — |
| Darkrooms | — | — | — | 1.0 |

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ² ^a | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R _a CFM/FT ² ^a | EXHAUST AIRFLOW RATE CFM/FT ² ^a |
|------------------------------|---|---|---|---|
| Copy, printing rooms | 4 | 5 | 0.06 | 0.5 |
| Meat processing ^c | 10 | 15 | — | — |
| Pharmacy (prep. area) | 10 | 5 | 0.18 | — |
| Photo studios | 10 | 5 | 0.12 | — |
| Computer (without printing) | 4 | 5 | 0.06 | — |

For SI: 1 cubic foot per minute = 0.0004719 m³/s, 1 ton = 908 kg, 1 cubic foot per minute per square foot = 0.00508 m³/(s · m²), °C = [(°F) -32]/1.8, 1 square foot = 0.0929 m².

- a. Based upon *net occupiable floor area*.
- b. Mechanical exhaust required and the recirculation of air from such spaces is 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 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 (see Section 403.2.1, Items 2 and 4).
- h. For nail salons, each nail station shall be provided with a *source capture system* capable of exhausting not less than 50 cfm per station.

Reason: The current ventilation criteria in the IMC are essentially based on ASHRAE Standard 62-2007. Research has been conducted since then our knowledge of indoor air quality and ventilation has evolved. In response to these actions ASHRAE has enhanced Standard 62.1, upon which the IMC is based. This code change would make the IMC consistent with ventilation rate procedures defined in ANSI/ASHRAE Standard 62.1-2010.

Substantiation: ANSI/ASHRAE Standard 62.1-2010 is a consensus national standard. Standard 62.1 ventilation rate calculation procedure has been substantially updated in the 2010 version to reflect the latest research on building indoor air quality. The procedure now requires designers to account for pollutant sources other than occupants, such as building materials and furnishings, and to account for the efficiency of the ventilation system to deliver outdoor air to the breathing zone. Ventilation systems designed using the new procedures will result in slightly lower outdoor rates for most occupancies compared to the current code, reducing first costs and energy costs.

Cost Impact: The code change proposal will not increase the cost of construction, and in some instances will reduce the first cost of construction. Engineering design effort and jurisdictional plan review processes will not be materially affected due to the availability and greater specificity of compliance tools.

403.3.1.1-M-FERGUSON.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed text in Section 403.3.1.4 is subjective and unenforceable.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

403.3.1.4 Design Zone Population. ~~Design zone population (P_z) shall equal the largest (peak) number of people expected to occupy the ventilation zone during typical usage.~~

Exceptions:

1. ~~Where the number of people expected to occupy the ventilation zone fluctuates, a zone population equal to the average number of people shall be permitted to be used,~~
2. ~~Where the largest or average number of people expected to occupy the ventilation zone cannot be established for a specific design, an estimated value for zone population shall be permitted to be used, provided that such value is the product of the net occupiable area of the ventilation zone and the occupant density listed in Table 403.3.~~

**TABLE 403.3
MINIMUM VENTILATION RATES**

| OCCUPANCY CLASSIFICATION | OCCUPANT DENSITY #/1000 FT ² ^a | PEOPLE OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_p CFM/PERSON | AREA OUTDOOR AIRFLOW RATE IN BREATHING ZONE, R_a CFM/FT ² ^a | EXHAUST AIRFLOW RATE CFM/FT ² ^a |
|--|---|--|--|--|
| Correctional facilities | | | | |
| Cells without plumbing fixtures | 25 | <u>540</u> | 0.12 | — |
| with plumbing fixtures ⁹ | 25 | <u>540</u> | 0.12 | 1.0 |
| Hotels, motels, resorts and dormitories | | | | |
| Lobbies/prefunction | <u>42030</u> | 7.5 | 0.06 | — |

(Portions of proposal not shown are unaffected by this Public Comment.)

Commenter's Reason: The remainder of the changes from the proposal are not included as this comment does not intend to modify them. The intent of this modification is only to make the ventilation rates in Table 403.3 consistent with the current published version of ASHRAE Standard 62.1-2010. The proposed new requirements for Zone Population are being removed in response to objections raised during the code hearings. All other modifications from the original proposal are not shown and remain unchanged by this public comment.

M50-12

Final Action: AS AM AMPC____ D

M52-12

403.4

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

403.4 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements in Table 403.3. Where Table 403.3 specifies a people outdoor airflow rate, an area outdoor airflow rate, or both for an occupancy that also has an exhaust airflow rate specified by Table 403.3, the space served by the required exhaust airflow shall be supplied with outdoor air at a rate not less than that determined in accordance with Section 403.3 and such outdoor air shall be either a component of the makeup air for the required exhaust airflow or it shall be otherwise relieved or exhausted. Exhaust *makeup air* shall be permitted to be any combination of outdoor air, recirculated air and transfer air provided that the outdoor air requirements of Table 403.3 are satisfied except as limited in accordance with Section 403.2.

Reason: Consistent with the intent of ASHRAE 62.1, the exhaust rate prescribed by the last (far right) column of Table 403.3 is NOT applied in addition to the rate determined from the other columns. Note that the exhaust column rate will almost always be greater than the rate determined from the other columns, therefore, the exhaust rate column rules. For example, see table entries for cells with plumbing, wood shops, science labs, barber shops, ice arenas and copy rooms. This raises the question of why are there numbers in the first 3 columns if they are overridden by the exhaust column. According to ASHRAE, the reason is to make sure that at least that much outdoor air is introduced into the space as makeup air for the exhaust system, with the rest of the makeup air being transfer air from other spaces. For example, assume a standalone barber shop of 1000 sq ft with a single zone and assume a zone effectiveness (E_z) of 1. So, 0.5 times 1000 = 500 CFM for the exhaust column. For the other columns, 7.5 times 25 occupants = 188CFM and 0.06 times 1000 = 60 CFM; 60 plus 188 = 248 CFM which is less than 500. The intent is that 500CFM is the required ventilation rate for the shop and the makeup air has to be composed of at least 248 CFM of outdoor air and the remainder of 252 CFM can be transfer air or outdoor air. Now that it can be seen how this is supposed to work, it is apparent that Section 403.4 fails to explain this. The code user would have no idea based on current text.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

403.4-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

403.4 Exhaust ventilation. Exhaust airflow rate shall be provided in accordance with the requirements in Table 403.3. Outdoor air introduced into a space by an exhaust system shall be considered as contributing to the outdoor airflow required by Table 403.3. Where Table 403.3 specifies a people outdoor airflow rate, an area outdoor airflow rate, or both for an occupancy that also has an exhaust airflow rate specified by Table 403.3, the space served by the required exhaust airflow shall be supplied with outdoor air at a rate not less than that determined in accordance with Section 403.3 and such outdoor air shall be either a component of the makeup air for the required exhaust airflow or it shall be otherwise relieved or exhausted. Exhaust makeup air shall be permitted to be any combination of outdoor air, recirculated air and transfer air provided that the outdoor air requirements of Table 403.3 are satisfied.

AIR, MAKEUP. Air that is provided to replace air being exhausted Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration

AIR, OUTDOOR AIR. Air taken from the outdoors, and therefore not previously circulated through the system. Ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration

AIR, TRANSFER. Air moved from one indoor space to another

INFILTRATION. Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors, and walls from unconditioned spaces or the outdoors caused by pressure differences across these openings due to wind, inside-outside temperature differences (stack effect), and imbalances between supply and exhaust airflow rates.

EXFILTRATION. Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors, and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings due to wind, inside-outside temperature differences (stack effect), and imbalances between supply and exhaust airflow rates.

TABLE 403.3.1.2
ZONE AIR DISTRIBUTION EFFECTIVENESS^{a,b,c,d,e}

| Air Distribution Configuration | Ez |
|---|-----------|
| Ceiling or floor supply of cool air | 1.0f |
| Ceiling or floor supply of warm air and floor return | 1.0 |
| Ceiling supply of warm air and ceiling return | 0.8g |
| Floor supply of warm air and ceiling return | 0.7 |
| Makeup air drawn in on the opposite side of the room from the exhaust and/or return | 0.8 |
| Makeup air drawn in near to the exhaust and/or return location | 0.5 |

- "Cool air" is air cooler than space temperature.
- "Warm air" is air warmer than space temperature.
- "Ceiling" includes any point above the breathing zone.
- "Floor" includes any point below the breathing zone.
- ~~"Makeup air" is air supplied or transferred to a zone to replace air removed from the zone by exhaust or return systems.~~
- Zone air distribution effectiveness of 1.2 shall be permitted for systems with a floor supply of cool air and ceiling return, provided that low velocity displacement ventilation achieves unidirectional flow and thermal stratification.
- Zone air distribution effectiveness of 1.0 shall be permitted for systems with a ceiling supply of warm air, provided that supply air temperature is less than 15°F above space temperature and provided that the 150 foot-per-minute supply air jet reaches to within 41/2 feet of floor level.

501.4 Pressure equalization. Mechanical exhaust systems shall be sized to remove the quantity of air required by this chapter to be exhausted. The system shall operate when air is required to be exhausted. Where mechanical exhaust is required in a room or space in other than occupancies in R-3 and dwelling units in R-2, such space shall be maintained with a neutral or negative pressure. If a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical exhaust for a room, adequate means shall be provided for the natural or mechanical exhaust of the excess air supplied. If only a mechanical exhaust system is installed for a room or if a greater quantity of air is removed by a mechanical exhaust system than is supplied by a mechanical ventilating supply system for a room, adequate makeup air consisting of supply air, transfer air or outdoor air shall be provided to satisfy the deficiency. The calculated building infiltration rate shall not be used to satisfy the requirements of this section.

Commenter's Reason: Overview: The intention of M52, which was approved as submitted, was to clarify the relationship between exhaust air, outdoor air, transfer air, and makeup air. This comment proposes to further simplify and clarify this section by updating key definitions to be consistent with ASHRAE 62.1 and then deleting redundant/outdated text in Sections 403.4, Table 403.3.1.2, and 501.4. If approved, this change should reduce a great deal of confusion that exists over these terms and their application.

Detailed Explanation: M52 added the second sentence of Section 403.4 to describe the physical relationship between exhaust air, makeup air, outdoor air, and transfer air. It sought to clarify that exhaust air can result in outdoor air provided to a space. This clarification is helpful because the current IMC definition of outdoor air (*"air from the outdoors, and therefore not previously circulated through the system"*) does not provide any information on how outdoor air can be provided by an exhaust system. By updating the definition of outdoor air to the same definition used in ASHRAE 62.1 (the standard upon which this section was originally based), this is clarified (i.e., exhaust systems provide outdoor air through infiltration). Section 403.4 also seeks to clarify the origin/composition of makeup air. This is currently necessary because the current IMC definition of makeup air is inadequate. By updating the definition of makeup air to that used in ASHRAE 62.1 (i.e., "...any combination of outdoor air and transfer air"), this is corrected, and there is no longer a need to explain the origin/composition of makeup air in Section 403.4.

Table 403.3.1.2, based on ASHRAE 62.1 Table 6-2, has a definition of makeup air that should be removed for two reasons. First, definitions belong in chapter 2. Second, ASHRAE 62.1 Table 6-2 does not support this definition. For consistency, there should only be one definition of makeup air within the IMC and it should correlate with ASHRAE 62.1.

Regarding Section 501.4, with makeup air now defined to include outdoor air and transfer air, it is no longer necessary to have the explanation of makeup air in this section, only the reference. Also, proposal M61 (approved as submitted by the IMC committee in Dallas) removed the last sentence of this section. Hence, this sentence has been stricken in keeping with the committee's action.

Three new definitions are added for Transfer Air, Infiltration, and Exfiltration. Transfer Air (Section 403.2.2) and Infiltration (Section 401.2) are currently referenced within the IMC but not defined within the IMC. All three of these terms are also referenced within the ASHRAE 62.1 definitions of makeup air and outdoor air that are proposed within this comment, and so should be defined here for clarity.

M52-12

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M56-12

202, 428 (New)

Proposed Change as Submitted

Proponent: Karen Hobbs, Natural Resources Defense Council, representing self (khobbs@nrdc.org); Harry Misuriello, American Council for an Energy-Efficient Economy, representing himself (misuriello@verizon.net)

Add new definition as follows:

EVAPORATIVE COOLING SYSTEM. A system for cooling the air in a building or space by removing heat from the outdoor air by means of the evaporation of water. The system forces air through wet porous pads, causing the latent heat of evaporation to cool the air. Water is continuously circulated over the pads to replenish the evaporated water. Where the cooled air is sent directly into the building, the system is referred to as “direct evaporative cooling”. Where the cooled air is sent through heat exchangers recirculating indoor air, the system is referred to as “indirect evaporative cooling”.

Add new text as follows:

SECTION 428 **EVAPORATIVE COOLING SYSTEMS**

428.1 Evaporative Cooling. Evaporative cooling systems shall utilize use less than 4 gallons of water per ton-hour of cooling when system controls are set to maximum water use. Water use, expressed in maximum water use per ton-hour of cooling, shall be marked on the device and included in product user manuals, product information literature and installation instructions. Water use information shall be readily available at the time of code compliance inspection.

428.1.1 Overflow Alarm. The evaporative cooling system shall be equipped with an overflow alarm to alert building owners, tenants or maintenance personnel when the water refill valve continues to allow water to flow into the reservoir when the reservoir is full. The alarm shall have a minimum sound pressure level rating of 85 dB measured at a distance of ten feet.

428.1.2 Automatic Pump Shut-off. The evaporative cooling system shall automatically cease pumping water to the evaporation pads when there is no demand for sensible heat reduction.

428.1.3 Cooler Reservoir Discharge. A water quality management system is required utilizing a timer or water quality sensor. Where timers are used, the time interval between periods of discharging of water from the reservoir shall be set for six hours or greater of cooler operation. Continuous discharge and continuous bleed systems are prohibited.

428.1.3.1 Discharge Water Reuse. Where a nonpotable water source system exists on site, evaporative cooler discharge water shall be collected and discharged to such collection system.

Exception: Where the reservoir water will adversely affect the quality of the nonpotable water supply making the nonpotable water unusable for its intended purposes.

428.1.3.2 Discharge Water to Drain. Where discharge water is not required to be recovered for reuse, the sump overflow drain line shall discharge to an approved location. Drain lines shall not be directly connected to any drainage system. Where the discharge water is discharged into a sanitary drain, an air gap of not less than 6 inches is required between the termination of the discharge line and the drain opening. The drain line shall terminate in a location that is readily visible to the building owner, tenants or maintenance personnel.

Reason:

1. This proposal was approved by the IGCC in May, 2011, as submitted by the Alliance for Water Efficiency (AWE) and Natural Resources Defense Council (NRDC).
2. Evaporative coolers can waste large quantities of water. There is great variance in water efficiencies of different makes and models. Limiting systems to use less than 4 gallons of water per hour is a relatively low standard and should be easily met by most systems.
3. NRDC estimates that nationwide adoption of the revised values in this proposal, effective 2016, can be expected to save:
 - 19 million gallons of water per day by 2030;
 - 9.3 million kilowatt hours per year by 2030; and
 - Consumers will realize more than \$27 million dollars in reduced electricity and water costs.
4. Faulty float valves can cause reservoirs to overflow, sending thousands of gallons of water into the wastewater line without the problem detected. Alarms are needed to alert the operator of this waste.
5. The discharge water is nonpotable, but of sufficient quality to be reused for other applications.
6. There are no known water use standards for these systems by AHRI or any other known organization.

Cost Impact: None

428 (NEW)-P-HOBBS.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed text would cause a significant cost increase. Product user manuals (Section 428.1) are not enforceable. This proposal is not coordinated with current Section 928.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Karen Hobbs, Natural Resources Defense Council, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

EVAPORATIVE COOLING SYSTEM. A system for cooling the air in a building or space by removing heat from the outdoor air by means of the evaporation of water. The system forces air through wet porous pads, causing the latent heat of evaporation to cool the air. Water is continuously circulated over the pads to replenish the evaporated water. Where the cooled air is sent directly into the building, the system is referred to as "direct evaporative cooling". Where the cooled air is sent through heat exchangers recirculating indoor air, the system is referred to as "indirect evaporative cooling".

SECTION 928 EVAPORATIVE COOLING SYSTEMS

928.1 Evaporative Cooling. Evaporative cooling systems shall utilize use less than 4- 5 gallons of water per ton-hour of cooling when system controls are set to maximum water use. Water use, expressed in maximum water use per ton-hour of cooling, shall be marked on the device. and included in product user manuals, product information literature and installation instructions. Water use information shall be readily available at the time of code compliance inspection.

928.1.1 Overflow Alarm. The evaporative cooling system shall be equipped with an overflow alarm to alert building owners, tenants or maintenance personnel when the water refill valve continues to allow water to flow into the reservoir when the reservoir is full. The alarm shall have a minimum sound pressure level rating of 85 dB measured at a distance of ten feet.

928.1.2 Automatic Pump Shut-off. The evaporative cooling system shall automatically cease pumping water to the evaporation pads when there is no demand for sensible heat reduction is not needed.

928.1.3 Cooler Reservoir Discharge. A water quality management system is required utilizing a timer or water quality sensor. Where timers are used, the time interval between periods of discharging of water from the reservoir shall be set for six hours or greater of cooler operation. Continuous discharge and continuous bleed systems are prohibited.

928.1.3.1 Discharge Water Reuse. Where a nonpotable water source system exists on site, evaporative cooler discharge water shall be collected and discharged to such collection system. Exception: Where the reservoir water will adversely affect the quality of the nonpotable water supply making the nonpotable water unusable for its intended purposes.

928.1.3. Discharge Water to Drain. Where discharge water is not required to be recovered for reuse, The sump overflow drain-line shall discharge to an approved location. Drain lines shall not be directly connected to a wastewater drain any drainage system. Where the discharge water is not required to be recovered for reuse, the discharge line shall terminate at a conspicuous point of disposal. discharged into a sanitary drain, an air gap of not less than 6 inches is required between the termination of the discharge line and the drain opening. The drain line shall terminate in a location that is readily visible to the building owner, tenants or maintenance personnel.

Commenter's Reason:

1. The Committee disapproved this proposal for three reasons, "The proposed text would cause a significant cost increase. Product user manuals (Section 928.1) are not enforceable. This proposal is not coordinated with current Section 928." Each of these reasons is addressed below and in the revised proposal:
 - 1a. "The proposed text would cause a significant cost increase." This is simply not true. Manufacturers surveyed are currently making products, in various price ranges, that would meet the proposed gallons of water per ton-hour of cooling. We did revise the number from 4 gallons of water per ton-hour of cooling to 5 to include more manufacturers. This limit is still needed as evaporative coolers can waste large quantities of water. There is great variance in water efficiencies of different makes and models. Limiting systems to use less than 5 gallons of water per hour is a relatively low standard and should be easily met by most systems.

NRDC estimates that nationwide adoption of the revised values in this proposal, effective 2016, can be expected to save:

 - 19 million gallons of water per day by 2030;
 - 9.3 million kilowatt hours per year by 2030; and
 - Consumers will realize more than \$27 million dollars in reduced electricity and water costs.
 - 1b. "Product user manuals are not enforceable." That reference has been deleted from this proposal.
 - 1c. "This proposal is not coordinated with the current Section 928." This proposal does not need to be coordinated, as Section 928 addresses different subjects than this proposal. The current section 928 in the IMC will simply become Section 929. Note that this proposal was published as Section 428 in error, as it should have been Section 928.

The definition was deleted because a definition for "Evaporative Cooling System" exists in the IMC.
2. Faulty float valves can cause reservoirs to overflow, sending thousands of gallons of water into the wastewater line without the problem detected. Alarms are needed to alert the operator of this waste.
3. There are no known water use standards for these systems by AHRI or any other known organization.

M56-12

Final Action: AS AM AMPC____ D

M58-12

501.3.1

Proposed Change as Submitted

Proponent: Umesh Kumar Bhargava, PE, Bhargava International Inc., representing self.

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:

3. For all *environmental air* exhaust: ~~3~~ 1 feet) from property lines; ~~3~~ 1 feet from operable openings into buildings for all occupancies other than Group U and ~~40~~ 5 feet from mechanical air intakes. Such exhaust shall not be considered to be hazardous or noxious.

(Portions not shown remain unchanged)

Reason: Local exhaust is more effective than central exhaust. Therefore, in dwelling unit's side wall exhaust is gaining more popularity amongst engineers. However due to limited exterior wall space availability and clearances requirements from openings, the proposed change is suggested based on following reasons:

- a. Environmental air is discharged to outside the dwelling and therefore is diluted instantly and does not have impact on indoor air quality.
- b. Products of combustion from Direct Vent appliances are permitted to terminate with 1 foot.
- c. IMC permits to recirculate kitchen exhaust air. It indicates that environmental air is acceptable to be recirculating with carbon filter. Dilution of environmental air by mixing with atmospheric air should more effective than carbon filter, which depend on user behavior.
- d. Velocity at exterior termination is approximately 5 miles per hour (600 feet per minute, 50 CFM thru 4 inch diameter duct)
- e. High discharge velocity also results in mixing outside atmospheric air instantaneous dilution.

Cost Impact: None

501.2.1-M-BHARGAVA.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: No justification given for changing the distances. The revisions could result in exhaust re-entering the building. This section is not limited to dwelling units.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal 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:

3. For all *environmental air* exhaust: 3_4 feet) from property lines; 3_4 feet from operable openings into buildings for all occupancies other than Group U and 10_5-feet from mechanical air intakes. Such exhaust shall not be considered to be hazardous or noxious.

Dwelling unit air intake and exhaust terminals that are concentric or adjacent need not be separated by such distances where the environmental air exhaust is not from kitchens, clothes dryers, or garages, and where the manufacturer of such terminals specifies that there is less than 5% cross contamination between the exhaust and intake air streams.

(Portions not shown remain unchanged)

Commenter's Reason: This comment is intended to remove the requirement for a 10 foot separation distance between environmental exhaust air outlets and mechanical air intakes when an integrated exhaust-supply termination specifically designed for this purpose and verified by the manufacturer to provide a minimum acceptable level of cross contamination. The most common example of this type of system is an integrated supply-exhaust termination that is used for HRVs or ERVs (typically referred to as "dual hood" devices). There are multiple manufacturers that make these products, and where cross contamination values are reported, they are typically less than 5%.

The IMC defines Environmental Air as, "Air that is conveyed to or from occupied areas through ducts which are not part of the heating or air-conditioning system, such as ventilation for human usage, domestic kitchen range exhaust, bathroom exhaust, domestic clothes dryer exhaust and parking garage exhaust." This comment does not permit integrated supply-exhaust terminations where exhaust air could potentially contain products of combustion (such as air exhausted from kitchens, garages, and clothes dryers).

Cost Impact: This change will not increase the cost of construction.

M58-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M66-12

504.4, 504.6.2

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

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.

504.6.2 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 nominal ¼ inch long by 1/8 inch diameter rivets ~~screws~~ or other fasteners that do not protrude into the inside of the duct more than such rivets.

Reason: Sections 504.4 and 504.6.2 both discuss duct fasteners, but, state different requirements and the IRC says something different yet. The IRC allows duct fasteners that protrude into the duct a limited distance. It is not logical for the IRC and IMC to differ on this subject. If duct fasteners are not allowed, there would be no method of securing duct joints other than duct tape. Tapes are sealing methods, not duct joining methods, and will eventually allow the duct joints to separate in concealed locations.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

504.4-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Lint will collect on the protrusions. Deletion of text in Section 504.4 will lose coverage for commercial ducts. The rivet diameter is not relevant.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Modified by this Public Comment.

Modify the proposal 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.

504.6.2 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 be joined with nominal 1/4 inch long by 1/8 inch diameter rivets or other fasteners that do not protrude into the inside of the duct more than such rivets.~~
Ducts shall not be joined with screws or similar fasteners that protrude more than 1/8 inch (3.2mm) into the inside of the duct.

Commenter's Reason: The above new language is extracted from the 2012 IRC. This language does not reference rivets diameter which was stated to be irrelevant by the committee. The allowed 1/8" protrusion into the duct will only permit a minimal amount of lint to collect on the protrusion which was a concern of the committee. The small amount of lint is trivial in comparison to the duct separating from the lack of fastening and allowing combustion by products and lint to fill building cavities, crawl space, attics, or any other concealed or other areas where these exhaust systems are located. The original section 504.4 is restored to current 2012 code text..

M66-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M73-12

504.8, 505.3 (NEW)

Proposed Change as Submitted

Proponent: Al Godwin, CBO, CPM representing Aon Fire Protection Engineering
(al.godwin@aon.com)

Revise as follows:

504.8 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of the system shall be in accordance with all of the following:

(Items 1 through 12 remain unchanged)

13. Dryer ducts shall have a cleanout located near the shaft penetration to permit cleaning of the 22" subduct required by Section 607.5.5, exception 2. The subduct length shall be considered in the calculation of allowable duct length.

505.3 Common exhaust systems for domestic kitchens located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple domestic kitchen exhaust systems, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.
2. Dampers shall be prohibited in the exhaust duct, except as specified in Section 505.1. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, exception 2.
3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) and in accordance with *SMACNA Duct Construction Standards*.
4. The ductwork within the shaft shall be designed and installed without offsets.
5. The exhaust fan motor design shall be in accordance with Section 503.2.
6. The exhaust fan motor shall be located outside of the airstream.
7. The exhaust fan shall run continuously, and shall be connected to a standby power source.
8. Exhaust fan operation shall be monitored in an *approved* location and shall initiate an audible or visual signal when the fan is not in operation.
9. Makeup air shall be provided for the exhaust system.
10. A cleanup opening shall be located at the base of the shaft to provide access to the duct to allow for cleanout and inspection. The finished openings shall be not less than 12 inches by 12 inches (305 mm by 305 mm).
11. Screens shall not be installed at the termination.
12. The common multistory duct system shall serve only kitchen exhaust and shall be independent of other exhaust systems.

Reason: Since exception 2 has been installed in the IBC, it has been incomplete. The IMC has done a good job of updating the provisions for common ducts with clothes dryers but nothing has been done for domestic kitchens. Designers would not go to the expense of installing a shaft for domestic kitchen exhaust if there was not a smoke issue. When expensive condo's install super domestic kitchens, there is going to be smoke.

Also, IMC Section 505.1 specifically requires systems with downdraft exhaust to discharge to the exterior. How is that going to be done in a multi-story building? And, where there is smoke, there is grease. Thus, provisions are needed for kitchen exhaust and such exhaust needs to be separate from bathroom/toilet exhaust. The designer should take some responsibility for controlling grease discharge, but specifics are left to his/her discretion. Long dryer ducts have to install a 90 degree riser at the very end of their discharge, the weakest point. A cleanout is appropriate. Perhaps someone has a better idea, but this should be a start.

Cost Impact: This code proposal will not increase the cost of construction since this is the method it should be designed to and it is less expensive than installation of a Type I hood.

504.8-M-GODWIN.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal as follows:

504.8 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of the system shall be in accordance with all of the following:

(Items 1 through 12 remain unchanged)

13. ~~Dryer ducts shall have a cleanout located near the shaft penetration to permit cleaning of the 22" subduct required by Section 607.5.5, exception 2. The subduct length shall be considered in the calculation of allowable duct length.~~

505.3 Common exhaust systems for domestic kitchens located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple domestic kitchen exhaust systems, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*.
2. Dampers shall be prohibited in the exhaust duct, except as specified in Section 505.1. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, exception 2.
3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (0.4712 mm) (No. 26 gage) and in accordance with *SMACNA Duct Construction Standards*.
4. The ductwork within the shaft shall be designed and installed without offsets.
5. The exhaust fan motor design shall be in accordance with Section 503.2.
6. The exhaust fan motor shall be located outside of the airstream.
7. The exhaust fan shall run continuously, and shall be connected to a standby power source.
8. Exhaust fan operation shall be monitored in an *approved* location and shall initiate an audible or visual signal when the fan is not in operation.
9. Where the exhaust rate for an individual kitchen exceeds 400 cfm (0.19 m³/s) makeup air shall be provided for the exhaust system in accordance with Section 505.2.
10. A cleanup opening shall be located at the base of the shaft to provide access to the duct to allow for cleanout and inspection. The finished openings shall be not less than 12 inches by 12 inches (305 mm by 305 mm).
11. Screens shall not be installed at the termination.
12. The common multistory duct system shall serve only kitchen exhaust and shall be independent of other exhaust systems.

Committee Reason: Approval is based upon the proponent's published reason. The modifications correlate with the action taken on FS110-12 and serve to coordinate with current Section 505.2.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Guy McMann, Jefferson County, Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Submitted.

Commenter's Reason: As a result of the modification, no makeup air will be required for systems serving hood fans under 400 cfm. If no fan exceeds 400 cfm, nothing is triggered. In a multi-story system serving dwelling units, it is extremely unlikely that any fan would be over 400 cfm. If a multi-story system had 50 kitchen hoods connected to it, and each hood was 200 cfm, no make air would be required to enter the shaft to balance the airflow for the exhaust fan on the roof. This text has nothing to do with the makeup air needed for the individual hood fans in the dwelling units, rather it is related to makeup air for the shaft main exhaust fan, yet this modification attempted to link these unrelated subjects. The subject of this proposal has nothing to do with Section 505.2 and the modification has completely changed the intent of the original text. Without makeup air for the shaft exhaust fan, air would

be pulled through all of the hoods served, continuously 24/7 whether the hoods are on or off. This would result in energy waste except where the dwellings were mechanically ventilated via the kitchen and bath exhaust.

M73-12

Final Action: AS AM AMPC____ D

M74-12

504.8, Chapter 15

Proposed Change as Submitted

Proponent: Tony Crimi, A.C. Consulting Solutions Inc, representing International Firestop Council

Revise as follows:

504.8 Common exhaust systems for clothes dryers located in multistory structures. Where a common multistory duct system is designed and installed to convey exhaust from multiple clothes dryers, the construction of the system shall be in accordance with all of the following:

1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the *International Building Code*. As an alternative to a fire-resistance-rated shaft, the duct shall be enclosed in a duct enclosure system tested and listed to have not less than a 2-hour fire-resistance rating in accordance with ASTM E2816-11.

(Portions not shown remain unchanged)

Add new Referenced Standard to Chapter 15 as follows:

ASTM E2816-11, Standard Test Methods for Fire Resistive Metallic HVAC Duct Systems.

Reason: This proposal would allow an additional tested method of protection for duct enclosure systems to be used. The enclosures or ductwork would be permitted to be used if it were protected by a tested and listed assembly conforming to the new *ASTM E2816-11, Standard Test Methods for Fire Resistive Metallic HVAC Duct Systems* evaluated for the specific purpose. This test is now also referenced as part of ICC-ES AC179, Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies. The purpose of these acceptance criteria is to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, which provides an alternate to required fire-resistance-rated shafts or an alternate to required fire dampers in specific locations. This criterion provides an alternate to shaft enclosures for vertical ducts.

The new ASTM Standard evaluates the HVAC duct systems for surface burning characteristics, non-combustibility, fire resistance, durability, and fire engulfment with horizontal and vertical through-penetration firestops. The Standard evaluates the fire performance of HVAC ducts for both supply (pressurization) and return air, in the vertical and horizontal orientation, with or without openings. These test methods evaluate the ability of a HVAC duct system to resist the spread of fire from one compartment to another compartment when subjected to the standard time-temperature curve of ASTM E119.

Cost Impact: This change will potentially reduce the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM E2816-11] 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, 2012.

504.8-M-CRIMI.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: This revision could have a ripple effect on the other items in the list. Will the new text fit with the items that discuss duct offsets, cleanouts in a shaft, etc. The IBC fire safety committee disapproved similar proposed text.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council requests Approval as Submitted.

Modify the proposal as follows:

Commenter's Reason: The Committee Reason for rejecting this proposal was based on concerns around whether or not the revision could have a ripple effect on the other items in the list. They were concerned about ensuring that the text fit with the items that discuss duct offsets, cleanouts in a shaft, etc.

In fact, having had the opportunity to review this in more depth, it is clear that the text fits very well within the Article. The original proposal also stated that the other items 2 through 12 remain unchanged. For clarity, Item 4 requires that the ducts be designed and installed without offsets, a requirement that will not change based upon this proposal. The ASTM E2816 Standard evaluates the fire performance of HVAC ducts for both supply (pressurization) and exhaust air, in the vertical and horizontal orientation, with or without openings. Cleanouts can be evaluated as part of the tested systems, but in any case, Ducts C and D are actually evaluated with unprotected openings.

As a point of information, testimony and Committee discussions also questioned the potential that a lint fire would exceed the 2-hour fire test requirements of ASTM E2816 that uses the ASTM E119 time-temperature curve. Based on calculations, the amount of lint required to be inside the duct to equal the ASTM E2816 fire exposure would be sufficient to cover the surface area of 1.5 football fields to a depth of one inch, which represents more than 75,000 sf. Therefore, the fire exposure conditions in the test standard are appropriate for the clothes dryer exhaust application.

ASTM E2816 evaluates the ability of a HVAC duct system to resist the spread of fire from one compartment to another compartment separated by fire resistance rated construction when the HVAC duct system is exposed to fire from the outside of the horizontal or vertical HVAC duct system, or from the outside with hot gases entering the inside of the HVAC duct system from unprotected openings, when subjected to the standard time-temperature curve of ASTM E119. This test is now also referenced as part of ICC-ES AC179, Acceptance Criteria for Metallic HVAC Duct Enclosure Assemblies. The purpose of that acceptance criteria is specifically to establish requirements for fire protection enclosure systems applied to metallic HVAC ducts, which provides an alternate to required fire-resistance-rated shafts or an alternate to required fire dampers in specific locations. This proposal is consistent with AC 179 criterion providing an alternate to fire dampers in horizontal ducts (penetrating fire barriers, fire partitions, and or smoke barriers) and vertical ducts. This is applicable to Item 2, which explicitly prohibits the use of dampers.

M74-12

Final Action: AS AM AMPC____ D

M76-12

505.1, 505.3 (New), 507.2.3

Proposed Change as Submitted

Proponent: Carl Baldassarra, P.E., FSFPE, Chair, ICC Code Technology Committee

Revise as follows:

SECTION 505 DOMESTIC KITCHEN EXHAUST EQUIPMENT

505.1 Domestic systems. Where domestic range hoods and domestic appliances equipped with downdraft exhaust are ~~located within dwelling units 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 installation 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:
 - 2.1. The duct shall be installed under a concrete slab poured on grade.
 - 2.2. The under floor 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.

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm (0.19 m³/s) shall be provided with *makeup air* at a rate approximately equal to the *exhaust air* rate. Such *makeup air* systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

505.3 Other than Group R. In other than Group R occupancies, where 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.

SECTION 507 COMMERCIAL KITCHEN HOODS

507.2.3 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 appliances and processes in accordance with Sections 507.2, 507.2.1 and 507.2.2. Domestic cooking appliances utilized for domestic purposes shall comply with Section 505.

Reason: The intent of this proposal is to clarify requirements and address new situations as Assisted Living and Nursing Home designs change.

Current requirements for domestic appliances used for domestic purposes are geared towards Group R facilities. When a stove is located in another use group, often a requirement for commercial hoods is misapplied. In a residential dwelling unit, often a range hood is not required if there is enough ventilation. Given the different types of facilities, this proposal would always require a hood when a range was provided in another use group.

As the style of assisted living facilities and nursing homes attempts to produce a more residential atmosphere, domestic ranges are provided either within the unit (some assisted living) or in common use areas (assisted living or nursing home residential 'suites'). Residents use this equipment for light cooking duties (few people and only occasional meals) or special cooking (i.e., cookies, cakes). If this equipment is used for cooking for a large number of residents on a regular basis, it is being used for commercial purposes, and it would fall under 507.2.3.

Hospitals or outpatient rehab facilities sometimes have domestic ranges in occupational therapy and dietician areas. The goal being to provide residents with training on good eating habits when they are at home.

Changes to 505.1 would allow residential and areas such as business break rooms to allow for recirculation if the mechanical system is designed for it.

The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/cc/ctc/index.html>. Since its inception in April, 2005, the CTC has held twenty-two meetings – all open to the public.

Cost Impact: Reduction

505-M-BALDASSARRA-CTC.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based upon the proponent's published reason. The code needs to address the evolving lifestyles for aging populations.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County, representing the Virginia, Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and the Virginia Building Code and Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: Although we understand the proponents reason statement for the use of domestic cooking appliances in other Groups, we don't believe that the code language for such an allowance should provide a blanket statement that will allow such a use without going through the rigorous evaluation process from the design professional and the authority having jurisdiction as provided for in IMC 105.1. The change made to 505.1, Exception 1 indicates that there is certainly a difference in use between a Group I and a Group R when relating to domestic cooking appliances by not allowing the use of a ductless range hood in a Group I environment. As written, this code section will allow for domestic cooking appliances to be installed in public areas of nursing homes, firehouses, churches, and the like without the protection of a Type I hood and without the use of the evaluation process provided by IMC 105.1. These are all unique situations that cannot be grouped together into one all-encompassing code requirement.

M76-12

Final Action:

AS

AM

AMPC_____

D

M79-12

505.2

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm shall be mechanically provided with *makeup air* at a rate approximately equal to the *exhaust air* rate. Such *makeup air* systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Reason: Section 505.2 does not state whether the makeup air system is required to be mechanical or gravity. Current text certainly suggests that mechanical is required. Should a simple louvered opening with a damper be permitted to provide makeup air by gravity? If so, how much pressure loss is allowed across the louvered opening? This loss must be known in order to calculate the opening and louver size. The code is silent on this. The intent is to prevent negative pressures from being developed by the kitchen exhaust that would affect other exhaust systems, chimneys, fireplaces, appliances and appliance vents. A small gravity opening to the outdoors would allow makeup air to enter the kitchen, but how negative must the space go to cause the necessary airflow rate to pass through such opening? Mechanical makeup air can be matched to the exhaust rate with no pressurization of the space.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: This could increase the cost of construction depending on how current text is interpreted.

505.2-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Natural makeup air should be a design option. It could be confused whether the text means fan powered makeup air supply or a mechanical damper with gravity supply air. No evidence that a problem exists.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cfm shall be mechanically or naturally provided with *makeup air* at a rate approximately equal to the *exhaust air* rate. Such *makeup air* systems shall be equipped with a means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Commenter's Reason: Referring to a required makeup air flow rate and referring to automatic starting and operation seem to imply that the makeup air must be provided mechanically, so, the original proposed code change put forth by the PMG CAC was intended

to clarify that. However, many of those who spoke against the original proposed code language felt that makeup air should also be allowed to be provided naturally. Adding “or naturally” clears up the language and allows for natural makeup air to be a design option.

Public Comment 2:

Guy McMann, Jefferson County, Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 ~~600~~ cfm (0.19 m3/s) shall be mechanically provided with makeup air at a rate approximately equal to the exhaust air rate. Such makeup air systems shall be equipped with an electrically operated means of closure and shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system.

Commenter's Reason: Raising the cfm threshold will provide a little more relief as the majority of hoods being installed seem to be falling in this range. It's not intended to provide makeup air using fans, gravity works well provided that the damper is electrically activated. Gravity dampers are not a positive means of closure because they are subject to pressure differentials and normally don't operate opening to the inside.

It's important to note that once the threshold is exceeded all the exhausted air needs to be made up. This helps combat the depressurization as a result of other contributing factors from dryers, exhaust fans, etc. Simply making up air over the threshold isn't good enough. Currently the code calls for makeup air on dryers over 200 cfm. This proposal is consistent with that line of reasoning.

M79-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M80-12

505.2

Proposed Change as Submitted

Proponent: Dan Buuck, National Association of Home Builders (NAHB)
(dbuuck@nahb.org)

Revise as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 400 cubic feet per minute (0.19 m³/s). Such makeup air systems shall be equipped with a backdraft damper means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system.

Exception: In dwelling units, where all appliances are of direct-vent, power-vented, unvented, or electric type, makeup air is not required for hood systems that exhaust 600 CFM or less. Exhaust hood systems located in such dwelling units and capable of exhausting in excess of 600 cubic feet per minute (0.28 m³/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 600 cubic feet per minute.

Reason: This section, new in the 2009 International Residential Code (IRC) and 2009 International Mechanical Code (IMC), attempts to solve an unproven backdrafting problem with range hoods. The exhaust rate of 400 cubic feet per minute (cfm) was chosen arbitrarily and without substantiation other than it being greater than the minimum exhaust rate of range hoods on the market. However, several manufacturers do not produce any range hoods below the 400 cfm threshold, effectively reducing a homeowner's choice of kitchen exhaust options without the added difficulty and expense of installing makeup air.

The reasoning that kitchen exhaust systems are available with an exhaust rate under 400 cfm does not take down-draft systems, popular with homeowners, into consideration. Most of them operate at 500 to 600 cfm and therefore require makeup air under this section.

As written, this section allows range hoods up to 400 cfm to be installed without makeup air. It would be consistent to require makeup air equaling the amount above and beyond 400 cfm for larger fans. Essentially, there would be no difference between the effect a 400 cfm fan has on a house and a 600 cfm fan with 200 cfm of makeup air. This would also improve the feasibility and acceptance of this code section as well as cut down on the amount of wasted energy in heating or cooling the makeup air.

This section requires an automatic means of closure for the makeup air opening beyond what the code has historically required for residential construction. For example, Section G2407.6 requires no dampers whatsoever for combustion air openings to the outdoors, such as found in many homes in the northern US. The amended section would allow barometric dampers as required for clothes dryer exhaust ducts.

Finally, the current code section does not take into account the fact that in many homes there is no danger of backdrafting (the original reason for this code section) due to the lack of natural draft appliances. The 400 cfm threshold could be raised to 600 cfm in those cases with no added danger. This would allow for down-draft fans without dedicated makeup air when the exception is met.

Cost Impact: The code change proposal will not increase the cost of construction.

505.2-M-BUUCK.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Disapproval is based on the action taken on M79-12. The text regarding the difference between 600 cfm and the actual exhaust rate will confuse code users.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Dan Buuck, Dipl.-Ing. (FH), representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be ~~mechanically or passively~~ provided with *makeup air* at a rate approximately equal to the ~~difference between the exhaust air rate and 400 cubic feet per minute (0.19 m³/s).~~ Makeup air shall be outdoor air, recirculated air, transfer air or a combination of such. Such makeup air systems shall be equipped with a ~~backdraft damper~~means of closure and shall automatically open when the exhaust system operates. ~~Such means of closure include barometrically controlled dampers and mechanical dampers.~~

Exceptions: In dwelling units, where all appliances are of direct-vent, power-vented, unvented, or electric type, makeup air is not required for hood systems that exhaust 600 CFM or less. Exhaust hood systems located in such dwelling units and capable of exhausting in excess of 600 cubic feet per minute (0.28 m³/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 600 cubic feet per minute.

1. Makeup air for kitchen exhaust systems is not required where any of the following apply:
 - 1.1 Fuel-fired appliances are not located within the dwelling unit.
 - 1.2 Fuel-fired appliances are located in an enclosed space and provided with outdoor combustion air in accordance with Section 304.6 of the *International Fuel Gas Code* or Section G2407.6 of the *International Residential Code*.
 - 1.3 The dwelling unit infiltration is confirmed to be 5.0 air changes per hour or greater at 0.2-inch water column (50 Pa).
 - 1.4 An approved test verifies proper operation of vented fuel-fired appliances during the operation of the kitchen exhaust system.
2. Additional makeup air is not required where all vented appliances in the dwelling unit are direct-vent and the kitchen exhaust does not exceed the calculated cfm determined by:

$$cfm_{\text{exhaust}} = ACH^{50} \times cu\ ft_{\text{dwelling}} \div 60\ \text{min} \times 0.80$$

where:

$$cfm_{\text{exhaust}} = \text{kitchen exhaust fan air flow rate in cubic feet per minute}$$

$$ACH^{50} = \text{air changes per hour of the dwelling unit at 0.2-inch water column (50 Pa)}$$

$$cu\ ft_{\text{dwelling}} = \text{volume of the dwelling}$$

Commenter's Reason: This comment allows outdoor air, recirculated air and transfer air from other parts of the dwelling to provide makeup air for the kitchen exhaust fan. The added language is referenced from Section 403.4. Transfer air is already addressed in Section 403.2.2. This section states that transfer air from other occupiable spaces shall not be prohibited. Credit goes to Mike Moore for this language and for several of the exceptions.

I give credit to the PMG CAC for the language “mechanically or passively” which it also proposes in a separate comment. These modifications clarify the original intent of the section, and “means of closure” replaced the proposed term—changing back to the language from the existing code section.

The original intent of this section was to allow simple, non-mechanized openings for high-cfm kitchen exhaust fans. Because the original language allows for multiple interpretations, we are revisiting the question of whether a motorized or passive damper is allowed. We must remember that this section applies to residential construction and nowhere else is an interlocked damper required in the code for a house or dwelling unit. A simple barometrically-activated damper that opens when there is negative pressure inside the dwelling is a simple and effective solution to this issue with several advantages: It does not have the inherent complexity and cost of an interlocked damper with a motor, and it also can serve to automatically eliminate pressure differentials in the dwelling caused by any other equipment that exhausts to the exterior.

The current code section does not take into account the fact that in many homes backdrafting is not an issue, the original reason for this code section. The added exceptions address such cases. Exception 2 takes into account that direct-vent appliances function without danger of backdrafting up to a negative pressure of 50 Pascals. The equation calculates the allowable cfm for a kitchen exhaust fan (with a 20% safety factor) that will not exceed this limit. It will be most useful for larger dwelling units (houses), and it is being introduced here to coordinate with a possible change in the IRC. Example: a 2,000 sq ft house with 8-ft ceilings and a tested ACH⁵⁰ of 3 would be permitted to have a kitchen exhaust fan of max. 640 cfm without additional, i.e. dedicated, makeup air. This is a common sense solution to this issue which will provide safety while not punishing owners from installing efficient gas appliances, and it complies with the intent of the IMC to be a minimum code.

Public Comment 2:

Mike Moore, Newport Ventures, representing Broan NuTone, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

505.2 Makeup air required. Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m³/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 400 cubic feet per minute (0.19 m³/s). Makeup air shall be outdoor air, transfer air, or a combination of such. Such makeup air systems shall be equipped with a not less than one backdraft motorized damper means of closure and that shall be automatically controlled to start and operate simultaneously with the exhaust system.

Exception: In dwelling units, where all appliances are of direct-vent, power-vented, unvented, or electric type, makeup air is not required for hood systems that exhaust 600 CFM or less. Exhaust hood systems located in such dwelling units and capable of exhausting in excess of 600 cubic feet per minute (0.28 m³/s) shall be provided with makeup air at a rate approximately equal to the difference between the exhaust air rate and 600 cubic feet per minute.

Commenter's Reason:

The current language in 505.2 is confusing and needs to be reworked. First, the current language only addresses exhaust hood systems, but the physics of back drafting are indifferent as to whether the exhaust system is a hood, a down draft, a through the wall vent, or any other type of exhaust system. So, the word "hood" is removed to reflect this fact.

Second, because the IMC's definition of makeup air is obscure (i.e., *air that is provided to replace air being exhausted*) clarification needs to be provided as to the source of makeup air (i.e., makeup air can come from outdoors and can come via transfer from an adjacent space). This is consistent with other sections of the IMC (i.e., Section 403.4) and with ASHRAE 62.1 (see the 62.1 definition of makeup air). Third, clarification is needed to better describe the system required by the section. To understand what is being required in this section, it's important to look to other areas of the code for an interpretation. Section 508.1, which addresses makeup air for commercial kitchens, states, "Mechanical makeup air systems shall be automatically controlled to start and operate simultaneously with the exhaust system." Based on the phrase "automatically controlled to start and operate simultaneously" which is echoed in 505.2, the language in 505.2 clearly points to a requirement for a mechanical makeup air system. Mechanical makeup air systems could take many different forms, but at a minimum, this phrase implies a system with a motorized damper.

Gravity dampers are not approved by this text because they can malfunction at the low pressure differentials at which naturally vented appliances can potentially back draft (i.e., 3-5 Pascals based on info from BPI, CMHC, and CAN/CSA F326-M91; see references below). Malfunction can occur through improper balancing and slight restrictions in the damper caused by dirt, debris, or other matter.

For these reasons, this proposal was drafted as a clarification as to what type of kitchen exhaust systems require makeup air (any greater than 400 cfm), where makeup air comes from (transfer and outdoor air), and what type of system should be specified (motorized, automatically controlled damper).

References:

- BPI (Building Performance Institute). *Technical Standards for the Building Analyst Professional*. http://www.bpi.org/Web%20Download/BPI%20Standards/Building%20Analyst%20Professional_2-28-05nNC-newCO.pdf
- CAN/CSA F326-M91. *Residential Mechanical Ventilation Systems, A National Standard of Canada*. Reaffirmed 2010.
- CMHC (Canada Mortgage Housing Corporation). *Chimney Safety Tests Users Manual, Second Edition*. January 12, 1988. http://publications.gc.ca/collections/collection_2011/schl-cmhc/nh18-1/NH18-1-61-1988-eng.pdf.
- Minnesota Mechanical and Fuel Gas Code 1346.0501.501.3.2. <https://www.revisor.mn.gov/rules/?id=1346.0501>.

Cost Impact:

This language is clarification of an existing requirement, so is not expected to add any new costs to construction.

M80-12

Final Action: AS AM AMPC____ D

M84-12

506.3.2.5

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

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 test or an air test shall be performed to determine that all welded and brazed joints are liquid tight. A test shall be performed for the entire duct system, including the hood-to-duct connection. For listed factory-built ducts, tests shall be limited to duct joints assembled in the field and shall exclude factory welds. The duct work shall be permitted to be tested in sections, provided that every joint is tested.

A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls. ~~A test shall be performed for the entire duct system, including the hood-to-duct connection. The duct work shall be permitted to be tested in sections, provided that every joint is tested. For listed factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.~~

An air test shall be performed by capping the ductwork system at the outlet and at the point of connection to the hood and then pressurizing the system with air at a pressure of not less than 1 inch wc. A manometer shall be used to measure pressure within the ductwork. Before taking pressure readings, the temperature of the air in the ductwork and the ductwork itself shall be allowed to stabilize and the source of air pressure shall be disconnected from the ductwork system. The ductwork system shall maintain the pressure without loss for a period of not less than 15 minutes.

Reason: The code allows only one method of testing grease ducts and that method is far from precise. An air test is much more likely to expose a leak and provides the installer with an option. This air test is also allowed by ASHRAE 154. Much of Sections 506 and 507 is parallel with 154.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

506.3.2.5-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Testing with air is difficult. False failure can result from air testing because of temperature changes. Grease ducts operate under negative pressure. Factory welds can also leak and need to be tested.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Submitted.

Commenter's Reason: Because current code language only allows for one type of testing for grease ducts, the purpose of this code change was to allow test methods other than light. This gives the installer options which would be acceptable to the inspector. Unfortunately, the committee voiced multiple reasons for disapproving this code change.

The first reason stated was that testing with air is difficult and that false failures with air testing can occur due to temperature changes. If testing with air is difficult, then don't test with it. The air test is an option. This proposed code change was allowing for an option for duct testing as opposed to utilizing the only option currently allowed by code which is the light test. The original proposed text clearly addressed the issue raised by the committee about temperature changes and pressure stabilization. Another reason for the committee's disapproval was that grease ducts operate under negative pressure and cannot be tested with positive pressure. There are ways to test under negative pressure and it doesn't matter anyway because a leak is a leak, whether leaking into the duct or out of the duct.

In M83, the committee stated that factory-built ducts do not need to be tested except at the joints between sections and fittings yet on this code change the committee stated that factory welds can also leak and need to be tested so they should also be covered in the testing parameters. The current code language acknowledges that factory built ducts are to be tested, but limited only to the duct joints which are assembled in the field, excluding factory welds.

M84-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M89-12

506.3.11, 506.3.11.1

Proposed Change as Submitted

Proponent: Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council (tcrimi@sympatico.ca) and John D. Nicholas of Perceptive Solutions LLC representing Unifrax I LLC (john@perceptivesolutionsllc.com)

Revise as follows:

506.3.11 Grease duct enclosures. A grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed spaces shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be either field-applied or factory-built. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. Duct enclosures shall be as prescribed by Section 506.3.11.1 or 506.3.11.2 ~~or~~ 506.3.11.3.

~~**506.3.11.1 Shaft enclosure.** Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the *International Building Code* requirements for shaft construction. Such grease duct systems and exhaust equipment shall have a clearance to combustible construction of not less than 18 inches (457 mm), and shall have a clearance to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (76 mm). Duct enclosures shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.~~

506.3.11.1.2 Field-applied grease duct enclosure. Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by field applied grease duct enclosure that is a listed and labeled material, system, 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 from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through-penetration fire-stop system classified in accordance with ASTM E 814 or UL 1497 and having a "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such systems shall be installed in accordance with the listing and the manufacturer's installation instructions. Partial application of a field-applied grease duct enclosure system 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.

506.3.11.2.3 Factory-built grease duct assemblies. Factory- built grease duct assemblies incorporating integral enclosure materials shall be *listed* and *labeled* for use as commercial kitchen grease duct assemblies in accordance with UL 2221. Duct penetrations shall be protected with a through-penetration firestop system classified in accordance with ASTM E 814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such assemblies shall be installed in accordance with the listing and the manufacturer's installation instructions.

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

Reasons:

CRIMI- The use of a grease duct enclosure installed in conformance with the IBC requirements for shaft construction is really just another "field-applied" grease duct enclosure system, and should be subject to the same conditions as any other field-applied grease duct enclosure system. In that case, Section 506.3.1 becomes redundant, since testing in conformance with ASTM E2336 addresses the issues related to clearances to combustible and noncombustible construction.

The historical practice of allowing certain materials to be used to enclose grease ducts serving Type 1 hoods without specifically fire testing them for the application needs to be revisited. The IBC requirements for shaft construction cover many items, but the fire-resistance requirements to conform to ASTM E119 do not address normal service conditions for grease ducts at all. Evaluating enclosure materials used to protect a grease duct from fire is an aid for predicting their fire performance and promotes uniformity in requirements of various authorities. To do this it is necessary that the fire-endurance properties of enclosure materials be measured and specified according to a common standard expressed in terms that are applicable alike to a wide variety of materials, situations, and conditions of exposure. The ASTM E2336 and UL 2221 test methods evaluate the enclosure materials and the grease duct enclosure systems using the following test methods: noncombustibility, fire resistance, durability, internal fire, and fire-engulfment with a through-penetration fire stop.

In contrast to the requirements of IBC Section 713 for Shaft Enclosures, these test methods prescribe a standardized fire exposure for comparing the test results of grease duct enclosure materials and grease duct enclosure systems. Using these test results to predict the performance of actual grease duct enclosure systems requires the evaluation of these specific test conditions.

Over the last decade, the technology surrounding the installation and protection of grease ducts has evolved in response to growing concern over grease duct fires, and concerns over space. The protection of grease ducts under fire exposure conditions is an item of importance in securing constructions that are safe, and that are not a menace to adjacent construction or building occupants. Protection of grease ducts has long been addressed in the codes of many authorities, municipal and other agencies. Many types of enclosure materials are used to protect grease ducts. Normally, these enclosure materials are either applied to grease ducts in the field or are fabricated as part of the grease duct when shipped from the factory.

NICHOLAS-This proposed code change allows for the use of either a pre-fabricated duct system or field applied enclosure system when these systems are tested and listed in accordance with *ASTM E2336, Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems* a full consensus test method that was specifically designed to assess both specific end use of the duct and its protection materials.

The history of many provisions in our building codes are traced back to ASTM E119 as it is the oldest fire-resistance standard cited in the U.S. building codes. However, when fire test standards are developed for specific material applications those test standards replaced ASTM E119. There are many examples of advancements in fire testing being used to provide a fire test based on ASTM E119 but specifically developed for a particular application: doors, windows, firestop systems, joint systems, etc. For example, doors were tested to ASTM E119, then ASTM E152, and now to UL10b and 10c, which were developed to assess the door's fire performance in a specific application. This proposed code change is a cost effective method of providing a test specifically designed to test the duct system as the shaft is not tested as constructed in the field but rather as a wall panel. ASTM E119 does not have a protocol for testing shafts that can be engulfed in a fire. The fire-resistance engulfment test of ASTM E2336 is a much more serve test scenario for a shaft or duct system as the volume of air within the shaft or duct is limited and will heat faster than the ambient laboratory air in contact with the wall panel. Also, the stability of the shaft as constructed in the field will react differently than a wall panel. The corners of the shaft will be tested as the sides of the shaft create stresses on the corners that are not evaluated by the ASTM E119 wall panel, which is secured into a test frame. Using tests designed to address the actual construction and application of materials is more conservative and usually increases life safety. Further, sometimes newer fire tests of materials allow more cost effective materials and construction than materials assessed by traditional tests not specifically designed to address their actual construction and application.

As products are in service for prolonged periods of time some performance limitations are noted and addressed by industry and the codes. GA-216-2007, *Specifications for the Application and Finishing of Gypsum Panel Products* states "1.4 Gypsum panel products shall not be used where they will be exposed to sustained temperatures of more than 125°F (52°C) for extended periods of time."¹

Also, several changes related to the use of conventional shaft materials have taken place within the building and mechanical codes over the years. For example, the IMC under Section 602.2 **Construction** states, "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." A similar limitation is noted in the IMC under Section 603.5.1 **Gypsum Ducts** states, "The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125°F (52°C) and the gypsum board surface temperature is maintained above the airstream dew-point temperature. Air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers." For these reasons, a shaft wall construction tested to ASTM E119 as a panel may not provide the performance when that construction is tested as a shaft engulfed in a fire. Nor may a shaft wall construction tested to ASTM E119 as a panel maintain its stability and insulation when tested as a shaft subjected to a prolonged service test temperature established by UL1978 and adopted by ASTM E2336 and UL 2221.

Both ASTM E2336 and UL2221 have an engulfment fire tests and a portion of their standard dedicated to a prolonged internal service temperature test, approximately 500°F, which must be maintained for a minimum of 4-hour exposure. Then with 15 minutes the fire test temperature is increase to approximately 2000°F and sustained for 30 minutes. These test protocols are designed to subject the fire protection materials to an exposure that may be experienced in service. As these tests were not developed for a particular material, having conventional shaft materials tested to the same tests will ensure conformity of fire protection and dispel concerns about the service temperature limitations, which may decrease the performance of conventional shaft materials, cited in the codes and by the industry.

This method of tests uses the ASTM E119 time-temperature for the engulfment test to assess the duct system. This method of tests also assesses both internal and external fire threats as well as both horizontal ducts and vertical ducts. In ASTM E2336, the systems supports are also tested as part of the fire resistance test. ASTM E2336 offers the following tests to assess performance: ASTM E136 for insulation's non-combustibility, ASTM C518 for the insulation's durability and ASTM E814 for the system's ability as a firestop to prevent the spread of fire from compartment to compartment, and ASTM E2226 for the resistance to the application of a hose stream.

ICC-ES AC101, *Acceptance Criteria For Grease Duct Enclosure Assemblies*, establishes requirements for fire protection enclosure systems, applied to grease ducts which provide an alternate to required fire-resistance-rated shafts, as well as to determine the characteristics of the system and enclosure material currently cited in the codes.

These comments are respectfully submitted as the ASTM Task Group Chair of ASTM E2336 who drafted its first version, as the ANSI Designated Expert to ISO TC92 SC2 WG4 that created and maintains ISO 6944 *Fire Containment — Elements of Building Construction — Part 2: Kitchen Extract Ducts* and one who has designed, supervised, and overseen grease duct fire tests as part of an international laboratory as well as one who had jurisdiction over the product certification process for products and materials.

Bibliography:

1. GA-216-2007, Copyright 2007, Gypsum Association

Cost Impact: This change will potentially reduce the cost of construction.

506.3.11-M-CRIMI-NICHOLAS.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Shafts are a proven method of protection and no substantiation was provided to indicate that shafts are failing. The IMC is a minimum code and it contains options for compliance that should not be eliminated.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C. Consulting Solutions Inc, representing International Firestop Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

506.3.11 Grease duct enclosures. A grease duct serving a Type I hood that penetrates a ceiling, wall, floor or any concealed spaces shall be enclosed from the point of penetration to the outlet terminal. A duct shall penetrate exterior walls only at locations where unprotected openings are permitted by the *International Building Code*. The duct enclosure shall serve a single grease duct and shall not contain other ducts, piping or wiring systems. Duct enclosures shall be either field-applied or factory-built. Duct enclosures shall have a fire-resistance rating of not less than that of the assembly penetrated and not less than 1 hour. Duct enclosures shall be as prescribed by Section 506.3.11.1 or, 506.3.11.2 or 506.3.11.3.

506.3.11.1 Shaft enclosure. Vertical commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be permitted to be enclosed in accordance with the *International Building Code* requirements for shaft construction. Such grease duct systems and exhaust equipment shall have a clearance to combustible construction of not less than 18 inches (457 mm), and shall have a clearance to noncombustible construction and gypsum wallboard attached to noncombustible structures of not less than 6 inches (76 mm). Duct enclosures shall be sealed around the duct at the point of penetration and vented to the outside of the building through the use of weather-protected openings.

506.3.11.4 2 Field-applied grease duct enclosure. Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a field applied grease duct enclosure that is a listed and labeled material, system, 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 from the point at which the duct originates to the outlet terminal. Duct penetrations shall be protected with a through-penetration fire-stop system classified in accordance with ASTM E 814 or UL 1497 and having a "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such systems shall be installed in accordance with the listing and the manufacturer's installation instructions. Partial application of a field-applied grease duct enclosure system 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.

506.3.11.2 3 Factory-built grease duct assemblies. Factory- built grease duct assemblies incorporating integral enclosure materials shall be *listed* and *labeled* for use as commercial kitchen grease duct assemblies in accordance with UL 2221. Duct penetrations shall be protected with a through-penetration firestop system classified in accordance with ASTM E 814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such assemblies shall be installed in accordance with the listing and the manufacturer's installation instructions.

506.3.11.3 4 Duct enclosure not required. A duct enclosure shall not be required for a grease duct that penetrates only a nonfire-resistance-rated roof/ceiling assembly.

Commenter's Reason: This proposal has been modified to reflect the Committee comments and testimony during the Spring Code Action Hearings. While it was acknowledged that the use of a grease duct enclosure installed in conformance with the IBC requirements for shaft construction is really just another "field-applied" grease duct enclosure system, there was reluctance to remove a traditional option from the Codes. This proposal does, at the very minimum, require the fire resistant enclosures to be installed in the manner in which they are typically tested, which is as vertical wall assemblies in accordance with ASTM E119. Neither testing Laboratories nor Manufacturers endorse the use of a fire resistance rated wall assembly for use in a horizontal orientation without specific and detailed limitations because it is well known that such assemblies will very likely not provide the equivalent hourly rating.

The historical practice of allowing certain materials to be used to enclose grease ducts serving Type 1 hoods without specifically fire testing then for the application needs to be revisited. The IBC requirements for shaft construction cover many items, but the fire-resistance requirements to conform to ASTM E119 do not address normal service conditions for grease ducts at all.

In contrast to the requirements of IBC Section 713 for Shaft Enclosures, ASTM E2336 and UL 2221 test methods evaluate and compare the enclosure materials and the grease duct enclosure systems and prescribe a standardized fire exposure, testing the assembly in both in a vertical and horizontal orientations representative of the configuration the system would be installed in the application.

M89-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M95-12

506.3.11.2

Proposed Change as Submitted

Proponent: Richard Grace, Fairfax County Government, representing The Virginia Plumbing and Mechanical Inspectors Association, The Virginia Building Code Officials Association; Guy McMann, MCP, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcmann@jeffco.us)

Revise as follows:

506.3.11.2 Field-applied grease duct enclosure Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a field-applied grease duct enclosure that is a listed and labeled material, system, 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 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 classified in accordance with ASTM E 814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such systems shall be installed in accordance with the listing and the manufacturer's installation instructions. Partial application of a field applied grease duct enclosure system 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: As with many Standards, some of the pertinent language is not included in code text forcing the user to locate the Standard which may not be available or possibly even having to purchase it. In order to satisfy ASTM E 2336, two layers of wrapping material must be installed. This is extremely important information that the user needs to be aware of 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. Although the manufacturer's instructions require the two layers, this is simply a benefit for the user as this will aid on the front side of a possible installation.

Cost Impact: None

506.3.11-2-M-GRACE-MCMANN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The performance standard does not dictate the number of layers of the material, rather, this is dictated by the manufacturer's instructions. The proposed text could clash with the product listing.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Guy McMann, Jefferson County, Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

506.3.11.2 Field-applied grease duct enclosure Commercial kitchen grease ducts constructed in accordance with Section 506.3.1 shall be enclosed by a field-applied grease duct enclosure that is a listed and labeled material, system, 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 one or more layers ~~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 classified in accordance with ASTM E 814 or UL 1479 and having an "F" and "T" rating equal to the fire-resistance rating of the assembly being penetrated. Such systems shall be installed in accordance with the listing and the manufacturer's installation instructions. Partial application of a field applied grease duct enclosure system 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.

Commenter's Reason: The committee reason for disapproval revolved around the concern that there maybe duct wrap systems available that require one, two or three layers of material. Although the majority of systems use two layers, the door needs to be left open for other systems. The intent is still achieved with this revision and that is to give the installer advance notice that more than one layer might be required depending on the product of choice.

M95-12

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M99-12

506.5.1.2(New), 507.2

Proposed Change as Submitted

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

Revise as follows:

507.2 Where required. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. 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.

Exception: 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.

506.5.1.2 Down draft cooking appliances and ventilation systems. Down draft cooking appliances and ventilation systems shall be installed in accordance with the manufacturer's instructions and shall comply with all of the following requirements:

1. Exhaust ducts shall comply with Section 506.
2. Clearances to combustibles shall be in accordance with the manufacturer's listing.
3. Appliances shall be provided with filters complying with UL 1046.
4. Spaces containing such appliances shall be provided with makeup air complying with Section 508.
5. Appliances shall be interlocked with the exhaust system such that they cannot operate unless the exhaust system and makeup air system are operating.
6. The exhaust system shall be provided with controls that will prevent appliance operation when airflow falls below 25% of the normal operating flow rate or 10% below the exhaust air flow specified in the equipment listing, whichever is lower.
7. The ventilation system shall be capable of capturing and containing the effluent at the source

Reason: It's not a good practice to send the user to another Standard only to be confused by the different language and requirements that are not in the IMC. The IMC has all the pertinent information required for safe installations.

Currently the code is silent and provides no guidance on what to expect when code officials come across these types of appliances (Hibachi Tables). The National Standard contains requirements that are not present in the code and needs to be addressed. These appliances usually involve bottom discharge exhaust systems that may need monitoring to maintain capture and containment as they are not required to have type I hoods over them.

Cost Impact: None

506.5.1.2(NEW)-M-MCCANN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Some of the requirements in the standard were omitted such as fire protection and material requirements above the cooking surface. It is preferable to reference the standard rather than putting the requirements in the code.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Guy McMann, Jefferson County, Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

506.5.1.2 Down draft cooking appliances and ventilation systems. Down draft cooking appliances and ventilation systems shall be installed in accordance with the manufacturer's instructions and shall comply with all of the following requirements:

1. Exhaust ducts shall comply with Section 506.
2. Clearances to combustibles shall be in accordance with the manufacturer's listing.
3. Appliances shall be provided with filters complying with UL 1046.
4. Spaces containing such appliances shall be provided with makeup air complying with Section 508.
5. Appliances shall be interlocked with the exhaust system to prevent operation of the appliances when the such that they cannot operate unless the exhaust system and makeup air system are not operating.
6. The exhaust system shall be provided with controls an exhaust airflow monitoring system that will prevent terminate appliance operation when exhaust flow rate falls below 25% of the normal operating flow rate or 10% below the exhaust air flow the specified in the equipment listing, whichever is lower. A manual reset operation shall be required to restore appliance operation after termination by the airflow monitoring system.
7. The ventilation system shall be capable of capturing and containing the effluent at the source.
8. Surfaces located directly above the appliance shall be composed of noncombustible materials either elementary or composite, in accordance with the International Building Code Sections 703.5.1 and 703.5.2 respectively.
9. The appliances shall be equipped with integral fire extinguishing equipment that is listed for the application or fire extinguishing equipment shall be provided that complies with the International Fire Code and all of the following requirements:
 - 9.1 The cooking surfaces and exhaust ducts shall be provided with protection.
 - 9.2 Not less than one detection device shall be provided inside each duct opening and above each appliance. Such detection devices shall be installed in accordance with the manufacturers' installation instructions.
 - 9.3 A manual activation device shall be provided at each appliance.

(Portions of the proposal not shown are unaffected by this public comment.)

Commenter's Reason: The committee was concerned that not enough detail was pulled from the standard and that the proposal was somewhat incomplete. Now all the information has been incorporated, along with some general cleanup, providing complete guidance.

Currently the code is silent and provides no guidance on what to expect when code officials come across these types of appliances (Hibachi Tables). The National Standard contains requirements that are not present in the code and needs to be addressed. These appliances usually involve bottom discharge exhaust systems that may need monitoring to maintain capture and containment as they are not required to have type I hoods over them.

M99-12

Final Action: AS AM AMPC _____ D

M105-12

202, 507.2.1, 507.2.1.3 (New), 507.2.2, 507.2.2.1, Table 507.2.1, Table 507.2.2.1, 507.2.2.2, Table 507.2.2.2

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating Refrigerating and Air-Conditioning Engineers

Revise as follows:

507.2.1 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*. Type I hoods shall be installed over *light-duty cooking appliances* that produce grease or smoke. The duty classifications of cooking appliances served by Type I hoods shall be in accordance with Table 507.2.1

Exception: 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/m³ or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m³/s) in accordance with Section 17 of UL 710B.

507.2.1.3. Type I hoods shall overhang the appliances and equipment in accordance with their listing.

**TABLE 507.2.1
APPLIANCE DUTY CLASSIFICATIONS BY APPLIANCE TYPE**

| <u>Appliance Description</u> | <u>Size</u> | <u>Type I Hoods</u> | | | |
|---|----------------|-----------------------|------------------------|-----------------------|----------------------------------|
| | | <u>Light Duty</u> | <u>Medium Duty</u> | <u>Heavy Duty</u> | <u>Extra- Heavy Duty</u> |
| Braising pan/tilting skillet, electric | All | ● | - | - | - |
| Oven, rotisserie, electric and gas | All | ● | - | - | - |
| Oven, Combi, electric and gas | All | ● | - | - | - |
| Oven, convection, full-size, electric and gas | All | ● | - | - | - |
| Oven, convection, half-size, electric and gas [protein cooking] | All | ● | - | - | - |
| Oven, deck, electric and gas | All | ● | - | - | - |
| Oven, mini-revolving rack, electric and gas | All | ● | - | - | - |
| Oven, rapid cook, electric | All | ● | - | - | - |
| Oven, rotisserie, electric and gas | All | ● | - | - | - |
| Range, discrete element, electric (with or without oven) | All | ● | - | - | - |
| Salamander, electric and gas | All | ● | - | - | - |
| Braising pan/tilting skillet, gas | All | - | ● | - | - |
| Broiler, chain conveyor, electric | All | - | ● | - | - |
| Broiler, electric, under-fired | All | - | ● | - | - |
| Conveyor oven, electric | 6 kW or larger | - | ● | - | - |
| Conveyor oven, gas | All | - | ● | - | - |
| Fryer, doughnut, electric and gas | All | - | ● | - | - |

| <u>Appliance Description</u> | <u>Size</u> | <u>Type I Hoods</u> | | | |
|--|-------------|---------------------|--------------------|-------------------|-------------------------|
| | | <u>Light Duty</u> | <u>Medium Duty</u> | <u>Heavy Duty</u> | <u>Extra-Heavy Duty</u> |
| Fryer, kettle, electric and gas | <u>All</u> | - | ● | - | - |
| Fryer, open deep-fat, electric and gas | <u>All</u> | - | ● | - | - |
| Fryer, pressure, electric and gas | <u>All</u> | - | ● | - | - |
| Griddle, double-sided, electric and gas | <u>All</u> | - | ● | - | - |
| Griddle, flat, electric and gas | <u>All</u> | - | ● | - | - |
| Range, cook-top, induction | <u>All</u> | - | ● | - | - |
| Range, open-burner, gas (with or without oven) | <u>All</u> | - | ● | - | - |
| Range, hot top, electric and gas | <u>All</u> | - | ● | - | - |
| Broiler, chain conveyor, gas | <u>All</u> | - | - | ● | - |
| Broiler, electric and gas, over-fired (upright) | <u>All</u> | - | - | ● | - |
| Broiler, gas, under-fired | <u>All</u> | - | - | ● | - |
| Range, wok, gas and electric | <u>All</u> | - | - | ● | - |
| Appliances using solid fuel (wood, charcoal, briquettes, and mesquite) to provide all or part of the heat source for cooking | <u>All</u> | - | - | - | ● |

507.2.2 Type II hoods. Type II hoods shall be installed above dishwashers and appliances as required by Table 507.2.2. The duty classifications of cooking appliances served by Type II hoods shall be in accordance with Table 507.2.2 that produce heat or moisture and do not produce grease or smoke as a result of the cooking process, except where the heat and moisture loads from such appliances are incorporated into the HVAC system design or into the design of a separate removal system. Type II hoods shall be installed above all appliances that produce products of combustion and do not produce grease or smoke as a result of the cooking process. Spaces containing cooking appliances that do not require Type II hoods shall be provided with exhaust at a rate of 0.70 cfm per square foot (0.00033 m³/s). For the purpose of determining the floor area required to be exhausted, each individual appliance that is not required to be installed under a Type II hood shall be considered as occupying not less than 100 square feet (9.3 m²). Such additional square footage shall be provided with exhaust at a rate of 0.70 cfm per square foot [0.00356 m³/(s □ m²)]. Where hoods are not required, the additional heat and moisture loads generated by such appliances shall be accounted for in the sensible and latent loads for the HVAC system.

TABLE 507.2.2
TYPE II HOOD REQUIREMENTS BY APPLIANCE DESCRIPTION

| <u>Appliance Description</u> | <u>Size</u> | <u>Hood Not Required^{a,b}</u> | <u>Type II Hoods^a</u> | |
|-------------------------------------|-------------|--|----------------------------------|--------------------|
| | | | <u>Light Duty</u> | <u>Medium Duty</u> |
| Cabinet, holding, electric | <u>All</u> | ● | - | - |
| Cabinet, proofing, electric | <u>All</u> | ● | - | - |
| Cheese-melter, electric | <u>All</u> | ● | - | - |
| Coffee maker, electric | <u>All</u> | ● | - | - |
| Cooktop, induction, electric | <u>All</u> | ● | - | - |
| Dishwasher, under-counter, electric | <u>All</u> | ● | - | - |
| Dishwasher, powered sink, electric | <u>All</u> | ● | - | - |
| Drawer Warmer, 2 drawer, electric | <u>All</u> | ● | - | - |

| <u>Appliance Description</u> | <u>Size</u> | <u>Hood Not Required^{a,b}</u> | <u>Type II Hoods^a</u> | |
|--|----------------------|--|----------------------------------|--------------------|
| | | | <u>Light Duty</u> | <u>Medium Duty</u> |
| Egg cooker, electric | All | ● | - | - |
| Espresso machine, electric | All | ● | - | - |
| Grill, panini, electric | All | ● | - | - |
| Hot dog cooker, electric | All | ● | - | - |
| Hot plate, countertop, electric | All | ● | - | - |
| Ovens, conveyor, electric | < 6 kW | ● | | |
| Ovens, microwave, electric | All | ● | | |
| Ovens, warming, electric (add temp.) | All | ● | - | - |
| Popcorn machine, electric | All | ● | - | - |
| Rethermalizer, electric | All | ● | - | - |
| Rice cooker, electric | All | ● | - | - |
| Steam table, electric | All | ● | - | - |
| Steamers, bun, electric | All | ● | - | - |
| Steamer, compartment atmospheric, countertop, electric | All | ● | | |
| Steamer, compartment pressurized, countertop, electric | All | ● | | |
| Table, hot food, electric | All | ● | | |
| Toaster, electric | All | ● | - | - |
| Waffle Iron, electric | All | ● | - | - |
| Cheese-melter, gas | All | - | ● | - |
| Dishwasher, conveyor rack, chemical sanitizing | All | - | ● | - |
| Dishwasher, conveyor rack, hot water sanitizing | All | - | ● | - |
| Dishwasher, door-type rack, chemical sanitizing | All | - | ● | - |
| Dishwasher, door-type rack, hot water sanitizing | All | - | ● | - |
| Kettle, steam jacketed, tabletop, electric, gas and direct steam | < 20 gallons | - | ● | - |
| Oven, convection, half-size, electric and gas [non-protein cooking] | All | | ● | |
| Pasta cooker, electric | All | - | ● | - |
| Rethermalizer, gas | All | - | ● | - |
| Rice cooker, gas | All | - | ● | - |
| Steamer, atmospheric, gas | All | | ● | |
| Steamer, pressurized, gas | All | | ● | |
| Steamer, atmospheric, floor-mounted, electric | All | | ● | |
| Steamer, pressurized, floor-mounted, electric | All | | ● | |
| Kettle, steam-jacketed floor mounted, electric, gas and direct steam | < 20 gallons | - | ● | |
| Pasta cooker, gas | All | - | - | ● |
| Smoker, electric and gas, pressurized | All | - | - | ● |
| Steam-jacketed kettle, floor mounted, electric and gas | 20 gallons or larger | - | - | ● |
| ^a A hood shall be provided for an electric appliance if it produces 3.1×10^{-7} lb/ft ³ (5 mg/m ³) of grease or more when measured at 500 cfm (236 L/s). See Section 4.2.1. | | | | |
| ^b Where hoods are not required, the additional heat and moisture loads generated by such appliances shall be accounted for in the sensible and latent loads for the HVAC system. | | | | |

507.2.2.1 Type II hood exhaust flow rates. The net exhaust flow rate for Type II hoods shall comply with Table 507.2.2.1. The duty level for the hood shall be the duty level of the appliance that has the highest (heaviest) duty level of all of the appliances that are installed underneath the hood according to Table 507.2.2. The net exhaust flow rate is the exhaust flow rate for a hood, minus any internal discharge makeup air flow rate.

**TABLE 507.2.2.1:
TYPE II HOOD MINIMUM NET EXHAUST AIRFLOW RATES**

| <u>Type of Hood</u> | <u>Minimum Net Exhaust Flow Rate per Linear Hood Length in cfm/ft (L/s/m)</u> | |
|---------------------------------|---|------------------------------|
| | <u>Light Duty Equipment</u> | <u>Medium Duty Equipment</u> |
| <u>Wall-mounted Canopy</u> | <u>200 (310)</u> | <u>300 (465)</u> |
| <u>Single island</u> | <u>400 (620)</u> | <u>500 (775)</u> |
| <u>Double island (per side)</u> | <u>250 (388)</u> | <u>300 (465)</u> |
| <u>Eyebrow</u> | <u>250 (388)</u> | <u>250 (388)</u> |
| <u>Backshelf/ Pass-over</u> | <u>200 (310)</u> | <u>300 (465)</u> |

507.2.2.2 Type II hood overhang. Type II hoods shall overhang the appliances and equipment served in accordance with Table 507.2.2.2.

**TABLE 507.2.2.2
MINIMUM OVERHANG REQUIREMENTS FOR TYPE II HOODS**

| <u>Type of Hood</u> | <u>End Overhang</u> | <u>Front Overhang</u> | <u>Rear Overhang</u> |
|---------------------------------------|------------------------|----------------------------------|------------------------|
| <u>Wall-mounted canopy</u> | <u>6 in. (154 mm)</u> | <u>12 in. (154 mm)</u> | <u>N/A</u> |
| <u>Single-island canopy</u> | <u>12 in. (154 mm)</u> | <u>12 in. (154 mm)</u> | <u>12 in. (154 mm)</u> |
| <u>Double-island canopy</u> | <u>12 in. (154 mm)</u> | <u>12 in. (154 mm)</u> | <u>N/A</u> |
| <u>Eyebrow</u> | <u>N/A</u> | <u>12 in. (154 mm)</u> | <u>N/A</u> |
| <u>Backshelf/ Proximity/Pass-over</u> | <u>6 in. (154 mm)</u> | <u>10 in. (254 mm) (setback)</u> | <u>N/A</u> |
| <u>N/A = not applicable</u> | | | |

Delete definitions as follows:

~~**LIGHT-DUTY COOKING APPLIANCE**~~
~~**MEDIUM DUTY COOKING APPLIANCE**~~
~~**HEAVY-DUTY COOKING APPLIANCE**~~
~~**EXTRA-HEAVY-DUTY COOKING APPLIANCE**~~

Reason: The changes presented here reflect ASHRAE Standard 154-2011. Unlisted Type I hoods have been eliminated – the reasons for this change are that Type 1 hoods have been tested for the ability to structurally not warp or fail when subjected to grease fires as well as listed hoods tend to be more energy efficient than unlisted Type I hoods. Additionally Standard 154 has classified the duty-level required for both Type 1 and Type II hoods based on ASHRAE research projects. Additionally, Standard 154 has determined whether appliances need to be classified as unhooded, requiring Type 1 hoods or requiring Type II hoods.

Cost Impact: Requiring Type I hoods and showing which appliances can be unhooded does not have a cost for the operator. Both of these actually save significant amounts of energy (and costs) by reducing the amount of exhaust air required in kitchen spaced. Additionally there are cost savings in terms of reduced fan and duct sizes.

507.2.1-M-FERGUSON.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The definitions should not be deleted because they address gaps and omissions in the table. Section 507.2.1.3 addresses only listed hoods. Lists of appliances can place limits on those not in the list. Such lists can restrict new technology.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, requests Approval as Submitted.

Commenter's Reason: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers" The definitions should not be deleted because they address gaps and omissions in the table. Section 507.2.1.3 addresses only listed hoods. Lists of appliances can place limits on those not in the list. Such lists can restrict new technology", but the text clearly refers to the tables for the definitions. The current definitions are vague and open-ended. More specificity is required to define when Type I hoods should be used. The additional modification is included to address some appliances that were not included in the table, and to allow the use of custom built hoods.

Public Comment 2:

Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

507.2 Where Required. A Type I or Type II hood shall be installed at or above all commercial cooking appliances in accordance with Sections 507.2.1 and 507.2.2. 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.

Exception: Where an appliance is either custom built for the application, includes new technology or is of a type that is not listed in Tables 507.2.1 and 507.2.2, the hood type and ventilation rates shall be calculated based on the use and heat gain results that are equal to or less than the most comparable appliance shown in the Tables 507.2.1 and 507.2.2. The corresponding data used for this decision shall be reviewed and approved by the AHJ.

507.2.2 Type II hoods. Type II hoods shall be installed above dishwashers and appliances as required by Table 507.2.2. The duty classifications of cooking appliances served by Type II hoods shall be in accordance with Table 507.2.2. Type II hoods shall be installed above all appliances that produce products of *combustion* and do not produce grease or smoke as a result of the cooking process. Where hoods are not required, the additional heat and moisture loads generated by such appliances shall be accounted for in the sensible and latent loads for the HVAC system.

Exception: Dishwashers and appliances that are installed with integral ventilation ducts shall not require a hood.

Table 507.2.2
Type II Hood Requirements by Appliance Description

| Appliance Description | Size | Hood Not Required ^{a,b} | Type II Hoods ^a | |
|---|------|----------------------------------|----------------------------|-------------|
| | | | Light Duty | Medium Duty |
| Cooktop, induction, electric | All | • | | |
| Dishwasher, door-type, vapor condensing | All | • | | |
| Dishwasher, door-type rack, chemical sanitizing | All | • | | |
| Dishwasher, under-counter, electric | All | • | | |
| | | | | |

(Portions of proposal not shown are unaffected by this public comment.)

Commenter's Reason: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers" The definitions should not be deleted because they address gaps and omissions in the table. Section 507.2.1.3 addresses only listed hoods. Lists of appliances can place limits on those not in the list. Such lists can restrict new technology", but the text clearly refers to the tables for the definitions. The current definitions are vague and open-ended. More specificity is required to define when Type I hoods should be used. The additional modification is included to address some appliances that were not included in the table, and to allow the use of custom built hoods.

M105-12

Final Action: AS AM AMPC_____ D

M111-12

507.11.1

Proposed Change as Submitted

Proponent: Jay S. Parikh, Compliance Solutions International Inc., representing self.

Revise as follows:

507.11.1 Criteria. Filters shall be of such size, type and arrangement as will permit the required quantity of air to pass through such units at rates not exceeding those for which the filter or unit was designed or *approved*. Filter units shall be installed in frames or holders so as to be readily removable without the use of separate tools, unless designed and installed to be cleaned in place and the system is equipped for such cleaning in place. Where filters are designed to be and required to be cleaned, removable filter units shall be of a size that will allow them to be cleaned in a dishwashing machine or pot sink. Filter units shall be arranged in place or provided with drip-intercepting devices to prevent grease or other condensate from dripping into food or on food preparation surfaces.

Reason: Some grease filters available today are not to be cleaned, but are to be disposed of when loaded with grease, and replaced with new filters. The proposed change addresses such filters.

Cost Impact: The code change proposal will not increase the cost of construction.

507.11.1-M-PARIKH.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason and the action taken on M110-12.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County, Virginia, represents Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building Code and Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: It appears by the reason statement provided, the proponent introduced the proposed change to address disposable filters. The current language does not exclude disposable filters, nor does it exclude the disposal and replacement of permanent filters. More so, the proposed language suggests that there are filters, disposable or permanent, that do not have to be designed, nor are required to be cleaned.

M111-12

Final Action: AS AM AMPC_____ D

M112-12

508.1.2 (New)

Proposed Change as Submitted

Proponent: Steve Ferguson, American Society of Heating Refrigerating and Air-Conditioning Engineers

Add new text as follows:

508.1.2 Air balance. Design plans for a facility with a commercial kitchen ventilation system shall include a schedule or diagram indicating the design outdoor air balance. The design outdoor air balance shall indicate all exhaust and replacement air for the facility, plus the net exfiltration if applicable. The total replacement air airflow rate shall equal the total exhaust airflow rate plus the net exfiltration.

Reason: The proposed text is consistent with ASHRAE 154 and the IMC is currently silent on this issue.

Cost Impact: This will not increase the cost of construction.

508.1.2(NEW)-M-FERGUSON.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason and the need to inform the designer.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Richard Grace, Fairfax County, Virginia, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building Code and Officials Association (VBCOA), requests Disapproval.

Commenter's Reason: The IMC covers balancing (403.4.4) and pressure equalization (501.4) of all systems, including kitchens. Kitchens are not excluded from 403.4.4 or 501.4. It is redundant to repeat the same language in each applicable section of the same code when compliance requirements are already written within that code. Additionally, by adding in the language "net exfiltration", this section will directly conflict with 501.4 where stated "Where mechanical exhaust is required in a room or space in other than occupancies in R-3 and *dwelling units* in R-2, such space shall be maintained with a neutral or negative pressure." Exfiltration will require a positive pressure.

M112-12

Final Action:

AS

AM

AMPC ____

D

M123-12

514.2

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

514.2 Prohibited applications. Energy recovery ventilation systems shall not be used in the following systems:

Exception: The application of ERV equipment that recovers sensible heat only utilizing coil-type and fixed- plate heat exchangers shall not be limited by this section.

(Portions not shown remain unchanged.)

Reason: Section 514 limits the applications for ERV's and was focused on wheel- type heat exchanger units. Exemptions should apply for "run-around-coils", fixed plate heat exchangers and other non- latent energy types of ERV's. The ERV types in the exception cannot leak contaminants from one air stream to another, which was the concern of the original text. ERV's are in demand for some of these applications to meet the goals of energy and sustainability "green" codes, standards and rating systems.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

514.2-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The listing of some ERV's could prohibit such applications. Relaxation of the prohibition is a threat to indoor air quality.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

514.2 Prohibited applications. Energy recovery ventilation systems shall not be used in the following systems:

Exception: The application of ERV equipment that recovers sensible heat only utilizing coil-type and ~~fixed-plate~~ heat exchangers shall not be limited by this section.

Commenter's Reason: Fixed plate heat exchangers have been removed from the original change because of concern for cross contamination resulting from the loss of integrity of a fixed plate. Coil type heat exchangers would not pose a threat to indoor air quality.

M123-12

Final Action: AS AM AMPC_____ D

M126-12

602.1

Proposed Change as Submitted

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

Revise as follows:

SECTION 602 PLENUMS

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. Plenums shall be limited to one fire area. Return and transfer air shall be ducted from the boundary of the fire area directly to the air handling equipment. Fuel-fired appliances shall not be installed within a plenum.

Reason: It needs to be clarified that protected openings connecting one fire area to another are still linking the fire areas together regardless of whether a fire damper is installed in a fire barrier. There will still be a physical path for smoke to travel through even when the equipment has stopped in fire mode. Making it clear that this situation would require a direct ducted connection to the air handling equipment will be helpful to the user.

Cost Impact: None

602.1.#2-M-MCMANN.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal as follows:

SECTION 602 PLENUMS

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. Plenums shall be limited to one fire area. ~~Return and transfer 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.

Committee Reason: Approval is based on the proponent's published reason. The modification adding the word "served" clarifies the relationship between the fire area and the air handler that serves the fire area. The modification opens the requirement to all air systems which can include supply and exhaust air as well as return and transfer air.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Claude Kennedy, City of Salem, Oregon, representing Oregon Mechanical Officials Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

Section 602 Plenums

602.1 General. Supply return, exhaust, relief and ventilation air plenums shall be limited to the uninhabited crawl spaces, areas above ceiling or below floor, attic spaces, and mechanical equipment rooms. 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.~~ Return and transfer air connections to a plenum shall be continuously ducted from the boundary of the fire area to the air handling equipment located outside of the fire area. Fuel-fired appliances shall not be installed within a plenum.

Commenter's Reason: The original language found to be unclear and in need of clarification; OMOA officials suggest modifications as listed. Supportive comment is to clarify that return or transfer air in a plenum must be in ductwork when passing outside of its fire zone. The air handler/fan for this air cannot be located in a return plenum when outside of the originating fire zone.

M126-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M129-12

202, Section 602

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Add new definition as follows:

NON-DISCRETE PRODUCT. Products such as conduit, cable and plastic piping systems that are tested in accordance with ASTM E84 or UL 723.

Delete and substitute as follows:

SECTION 602 PLENUMS

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. Plenums shall be limited to one fire area. Fuel-fired appliances shall not be installed within a ~~plenum~~.

602.2 Construction. ~~Plenum~~ enclosures shall be constructed of materials permitted for the type of construction classification of the building.

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.

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.5, 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.~~
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.~~

602.2.1.1 Wiring. ~~Combustible electrical wires and cables and optical fiber cables exposed within a plenum shall be listed as having a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 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 as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame~~

spread distance of 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 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. Piping shall be *listed and labeled*.

602.2.1.3 Pneumatic tubing. Combustible pneumatic tubing 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 1820. Combustible pneumatic tubing shall be *listed and labeled*.

602.2.1.4 Electrical equipment in plenums. Electrical *equipment* exposed within a *plenum* shall comply with Sections 602.2.1.4.1 and 602.2.1.4.2.

602.2.1.4.1 Equipment in metallic enclosures. Electrical *equipment* with metallic enclosures exposed within a *plenum* shall be permitted.

602.2.1.4.2 Equipment in combustible enclosures. Electrical *equipment* with combustible enclosures exposed within a *plenum* shall be *listed and labeled* for such use in accordance with UL 2043.

602.2.1.5 Foam plastic insulation. 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 also comply with one or more of Sections 602.2.1.5.1, 602.2.1.5.2 and 602.2.1.5.3.

602.2.1.5.1 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.

602.2.1.5.2 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 2603.10 of the *International Building Code*.

602.2.1.5.3 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.

602.3 Stud cavity and joist space plenums. Stud wall cavities and the spaces between solid floor joists to be utilized as air plenums shall comply with the following conditions:

1. Such cavities or spaces shall not be utilized as a *plenum* for supply air.
2. Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.
3. Stud wall cavities shall not convey air from more than one floor level.
4. Stud wall cavities and joist space plenums shall comply with the floor penetration protection requirements of the *International Building Code*.

- ~~5. Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by approved fireblocking as required in the *International Building Code*.~~
- ~~6. Studwall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.~~

~~**[B] 602.4 Flood hazard.** For structures located in flood hazard areas, plenum spaces shall be located above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the plenum spaces during floods up to such elevation.~~

~~If the plenum spaces are located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment, they shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.~~

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. Plenums shall be limited to one fire area. Fuel-fired appliances shall not be installed within a plenum.

602.2 Construction. Plenum enclosures shall be constructed of materials permitted for the type of construction classification of the building.

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.

602.3 Materials installed within plenums. Sections 602. 3.1 through 602.3.8 shall apply to materials exposed within plenums. Such sections shall not apply to the following:

1. Dwelling units.
2. Smoke detectors.
3. Combustible materials fully enclosed within continuous noncombustible raceways or enclosures, gypsum board or other assembly meeting the fire resistive requirements of the building type of construction.
4. 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.

602.3.1 Rigid and flexible ducts and connectors. Rigid and flexible ducts and connectors shall conform to Section 603.

602.3.2 Duct coverings, linings, tape and connectors. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.

602.3.3 Combustible Wiring. Combustible electrical wires and cables and optical fiber cables exposed within a plenum shall be listed as having a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 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 as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 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.

602.3.4 Combustible fire sprinkler piping. Combustible 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.

602.3.5 Combustible pneumatic tubing. Combustible pneumatic tubing 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 1820.

602.3.6 Electrical equipment in plenums. Electrical equipment exposed within a plenum shall be enclosed within metallic enclosures or shall meet the requirements of UL 2043.

602.3.7 Foam plastic insulation. 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 also comply with one or more of the following:

1. 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.
2. 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 2603.10 of the International Building Code.
3. 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.

602.3.8 Non-discrete products. Non-discrete products not addressed in Sections 602.3.1 through 602.3.7 installed within plenums shall be noncombustible or 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.

Reason: This section was reorganized to eliminate a format having several exceptions. New text was added to cover what was addressed in the current Section 602.2.1, which was, in essence, what the industry refers to as non-discrete products that can be tested to ASTM E 84 or UL 723.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

202-NON-DISCRETE PRODUCT-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Beyond the reorganization of text, substantial technical changes were made. The listing and labeling requirement was deleted from fire sprinkler piping and pneumatic tubing sections. The word "exposed" was added back into Section 602.3. "Dwellings" in the exception to Section 602.3 was changed from "one- and two-family dwellings," which changes the application. Item # 3 of Section 602.3 speaks of fire-resistive requirements which are not relevant. The definition of non-discrete is vague.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

NON-DISCRETE PRODUCT. ~~Products such as conduit, cable and plastic piping systems that are tested in accordance with ASTM E84 or UL 723.~~

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. Plenums shall be limited to one fire area. Fuel-fired appliances shall not be installed within a plenum.

602.2 Construction. Plenum enclosures shall be constructed of materials permitted for the type of construction classification of the building.

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.

602.3 Materials installed within plenums. Sections 602. 3.1 through 602.3.8 shall apply to materials exposed within plenums. Such sections shall not apply to the following:

1. Dwelling ~~one- and two-family dwellings~~ units.
2. Smoke detectors.
3. ~~Combustible materials fully enclosed within continuous noncombustible raceways or enclosures, gypsum board or other assembly meeting the fire resistive requirements of the building type of construction.~~
- 4.3. 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.

602.3.1 Rigid and flexible ducts and connectors. Rigid and flexible ducts and connectors shall conform to Section 603.

602.3.2 Duct coverings, linings, tape and connectors. Duct coverings, linings, tape and connectors shall conform to Sections 603 and 604.

602.3.3 Combustible Wiring. Combustible electrical wires and cables and optical fiber cables exposed within a plenum shall be listed as having a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 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 as having a maximum peak optical density of 0.5 or less, an average optical density of 0.15 or less, and a maximum flame spread distance of 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.

602.3.4 Combustible fire sprinkler piping. Combustible 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. Such piping shall be listed and labeled.

602.3.5 Combustible pneumatic tubing. Combustible pneumatic tubing 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 1820. Combustible pneumatic tubing shall be listed and labeled.

602.3.6 Electrical equipment in plenums. Electrical equipment exposed within a plenum shall be enclosed within metallic enclosures or shall meet the requirements of UL 2043.

602.3.7 Foam plastic insulation. 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 also comply with one or more of the following:

1. 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.
2. 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 2603.10 of the International Building Code.
3. 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.

602.3.8 Non-discrete Other products. ~~Non-discrete~~ Products not addressed in Sections 602.3.1 through 602.3.7 and installed within plenums shall be noncombustible or 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.

602.4 Stud cavity and joist space plenums. Stud wall cavities and the spaces between solid floor joists to be utilized as air plenums shall comply with the following conditions:

1. Such cavities or spaces shall not be utilized as a plenum for supply air.
2. Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.
3. Stud wall cavities shall not convey air from more than one floor level.
4. Stud wall cavities and joist space plenums shall comply with the floor penetration protection requirements of the International Building Code.
5. Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by approved fireblocking as required in the International Building Code.
6. Studwall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

[B] 602.5 Flood hazard. For structures located in flood hazard areas, plenum spaces shall be located above the elevation required by Section 1612 of the International Building Code for utilities and attendant equipment or shall be designed and constructed to prevent water from entering or accumulating within the plenum spaces during floods up to such elevation. If the plenum spaces are located below the elevation required by Section 1612 of the International Building Code for utilities and attendant equipment, they shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

Commenter's Reason: The following revisions are in response to the committee reasons for disapproval. The listing and labeling requirement was deleted from fire sprinkler piping and pneumatic tubing sections. The word "exposed" was deleted from Section 602.3. "Dwellings" in the exception to Section 602.3 has been changed to "one- and two-family dwellings,". Item # 3 of Section 602.3 was deleted. The definition of non-discrete was deleted. Deleting the Stud Cavity and Flood hazard sections was unintended and they are added back in.

M129-12

Final Action: AS AM AMPC____ D

M130-12

602.2

Proposed Change as Submitted

Revise as follows:

602.2 Construction. *Plenum* enclosures shall be constructed of materials that comply with the requirements of section 703.5 of the *International Building Code* or of materials that 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 ~~permitted for the type of construction classification of the building.~~ 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.

Reason: All the materials contained within a plenum must be noncombustible or have a flame spread index of not more than 25 and a smoke developed index of not more than 50, except for a series of materials that meet their own special tests. The materials of construction of the plenum itself need to meet similar requirements. The IMC section is shown below.

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.6, materials within plenums shall be noncombustible or 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.

Plenums should not be allowed to be constructed simply of combustible materials (for example plain wood) because if the plenum enclosures can be made of wood, any fire would be able to spread along the walls of the plenum (wood typically has a flame spread index of up to 200) even with the best materials contained within the plenum.

During the last cycle proposal M88 introduced this issue but the technical committee was concerned that the proposal was placed in the wrong location because the requirements were placed in section 602.2.1 and they conflicted with the requirements of section 602.2 which would appear to allow plenum enclosures to be constructed of wood or other combustible building materials.

Requiring that a material be noncombustible in accordance with Section 703.5 of the IBC is much less onerous than simply requiring it to be noncombustible because composite materials are actually permitted to be "somewhat combustible" in accordance with 703.5.2 and only "elementary materials" are required to be strictly noncombustible. In particular section 703.5.2 of the IBC is intended to allow gypsum board to be classified as noncombustible, and, therefore, this avoids a conflict with the remainder of section 602.2 that allows gypsum board into certain plenums.

Section 703.5 of the IBC reads as follows:

703.5 Noncombustibility tests. *The tests indicated in Sections 703.5.1 and 703.5.2 shall serve as criteria for acceptance of building materials as set forth in Sections 602.2 602.3 and 602.4 in Type I, II, III and IV construction. The term "noncombustible" does not apply to the flame spread characteristics of interior finish or trim materials. A material shall not be classified as a noncombustible building construction material if it is subject to an increase in combustibility or flame spread beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.*

703.5.1 Elementary materials. *Materials required to be noncombustible shall be tested in accordance with ASTM E 136.*

703.5.2 Composite materials. *Materials having a structural base of noncombustible material as determined in accordance with Section 703.5.1 with a surfacing not more than 0.125 inch (3.18 mm) thick that has a flame spread index not greater than 50 when tested in accordance with ASTM E 84 or UL 723 shall be acceptable as noncombustible materials.*

The revised language proposed for the IMC takes care of the problem of using highly combustible materials to construct plenums by requiring that plenum enclosures be constructed of noncombustible materials (in accordance with section 703.5 of the IBC, which includes gypsum board) or of materials that meet the same fire test requirements as the materials contained within the plenum for all types of buildings.

Cost Impact: Plenums will not be permitted to be constructed of wood.

602.2-M-HIRSCHLER.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed text could be interpreted to require the materials in wall assemblies to comply as opposed to only the surfaces exposed to airflow.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, representing GBH International, Jesse Beitel, representing Hughes Associates for XPSA and Robert Davidson, representing Davidson Code Concepts, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

602.2 Construction. ~~Plenum enclosure construction materials that are exposed to the airflow shall~~ *Plenum enclosures shall be constructed of materials that* 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.

Commenter's Reason: The technical committee pointed out during the discussion that "The proposed text could be interpreted to require the materials in wall assemblies to comply as opposed to only the surfaces exposed to airflow." The public comment makes it clear that the new requirements apply only to those plenum enclosure construction materials exposed to the airflow.

The original proposal was opposed by one of the submitters of this public comment and the modification resolves the issue.

The original reason for the code proposal remains valid and is adequately addressed by this comment, albeit (properly) by restricting it to the materials of construction exposed to the airflow: "All the materials contained within a plenum must be noncombustible or have a flame spread index of not more than 25 and a smoke developed index of not more than 50, except for a series of materials that meet their own special tests. The materials of construction of the plenum itself need to meet similar requirements."

The other issue addressed by the proposal is also still valid: the requirements of section 703.5 of the IBC allow gypsum board to continue to be used as a plenum construction material.

M130-12

Final Action:

AS

AM

AMPC____

D

M131-12

202, 602.2.1, 602.2.1.6 (New), Chapter 15

Proposed Change as Submitted

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

Add definition as follows:

WATER DISTRIBUTION PIPE. Piping or tubing within the structure or on the premises that conveys water from the water service pipe, or from the meter when the meter is at the structure, to the points of utilization.

Add text as follows:

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.56, 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.
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.

602.2.1.6 Plastic water distribution pipe. Plastic water distribution piping and tubing used in a pressurized wet system 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 1887 or 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, UL 723 or CAN/ULC S102.2

Add referenced standard to Chapter 15:

CAN/ULC S102.2-10

Standard Method of Test for Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

Reason: The intent of this proposal is to provide known and accepted test methods, such as CAN/ULC S102.2 and UL-1887, to evaluate the acceptability of combustible supply piping to be used in plenum spaces. Such piping is used for hot and cold water supply but not as drain, waste and vent piping.

This action will complement the current standard, the ASTM E-84 test method, which is available to assess flame spread properties of combustible supply piping, and provide regulators and suppliers with the improved option of the UL test method to assess production of smoke by combustible piping. We do not wish to remove ASTM E84 as a suitable test for there are existing listings.

While UL 1887 is specifically scoped for use with combustible sprinkler piping at the present time, it is my understanding from

discussions with UL representatives that allowing for/requiring its utilization for combustible pressure piping, will not require modification of that standard. The membership should note that such piping is functionally equivalent to sprinkler piping in the application covered by the proposed code change.

In all cases testing according to UL 1887 is carried out on empty piping, i.e. piping NOT including water or any other liquid. This was a concern stated by the Committee in its earlier deliberations. This test condition insures that under the proposal combustible piping will be tested according to the most pessimistic scenario possible when comparing full or empty piping. This is because empty combustible piping is far more easily ignited and presents a greater smoke hazard than combustible piping that is full of water when they are compared directly.

S102.2 is referenced in the building code, and UL 1887 is already in the IMC.
The term "water distribution pipe" is already defined in the IPC.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [CAN/ULC S102.2-10] 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, 2012.

602.2.1-M-CUDAHY.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The standards are not necessarily equivalent. UL1887 is scoped to sprinkler piping only. ASTM E84 and UL 723 do not give sample testing direction, are not specific and are not consistent. Pipe in plenums must be listed for the application.

Analysis: Any update to this standard will be considered by the Administrative Code Committee during the 2013 Code Development Cycle.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Michael Cudahy, representing Plastic Pipe and Fittings Association (PPFA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

WATER DISTRIBUTION PIPE. Piping or tubing within the structure or on the premises that conveys water from the water service pipe, or from the meter when the meter is at the structure, to the points of utilization.

602.2.1.6 Plastic water distribution pipe. Plastic water distribution piping and tubing used in a pressurized wet system 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 1887 or 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, UL 723 or CAN/ULC S102.2 Such piping shall be listed and labeled.

Add referenced standard to Chapter 15:

CAN/ULC S102.2-10

Standard Method of Test for Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

(Portions not shown are unaffected by this Public Comment.)

Commenter's Reason: The committee at the initial hearing felt the proposal should include "listed and labeled" and also preferred S102.2 over UL 1887. The proposal has been modified to address those issues.

Public Comment 2:

Rosemary Heinze, representing Arkema, Inc., requests Disapproval.

Commenter's Reason: The Committee Action to disapprove this proposal should be upheld. No test data was provided by the proponent to demonstrate equivalency of the proposed additional test standards to the existing test standards. In fact, piping materials that meet 25/50 when tested in accordance with CANULC S 102.2 have produced smoke-developed index values of 450 and higher when tested in accordance with UL 723. This proposal would reduce the standard of safety that is maintained in the current code. Additionally, it is worth mentioning that there was a Floor Action following the Committee's decision to disapprove the proposal, and the Floor Action was not successful. Enclosed reference: Test data from JSH Polymers & Plastics, File# R21427 for CPVC resin.

SUMMARY OF RESULTS

| | | | |
|----------------|---------------------------|------------|-----------------|
| ENGINEER | : Karen Foxx-Smith | TECHNICIAN | : Sly Smith |
| FILE NO. | : R21427 | TEST DATE | : 5/12/03 |
| ASSIGNMENT NO. | : 03CA16601 | TEST TIME | : 7:27 AM |
| APPLICANT | : JSH Polymers & Plastics | TEST CODE | : 05120306 |
| MATERIAL | : CPVC resin | TEST NO | : 1 |
| | | MOUNTING | : Rods and Wire |

FLAME SPREAD RESULTS

| Distance (ft.) | Time (sec) |
|----------------|------------|
| 0.00 | 32 |
| 0.50 | 60 |
| 1.00 | 72 |
| 1.50 | 96 |
| 2.00 | 165 |

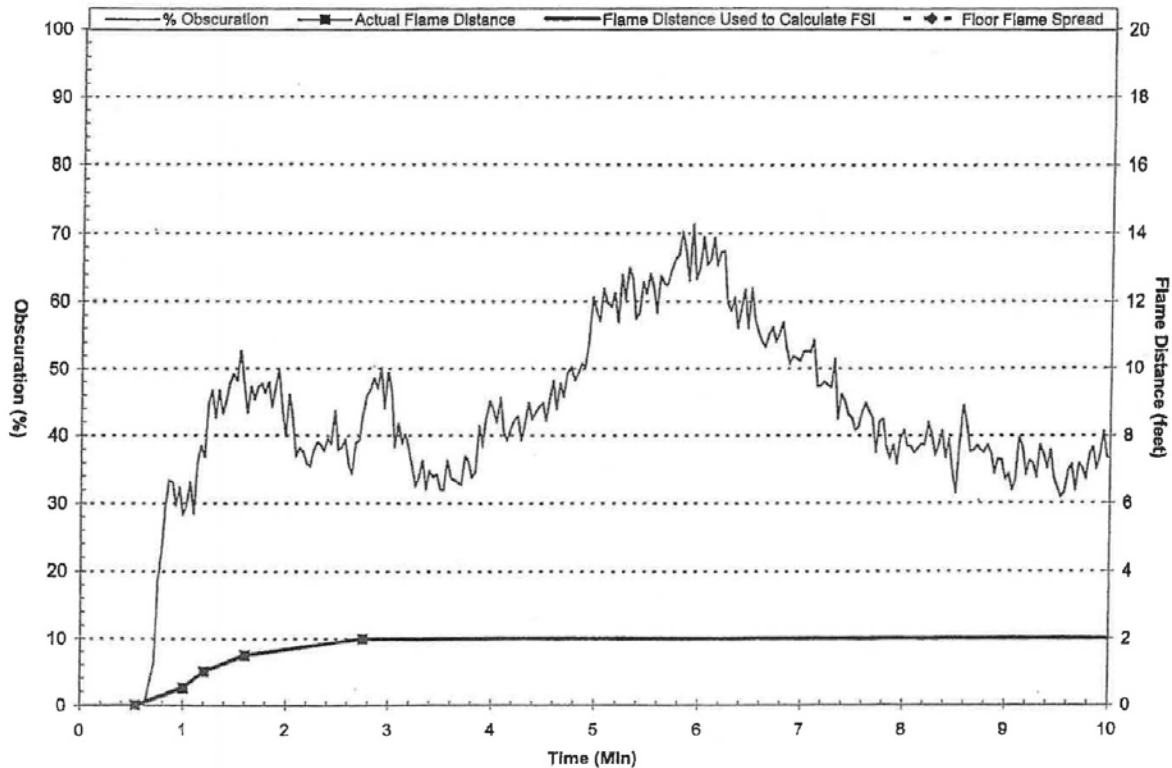
| | |
|---|--------------------------|
| Calculated Flame Spread (CFS): | 8.82 |
| Flame Spread Index(FSI): | 10 |
| Duration of test: | 10 min |
| Time to ignition: | 32 sec |
| Maximum Flame Spread: | 2 ft prior to 10 minutes |
| Actual area under the Flame spread Curve (ft.-min): | 17.1 |

SMOKE RESULTS

| | |
|------------------------------------|---------------------|
| Calculated Smoke Developed (CSD) : | 436.6 |
| SmokeDeveloped Index (SDI): | 450 |
| Area under the Smoke Curve: | 20.74 square inches |
| Area under the Red Oak Curve: | 4.75 square inches |

Flame Spread / Smoke Results

JSH Polymers Plastics
CPVC resin



05120306
R21427 / 03CA18601
Test No. 1
Test Location: North

Flame Spread Index = 10
Smoke Developed Index = 450
Max Flame Spread = 2 ft.

Public Comment 3:

Marcelo Hirschler, representing GBH International, requests Disapproval.

Commenter's Reason: Continue disapproving this proposal – UL 1887 and CAN/ULC S102.2 are not equivalent standards to ASTM E84 or UL 723, which is the default standard for materials in plenums. In fact, UL 1887 (which is intended for sprinkler piping) and CAN/ULC S102.2 (which is primarily intended for flooring materials and loose fill insulation materials) are much less severe fire tests than ASTM E84 or UL 723. Moreover, this proposal would not specifically require “Plastic water distribution piping and tubing” to be listed for the application. Moreover the definition addresses “water distribution pipe” and the requirements are for “plastic water distribution piping and tubing used in a pressurized water system” and thus are not consistent with each other.

The standards are not necessarily equivalent. UL1887 is scoped to sprinkler piping only. ASTM E84 and UL 723 do not give sample testing direction, are not specific and are not consistent. Pipe in plenums must be listed for the application.

M131-12

Final Action: AS AM AMPC____ D

M133-12

602.2.1

Proposed Change as Submitted

Proponent: Tony Crimi, A.C. Consulting Solutions Inc, representing International Firestop Council
(tcrimi@sympatico.ca)

Revise as follows:

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.5, 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 as plenum protection systems for use within a plenum.

Reason: This proposal aims to clarify Exception 5 to 602.2.1 which permits combustible materials to be installed in plenums provided they are fully enclosed in, amongst other things, "Materials listed and labelled for installation within a plenum." However, the current language lacks any kind of specific test standard, or detail as to the intent. Some have interpreted the exception to mean that the combustible item can be covered with *any* 25/50 rated material to bring it into code compliance. Testing has demonstrated that this is not the case. An individual material may pass the flame/smoke criteria, but may not provide enough protection for the combustible item beneath it to also pass the test. Reasons for this may include material shrinkage, high thermal conductivity, inadequate thickness, etc.

Testing and Certification Laboratories do provide Listings for "Plenum Protection Systems", which serve to protect a combustible item, keeping it from the degrading under fire conditions. These materials are qualified through fire testing of the combustible item together with the 'plenum protection material' as a system, to one of the plenum fire test methods dictated by the item type (such as NFPA 262, UL 1887, UL 1820 or UL 2024). These fire tests are a modified version of ASTM E 84 and utilise the Steiner Tunnel furnace. Testing is conducted at nationally recognised testing laboratories (NRTL) such as Intertek, ETL or UL. Listed system are then identified under the plenum protection (PP) category in the lab's Certifications Directory.

Cost Impact: This proposal will not affect the cost of construction.

602.2.2.1-M-CRIMI.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It is unnecessary to name such products. No listing agency uses such term. There is no definition for this term. The proposal would limit other materials. No performance criteria are given for such products. The current text already states what can be in a plenum.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tony Crimi, A.C. Consulting Solutions Inc., representing International Firestop Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.5, 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 as ~~plenum protection systems~~ a system for use within a plenum.

Commenter's Reason: This proposal is a clarification to Exception 5 to 602.2.1 which permits combustible materials to be installed in plenums provided they are fully enclosed in, amongst other things, "Materials listed and labelled for installation within a plenum."

Some have interpreted the exception to mean that the combustible item can be covered with *any* 25/50 rated material to bring it into code compliance. Testing has demonstrated that this is not the case. An individual material may pass the flame/smoke criteria, but may not provide enough protection for the combustible item beneath it to also pass the test. Reasons for this may include material shrinkage, high thermal conductivity, inadequate thickness, etc. The proposed language identifies that these combined materials must be tested together, and comply with flame spread and smoke developed requirements for plenums.

This approach is very commonly used with building materials. For example, foil facers for insulation products are tested both independently (as is the insulation) and together as faced batts and blankets.

M133-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M134-12

202, 602.2.1.4

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Add new definition as follows:

DISCRETE PRODUCT. Products such as duct straps, duct fittings, duct registers, and pipe hangers that are tested to UL 2043.

Revise as follows:

~~**602.2.1.4 Electrical equipment in plenums.** Electrical equipment exposed within a plenum shall comply with Sections 602.2.1.4.1 and 602.2.1.4.2~~

~~**602.2.1.4.1 Equipment in metallic enclosures.** Electrical equipment with metallic enclosures exposed within a plenum shall be permitted.~~

~~**602.2.1.4.2 Equipment in combustible enclosures.** Electrical equipment with combustible enclosures exposed within a plenum shall be listed and labeled for such use in accordance with UL 2043.~~

602.2.1.4 Discrete electrical, plumbing and mechanical products in plenums. Where discrete electrical, plumbing and mechanical products and appurtenances are located in a plenum and have exposed combustible material, they shall be listed and labeled for such use in accordance with UL 2043.

Reason: The first part of this proposal is just a text cleanup to delete unnecessary wording. Section 602.2.1.4.1 does not state a requirement and is simply the inverse of section 602.2.1.4.2. With Section 602.2.1.4.1 gone, Section 602.2.1.4 has no purpose. The only actual requirement is stated in Section 602.2.1.4.2. The second part of this proposal revises the remaining section to broaden its coverage to more than electrical products. There are combustible plumbing and mechanical products such as plumbing appurtenances, pipe and duct supports, condensate pumps, duct fittings, etc that are used in plenums and that cannot be effectively tested in accordance with standards ASTM E84 or UL 723. The UL 2043 standard was developed to test products and materials not able to be tested in accordance with ASTM E84 or UL 723, and is currently adopted by reference in Section 602.2.1.4.2. These products are individual distinct pieces and non-continuous (i.e. "discrete"). This proposal was presented last cycle and the Committee had questions about the term "discrete". Per the dictionary, 'discrete' refers to products that are non-continuous, individual distinct pieces, as compared to non-discrete products such as cable or plastic pipe. If adopted, this proposal will provide consistency in how the ICC codes treat discrete components in plenums. The new definition is necessary because of the new term. The definition basically states that a discrete product is something that is necessarily tested to UL 2043. A discrete product is defined by how it is tested.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

202-DISCRETE PRODUCT (NEW)-M-STRAUSBAUGH-PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal as follows:

DISCRETE PRODUCT. Products that are non-continuous, individual, distinct pieces such as, but not limited to, ~~such as~~ duct straps, duct fittings, duct registers, and pipe hangers. ~~that are tested to UL 2043.~~

Revise as follows:

602.2.1.4 Electrical equipment in plenums. Electrical equipment exposed within a plenum shall comply with Sections 602.2.1.4.1 and 602.2.1.4.2

602.2.1.4.1 Equipment in metallic enclosures. Electrical equipment with metallic enclosures exposed within a plenum shall be permitted.

602.2.1.4.2 Equipment in combustible enclosures. Electrical equipment with combustible enclosures exposed within a plenum shall be listed and labeled for such use in accordance with UL 2043.

602.2.1.4-5 Discrete electrical, plumbing and mechanical products in plenums. Where discrete electrical, plumbing and mechanical products and appurtenances are located in a plenum and have exposed combustible material, they shall be listed and labeled for such use in accordance with UL 2043.

Committee Reason: Approval is based on the proponent's published reason. The modification restores text that recognizes that electrical equipment having metallic enclosures is allowed in a plenum, despite the fact that such enclosures are not continuous because of the presence of mounting and similar holes in the metallic enclosure. The text of current Section 602.2.1.4.1 is needed to counter item # 5 of Section 602.2.1 which calls for combustible items to be fully enclosed by continuous enclosures.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, representing GBH International, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

DISCRETE PRODUCT. Products that are non-continuous, individual, distinct pieces such as, but not limited to, electrical, plumbing and mechanical products and duct straps, duct fittings, duct registers, and pipe hangers.

(Portions of proposal not shown remain unchanged.)

Commenter's Reason: This public comment addresses only the definition and supports the remainder of the proposal as approved by the technical committee. The reason for the proposed modification is to make the definition consistent with the requirements in sections 602.2.1.4 and 602.2.1.5. Discrete products such as duct straps, duct fittings and so on are clearly covered by the requirements of 602.2.1.5 but the requirements of 602.2.1.4 and 602.2.1.5 tend to apply also to larger discrete products with exposed combustible materials.

M134-12

Final Action:

AS

AM

AMPC____

D

M136-12

602.2.1.6 (New)

Proposed Change as Submitted

Proponent: Marcelo M. Hirschler/GBH International
(gbhint@aol.com)

Add new text as follows:

602.2.1.6 Plastic piping and tubing used in plumbing systems 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. The fire test report shall indicate that the materials were tested at full width of the tunnel and without water or any other liquid in the piping or tubing during the test.

Reason: The IMC requires, in 602.2.1, that all materials within plenums must meet a flame spread index of 25 and a smoke developed index of 50 when tested to ASTM E84. However, in actual practice, many plastic piping and tubing materials are tested by filling the product with water during the test. This is neither a test in accordance with ASTM E84 nor is it adequate for the following reasons:

1. The plastic piping and tubing is listed for use in plenums and can be used with liquids other than water. For example it could be used for combustible liquids.
2. The plastic piping and tubing is not required to be held horizontally in the plenum. If the pipe is not horizontal then the water will not be retained in the pipe during use.
3. During construction and remodeling pipes are often empty.
4. Fire testing for all other products using ASTM E84 is conducted on the material to be used and not on the material with some fillings.
5. ASTM E84 requires all materials and products to be tested at full tunnel width, with only very few exceptions. Plastic piping and tubing is not one of the exceptions. The exceptions in ATM E84 are: (1) when there is a standard practice for the material (as shown in section 6.8), (2) when adhesives and trim have been listed with tests at less than full width and (3) when a specific test or application standard has been issued (as shown in Appendix X5). The relevant sections are shown below (section 6.3 and its associated subsections, section 6.8 and appendix X5).
6. Other plastic piping and tubing materials are tested without water and the comparison is inadequate if some materials are tested full of water.
7. Some materials are tested with water simply because they cannot meet the requirements otherwise.
8. If the IMC committee believes that ASTM E84 is not an appropriate test for such materials (which is a reasonable approach) a code change is needed and an alternate test must be specified because the present wording of section 602.2.1 of the IMC requires plastic piping and tubing to be tested to the ASTM E84/UL 723 test by default, without offering additional guidance on how to do the testing.

ASTM E84 section 6.3, 6.8 and Appendix X5:

6.3 The size of the test specimen shall be:

Width: between 20 and 24 in. (508 and 610 mm)

Length: 24 ft + 12 in. — 6 in.

Thickness: maximum 4 in. (101 mm).

NOTE 1 - The test apparatus is not designed for testing at thicknesses greater than 4 in. (101 mm), but has the ability to be modified if required. This is accomplished through (a) modifications to the test apparatus lid to maintain an airtight seal, and (b) the introduction, usually of additional sample/lid supports above the test apparatus ledges. Due to the composition of some materials, test results obtained at a thickness greater than 4 in. (101 mm) will potentially vary from results of a test on the same material tested at a thickness of 4 in. (101 mm) or less.

6.3.1 The test specimen shall not be required to conform to the test specimen length and width described in 6.3 when the material complies with 6.3.1.1-6.3.1.3.

NOTE 2—When tests are conducted with materials installed at less than full width, representing the end-use width, any resulting flame spread and smoke developed indices will not relate to indices obtained with the calibration material, which is tested using the specimen width described in 6.3.

6.3.1.1 Materials for which there is a standard practice to address specimen preparation and mounting with this test method shall be tested as described in the appropriate standard practice (see 6.8).

6.3.1.2 Adhesives and trim shall be permitted to be tested in the width or length, or both, specified in their listings, or as part of their conditions for being labeled, by a nationally recognized testing laboratory.

6.3.1.3 Materials and products for which there is a specific test method or application standard requiring the use of the apparatus described in Section 5 shall be permitted to be tested in accordance with that specific test method or application standard (see Appendix X5).

*6.8 In addition to the above provisions, the standard practices listed below shall be used for specimen preparation and mounting of the relevant test materials. For all other products, guidance on mounting methods is provided in Appendix X1.
E2231 for pipe and duct insulation materials.*

E2404 for paper, vinyl and textile wall and ceiling covering materials.

E2573 for site-fabricated stretch systems.

E2579 for the following wood products: solid board, lumber and timber products (including solid boards, lumber, timber, fingerjoined lumber, glulam, laminate wood, laminated veneer lumber and parallel strand lumber products), panel products (including fibreboard, hardboard, oriented strandboard, waferboard, and plywood panel products), decorative wood products (including fine woodwork, millwork and moulding) and shingles and shakes used as interior wall and ceiling finish and interior trim.

E2599 for reflective insulation, radiant barrier and vinyl stretch ceiling materials for building applications.

E2688 for tapes up to and including 8 in. (203.2 mm) in width.

E2690 for caulks and sealants intended to be applied up to and including 8 in. (203.2 mm) in width.

X5. SPECIFIC TEST METHODS AND APPLICATION STANDARDS

X5.1 The following standards address testing of materials in accordance with test methods that are applications or variations of this test method or apparatus.

X5.1.1 Wires and cables for use in air-handling spaces are covered by NFPA 262.

X5.1.2 Pneumatic tubing for control systems are covered by UL 1820.

X5.1.3 Combustible sprinkler piping is covered by UL 1887.

X5.1.4 Optical fiber and communications raceways are covered by UL 2024.

IMC 602.2.1 Materials within plenums. Except as required by Sections 602.2.1.1 through 602.2.1.5, 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 E84 or UL 723.

For information also:

NFPA 90A (section on ceiling cavity plenums)

4.3.11.2.6.6 Plastic piping and tubing used in plumbing systems shall be permitted to be used within a ceiling cavity plenum if it exhibits 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, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, at full width of the tunnel and with no water or any other liquid in the pipe during the test.

NFPA 90A (section on raised floor plenums)

4.3.11.5.5.7 Plastic piping and tubing used in plumbing systems shall be permitted to be used within a raised floor plenum if it exhibits 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, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, at full width of the tunnel and with no water or any other liquid in the pipe during the test.

Cost Impact: None

602.2.1.6(NEW)-M-HIRSCHLER.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: E84 is already in the code and this proposal will be confusing to the code officials. E84 describes the specimen setup fully. There is no need to tell the testing lab what to put in the test report.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Marcelo M. Hirschler, representing GBH International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

602.2.1.6 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 E84 or UL 723. ~~The fire test report shall indicate that the materials were tested at full width of the tunnel and with no water or any other liquid in the piping or tubing during the test.~~

Commenter's Reason: The technical committee stated that ASTM E84 is already in the code. However, there is no explicit reference to testing plastic piping and tubing and there has been a lot of confusion in recent years regarding the need (or lack of it) for testing these materials. In view of the fact that the issues of "full width" or of water are addressed in the ASTM E84 standard I agree with the committee that they do not need to be addressed in the IMC.

However, it is important to state explicitly that plastic piping and tubing needs to comply with ASTM E84 requirements in view of the multiple discussions and challenges that have taken place in recent years regarding other test methods and in view of the fact (as shown below) that plastic pipe has often been tested full of water and by placing a single pipe in the ASTM E84 apparatus, neither of which is allowed by recent editions of ASTM E84.

Moreover it is important to clarify that plastic piping and tubing in plenums must be listed and this public comment adds that requirement.

M136-12

Final Action:

AS

AM

AMPC_____

D

M137-12

602.2.1.6 (New), Chapter 15

Proposed Change as Submitted

Proponent: David W. Ash, Lubrizol Advanced Materials Inc.

Add next text as follows:

602.2.1.6 Plastic plumbing piping. Plastic plumbing 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 index of not greater than 5 feet (1524 mm) when tested in accordance with UL 1887 or 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 CAN/ULC S102.2. Piping shall be listed and labeled.

Add referenced standard to Chapter 15:

CAN/ULC S102.2-10

Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies

Reason: Currently ASTM E-84 is the required test to determine the flame and smoke properties of materials. These values then determine whether or not a material may be used within plenums. There are exceptions to this standard for those products with special criteria and those are shown in sections 602.2.1.1 through 602.2.1.5.

Since that test is specified by the IMC, all other products, including plastic plumbing pipe, must be evaluated by this test. The scope of ASTM E-84 test states that it is applicable to surfaces such as walls and ceilings. Many products that are not used in a flat form are impacted by this requirement. Obviously, a pipe's tubular shape does not correspond to a flat shape. Although an ASTM committee has been attempting to decide on a test method for pipe, to date they have not been successful. Consequently, ASTM E-84 does not provide any direction in testing a pipe.

Other test standards have been developed that do include provisions for testing pipe. These standards have been successfully used for a number of years. The UL 1887 and CAN/ULC S102.2 standards recognize that the appropriate way to evaluate the flame and smoke characteristics of a pipe is to test a sample in that shape. These standards provide specific direction in the testing of the pipe and do not leave the decision of what sample to test up to the manufacturer or the testing agency. The addition of these two standards to the IMC as method to evaluate plastic plumbing pipe provides a clearer direction than what the IMC currently offers.

The CAN/ULC S102.2 standard is currently referenced in the International Building Code. The UL 1887 standard is currently referenced in the International Mechanical Code.

Cost Impact: This proposal would not increase the cost of construction.

602.2.1.6(NEW)-M-ASH.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Disapproval is consistent with the action taken on M131-12.

Analysis: Any update to this standard will be considered by the Administrative Code Committee during the 2013 Code Development Cycle.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

David W. Ash, representing Lubrizol Advanced Materials, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

602.2.1.6 Plastic plumbing piping. Plastic plumbing 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 index of not greater than 5 feet (1524 mm) when tested in accordance with UL 1887 or 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 CAN/ULC S102.2. Piping shall be listed and labeled.

Commenter's Reason: Currently ASTM E-84 is the required test to determine the flame and smoke properties of materials. These values then determine whether or not a material may be used within plenums. There are exceptions to this standard for those products with special criteria and those are shown in sections 602.2.1.1 through 602.2.1.5.

Since that test is specified by the IMC, all other products, including plastic plumbing pipe, must be evaluated by this test. The scope of ASTM E-84 test states that it is applicable to surfaces such as walls and ceilings. Many products that are not used in a flat form are impacted by this requirement. Obviously, a pipe's tubular shape does not correspond to a flat shape. Although an ASTM committee has been attempting to decide on a test method for pipe, to date they have not been successful. Consequently, ASTM E-84 does not provide any direction in testing a pipe.

Other test standards have been developed that do include provisions for testing pipe. These standards have been successfully used for a number of years. The CAN/ULC S102.2 standard recognizes that the appropriate way to evaluate the flame and smoke characteristics of a pipe is to test a sample in that shape. This standard provides specific direction in the testing of the pipe and does not leave the decision of what sample to test up to the manufacturer or the testing agency. Depending on the size of the pipe this standard requires that either multiple pipes be tested, or that the pipe be cut in half lengthwise and tested, or that a flat sheet be tested. The addition of this standard to the IMC as method to evaluate plastic plumbing pipe provides a clearer direction than what the IMC currently offers.

The CAN/ULC S102.2 standard is currently referenced in the International Building Code.

Public Comment 2:

Marcelo M Hirschler, representing GBH International, requests Disapproval.

Continue disapproving this proposal – CAN/ULC S102.2 is not an equivalent standard to ASTM E84 or UL 723, which is the default standard for materials in plenums. In fact, CAN/ULC S102.2 (which is primarily intended for flooring materials and loose fill insulation materials) is a much less severe fire test than ASTM E84 or UL 723. Moreover, the term “Plastic plumbing piping” is not specifically defined and it is unclear how “plastic plumbing piping” differs from other plastic plumbing products and this requirement would introduce confusion also.

M137-12

Final Action: AS AM AMPC_____ D

M138-12

602.3.1 (New)

Proposed Change as Submitted

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

Add new text as follows:

602.3.1 Dwelling stud cavity and joist space plenums prohibited. Building framing cavities in dwelling units shall not be utilized as ducts or plenums

Reason:

- This proposal brings consistency between the IMC and the residential portion of the IECC. A distinction needs to be made here that this prohibition only applies to dwellings. There is nothing in the commercial portion of the IECC to support this prohibition in commercial applications.
- These requirements still have value in non-residential applications and should not be deleted in their entirety. The new sub-section isolates the residential prohibition.

Cost Impact: None

602.3.1(NEW)-M-MCMANN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Section 101.3 of the IMC does not include energy efficiency. The IMC should not have its content dictated by the IECC.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Guy McMann, Jefferson County, Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

602.3.1 Dwelling stud cavity and joist space plenums prohibited. In Group R2, R3 and R4 occupancies 3 stories or less in height, building framing cavities in dwellings units shall not be utilized as ducts or plenums

Commenter's Reason: It's very important that the IECC and the IMC be consistent in its approach as to how building cavities are to be utilized when it comes to plenums. The committee reason for disapproval assumed this would no longer permit this option which they would be correct but only for dwellings that meet the definition of "Residential Building" in the IECC. Without this proposal, two residential buildings on the same lot could quite possibly be treated differently without justification. This added language makes the two codes consistent with each other eliminating confusion and inconsistent enforcement by tying the IECC definition and this section together.

M138-12

Final Action: AS AM AMPC_____ D

M139-12

602.2.1.6 (New)

Proposed Change as Submitted

Proponent: Dustin McLehaney, Chesterfield County, VA, Va. Plumbing and Mechanical Inspectors Association (VPMIA) And Va. Building Code Officials Association (VBCOA)
(MclehaneyD@chesterfield.gov)

Delete and substitute as follows:

~~**602.3 Stud cavity and joist space plenums.** Stud wall cavities and the spaces between solid floor joists to be utilized as air plenums shall comply with the following conditions:~~

- ~~1. Such cavities or spaces shall not be utilized as a plenum for supply air.~~
- ~~2. Such cavities or spaces shall not be part of a required fire-resistance-rated assembly.~~
- ~~3. Stud wall cavities shall not convey air from more than one floor level.~~
- ~~4. Stud wall cavities and joist space plenums shall comply with the floor penetration protection requirements of the *International Building Code*.~~
- ~~5. Stud wall cavities and joist space plenums shall be isolated from adjacent concealed spaces by approved fire blocking as required in the *International Building Code*.~~
- ~~6. Stud wall cavities in the outside wall of building envelope assemblies shall not be utilized as air plenums.~~

602.3 Building cavities. Building framing cavities shall not be used as ducts or plenums.

Reason: 2012 IECC section R403.2.3 and IRC N1103.2.3 both read as follows;

Building cavities. Building framing cavities shall not be used as ducts or plenums.

This practice is not permitted in residential applications. There is no logical reasoning that it should be permitted in a commercial application.

Cost Impact: The code change proposal will not increase the cost of construction.

602.3-M-MCLEHANEY.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Disapproval is based on the action taken on M138-12.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dustin McLehaney, Chesterfield County, Virginia, representing both the Virginia Plumbing Mechanical Inspectors Association, and the Virginia Building and Code Officials Association, requests Approval as Submitted.

Commenter's Reason: Code change proposal M139 was disapproved based on the following reasoning-Section 101.3 of the IMC does not include energy efficiency. The IMC should not have its content dictated by the IECC.

This concern here is not that the IECC is dictating what should be in the IMC but rather an inconsistency between the two codes. The IMC gives prescriptive requirements on how to utilize building framing cavities as ducts or plenums and the IECC states that building framing cavities shall not be used as ducts or plenums. The following language has been copied directly from the introduction section of the mechanical code- **This 2012 edition is fully compatible with all of the International Codes (I-Codes)** published by the International Code Council (ICC), **including** the International Building Code, **International Energy Conservation Code**, International Existing Building Code, International Fire Code, International Fuel Gas Code, International Green Construction Code (to be available March 2012), International Plumbing Code, ICC performance Code, International Private Sewage Code, International Property Maintenance Code, International Residential Code, International Swimming Pool and Spa Code (to be available March 2012), International Urban-Wildland Interface Code and International Zoning Code. Based on this language the IMC and the IECC are clearly inconsistent with one another on this issue. There should be a higher order of priority to have the I-Codes consistent or compatible as referenced above.

M139-12

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M140-12

603

Proposed Change as Submitted

Proponent: Bob Eugene, Underwriters Laboratories, representing Underwriters Laboratories
(Robert.Eugene@ul.com)

Revise as follows:

603.4 Metallic ducts. All metallic ducts shall be constructed as specified in the *SMACNA HVAC Duct Construction Standards- Metal and Flexible* or shall comply with *UL 181*. Flexible metallic ducts complying with *UL 181* shall be listed and labeled as Class 0 or Class 1 flexible air ducts and shall be installed in accordance with Section 304.1.

Exception: Ducts constructed and installed in accordance with *SMACNA HVAC Duct Construction Standards- Metal and Flexible* within single dwelling units shall have a minimum thickness as specified in Table 603.4

603.4.1 Minimum fasteners. Rigid Round metallic ducts constructed in accordance with *SMACNA HVAC Duct Construction Standards- Metal and Flexible* shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint.

Exception: Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion so as to prevent a hinge effect.

603.5 Nonmetallic ducts. Nonmetallic ducts shall comply with *UL 181*, shall be constructed listed and labeled as with Class 0 or Class 1 flexible air ducts material, and shall be comply with *UL 181* installed in accordance with Section 304.1. 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 Installation of listed and labeled air ducts. Listed and labeled air ducts shall be installed in accordance with Sections 603.6.1 and 603.6.2.

603.6.1 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).

603.6.2 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.

603.6 Flexible air ducts and flexible air connectors. Flexible air ducts, both metallic and nonmetallic, shall not be limited in length. 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.

603.6.1 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.

603.6.2-603.7 Flexible air connectors. Flexible air connectors, both metallic and nonmetallic, shall comply with *UL 181*, shall be listed and labeled as Class 0 or Class 1 flexible air connectors, and shall be installed in accordance with Section 304.1.

603.6.2.1 603.7.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 603.7.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

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.~~

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* or *NAIMA Fibrous Glass Duct Construction Standards* in accordance with 603.9.1 or shall comply with *UL181* in accordance with Section 603.9.2. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Closure systems used to seal ductwork shall be installed in accordance with the duct and closure system manufacturer's instructions. Unlisted duct tape is not permitted as a sealant on any duct.

603.9.1 Ducts in accordance with SMACNA and NAIMA. Joints, seams and connections in metallic and nonmetallic ducts 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, or closure systems in accordance with Section 603.9.2.

Exception: Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures of less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

603.9.2 Ducts in accordance with UL 181. Closure systems used to seal ductwork in accordance with UL181 shall be listed and labeled in accordance with either UL 181A or 181B in accordance with Table 603.9.2. Closure systems used to seal rigid metallic and rigid fiberglass ducts shall comply with 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-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 "181B-C." Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer's installation instructions. Unlisted duct tape is not permitted as a sealant on any duct.

Exception: Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

**TABLE 603.9.2
CLOSURE SYSTEMS**

| <u>Type of Ductwork</u> | <u>Standard</u> | <u>Type of Closure System</u> | <u>Marking</u> |
|---------------------------------------|------------------------|--------------------------------------|-----------------------|
| Rigid Metallic or Rigid Fiberglass | UL 181A | Pressure Sensitive Tape | 181A-P |
| Rigid Metallic or Rigid Fiberglass | UL 181A | Mastic Tape | 181A-M |
| Rigid Metallic or Rigid Fiberglass | UL 181A | Heat Sensitive Tape | 181A-H |
| Flexible Air Ducts and Air Connectors | UL 181B | Pressure Sensitive Tape | 181B-FX |
| Flexible Air Ducts and Air Connectors | UL 181B | Mastic Tape | 181B-M |
| Flexible Non-Metallic Air Ducts | UL181B | Mechanical Fastener ^a | 181B-C ^a |

a. Mechanical fasteners shall be used in conjunction with a listed pressure sensitive tape or mastic in accordance with UL181.

(Portions not shown remain unchanged.)

Reason: To provide additional clarity and consistency in the requirements air ducts constructed to SMACNA requirements and those that comply with UL181. This also provides additional clarity and consistency for the sealing of all ductwork.

Cost Impact: None

603.4-M-EUGENE.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: UL181 refers to rigid ducts, not metal ducts. UL181 is not a construction standard, but Section 603.4, as revised, suggests that it is.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because public comments were submitted.

Public Comment 1:

Bob Eugene, representing Underwriters Laboratories, LLC, requests Approval as Modified by this Public Comment.

Replace original proposal to Section 603.4 as follows:

603.4 Metallic ducts. All metallic ducts shall be constructed as specified in the SMACNA HVAC Duct Construction Standards-Metal and Flexible.

Exceptions:

1. Ducts installed within single *dwelling units* shall have a minimum thickness as specified in Table 603.4.
2. Flexible metallic ducts complying with UL 181, *listed and labeled* as Class 0 or Class 1 flexible air ducts, and installed in accordance with Section 304.1.

Revise section 603.4.1 as follows:

603.4.1 Minimum fasteners. Rigid Round metallic ducts constructed in accordance with SMACNA HVAC Standards-Metal and Flexible shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint.

Exception: Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion so as to prevent a hinge effect.

(Portions of code change not shown remain unchanged)

Commenter's Reason: Products that meet the criteria of UL181 have demonstrated equivalency with metallic ducts constructed in accordance with SMACNA *HVAC Duct Construction Standards—Metal and Flexible*. Text has therefore been revised to recognize UL181 ducts as an exception to the construction standard, SMACNA *HVAC Duct Construction Standards—Metal and Flexible*.

Public Comment 2:

Bob Eugene, representing Underwriters Laboratories, LLC, requests Approval as Modified by this Public Comment.

Replace original proposal to Sections 603.5 through 603.6.4 as follows:

603.5 Nonmetallic ducts. Nonmetallic ducts shall comply with UL 181, shall be constructed *listed and labeled* as with Class 0 or Class 1 ducts material, and shall ~~be~~ comply with UL 181 installed in accordance with Section 304.1. 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).

603.5.1 Gypsum ducts. The use of gypsum boards to form air shafts (ducts) shall be limited to return air systems where the air temperatures do not exceed 125°F (52°C) and the gypsum board surface temperature is maintained above the airstream dew-point temperature. Air ducts formed by gypsum boards shall not be incorporated in air-handling systems utilizing evaporative coolers.

603.6 Flexible air ducts and flexible air connectors. *Listed and labeled* 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.

603.6.1 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, 603.6.1 and 603.6.2.

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

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

603.6.2 Flexible air duct clearance. Flexible air ducts shall be installed with the minimum *clearance* to an *appliance* as specified in the *appliance* manufacturer's installation instructions.

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 Sections 304.1, and 603.7.1 through 603.7.4.

603.6.2.1 603.7.1 Connector length. Flexible air connectors shall be limited in length to 14 feet (4267 mm).

603.6.2.2 603.7.2 Connector penetration limitations. Flexible air connectors shall not pass through any wall, floor or ceiling.

603.6.2.3 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).

603.6.2.4 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.

(Renumber subsequent sections)

(Portions of code change not shown remain unchanged)

Commenter's Reason: To provide additional clarity and consistency in the requirements for air ducts constructed to SMACNA requirements and those that comply with UL181 by:

- Clarifying that it is the UL181 ducts are listed and labeled as Class 0 and Class 1, not the material.
- Clarifying that UL181 ducts are installed in accordance with the manufacturer's installation instructions (Section 304.1)
- Separating requirements that apply to flexible air ducts from those that apply to flexible air duct connectors to avoid confusion regarding the two types of products.

Public Comment 3:

Bob Eugene, representing Underwriters Laboratories, LLC, requests Approval as Modified by this Public Comment.

Replace original proposal to sections 603.9 through 603.9.2 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* or *NAIMA Fibrous Glass Duct Construction Standards* in accordance with Section 603.9.1 or shall comply with *UL 181 Standard for Factory-made Air Ducts and Air Connectors* in accordance with Section 603.9.2. Duct connections to flanges of air distribution system equipment shall be sealed and mechanically fastened. Closure systems used to seal all ductwork shall be installed in accordance with the duct and closure system manufacturer's instructions.

603.9.1 Ducts in accordance with SMACNA and NAIMA. All joints, longitudinal and transverse seams and connections in metallic and nonmetallic ductwork constructed as specified in *SMACNA HVAC Duct Construction Standards—Metal and Flexible* and *NAIMA Fibrous Glass Duct Construction Standards* shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems, liquid sealants, or tapes, or closure systems in accordance with 603.9.2.

Exception: Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

603.9.2 Ducts in accordance with UL 181. Closure systems used to seal ductwork in accordance with UL181 shall be *listed* and labeled for use with the intended type of ductwork in accordance with either UL 181A or UL181B and shall be marked in accordance with Table 603.9.2.

shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-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 "181B-C." Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer's installation instructions. Unlisted duct tape is not permitted as a sealant on any duct.

Exception: Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

| Table 603.9.2 | | | |
|---------------------------------------|----------|--------------------------------------|-----------|
| Type of Ductwork | Standard | Type of Closure System | Marking |
| Rigid Ducts | UL 181A | Pressure Sensitive Tape ^a | "181A-P" |
| | | Heat-Activated Tape | "181A-H" |
| | | Mastic Plus Embedded Fabric System | "181A-M" |
| Flexible Air Ducts and Air Connectors | UL 181B | Pressure Sensitive Tape ^a | "181B-FX" |
| | | Mastic Plus Embedded Fabric System | "181B-M" |

a Pressure sensitive tapes and mastics used as a closure system for non-metallic flexible air ducts and air connectors shall be used in conjunction with metal draw band or *listed* mechanical fasteners in accordance with UL181B and marked "181B-C".

(Portions of code change not shown remain unchanged)

Commenter's Reason: To provide additional clarity and consistency in the requirements for sealing air ducts constructed to SMACNA requirements and those that comply with UL181 by:

- Addressing committee concerns regarding the use of the term "metallic" in table 603.9.2.
- Deletion of verbiage in section 603.9.2 that is redundant with information in table 603.9.2.
- Updating Section 603.9 to incorporate M149 proposed language which was accepted as submitted.

M140-12

Final Action: AS AM AMPC_____ D

M143-12

Table 603.4

Proposed Change as Submitted

Proponent: Luis Escobar, Air Conditioning Contractors of America, representing ACCA
(luis.escobar@acca.org)

Revise as follows:

**TABLE 603.4
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESSES FOR SINGLE DWELLING UNITS**

| DUCT SIZE | GALVANIZED | | Appropriate Aluminum |
|--|-------------------------|--------------------------------------|--|
| | Minimum thickness (in.) | Equivalent galvanized gauge gage no. | B&S Gauge ALUMINUM MINIMUM THICKNESS (in.) |
| Round ducts and enclosed rectangular ducts | | | |
| 14 inches or less | <u>0.013</u> 0.0157 | <u>30</u> 28 | <u>26</u> 0.0175 |
| Over 14" 16 and 18 inches | <u>0.016</u> 0.0187 | <u>28</u> 26 | <u>24</u> 0.018 |
| 20 inches and over | 0.0236 | 24 | 0.023 |
| Exposed rectangular ducts | | | |
| 14 inches or less | <u>0.016</u> 0.0157 | 28 | <u>24</u> 0.0175 |
| Over 14 inches ^a | <u>0.019</u> 0.0187 | 26 | <u>22</u> 0.018 |

For SI: 1 inch = 25.4 mm, 1 inch water gage = 249 Pa.

a. For duct gages and reinforcement requirements at static pressures of ½-inch, 1-inch and 2-inch w.g., SMACNA HVAC Duct Construction Standards, Tables 2-1, 2-2, and 2-3, shall apply.

Reason: The change that was previously made in the 2009 IMC (and carried forward to the 2012 IMC) unnecessarily increased the material thickness required for round sheet metal ducts.

This proposed change seeks to return to the requirements of 2006 and previous IMC editions which have historically recognized 30 gauge sheet metal as being appropriate for round ducts 14 inches or less diameter in "Single Dwelling Units".

The changes to table 603.4 in the 2009 IMC (and carried forward to the 2012 IMC):

1. Significantly increased cost for round sheet metal ducts
2. Did not improve safety
3. Did not improve energy performance
4. Encourages increased use of less expensive and less efficient non-metallic ducts.

Cost Impact: This code change proposal will not increase the cost of construction.

T603.4-M-ESCOBAR.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: The current and past practice has been to allow 30 gage duct material. There is no safety issue with 30 gage duct. Nothing is gained by requiring 28 gage material.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mark Terzigni, representing SMACNA Sheet Metal and Air Conditioning Contractors' National Association, requests Approval as Modified by this Public Comment.

Replace the table in the original proposal with the following:

TABLE 603.4
DUCT CONSTRUCTION MINIMUM SHEET METAL THICKNESS FOR SINGLE DWELLING UNITS^a

| Duct Shape and Size | | ½ Inch Water Gage (125 Pa) | | | | 1 inch water Gage (250 Pa) | | | |
|---------------------|---------|----------------------------|-------|----------|-------|----------------------------|-------|----------|-------|
| ROUND diameter | | Galvanized | | Aluminum | | Galvanized | | Aluminum | |
| inches | mm | inches | mm | inches | mm | inches | mm | inches | mm |
| 0-11 | 0-280 | 0.013 | 0.323 | 0.018 | 0.465 | 0.013 | 0.323 | 0.018 | 0.465 |
| 12-14 | 281-350 | 0.013 | 0.323 | 0.018 | 0.465 | 0.016 | 0.399 | 0.023 | 0.574 |
| 15-17 | 351-430 | 0.016 | 0.399 | 0.023 | 0.574 | 0.019 | 0.475 | 0.027 | 0.684 |
| 18 | 431-450 | 0.016 | 0.399 | 0.023 | 0.574 | 0.024 | 0.599 | 0.034 | 0.863 |
| 19-20 | 451-500 | 0.019 | 0.475 | 0.027 | 0.684 | 0.024 | 0.599 | 0.034 | 0.863 |
| | | | | | | | | | |
| RECTANGULAR | | Galvanized | | Aluminum | | Galvanized | | Aluminum | |
| inches | mm | inches | mm | inches | mm | inches | mm | inches | mm |
| 0-8 | 0-200 | 0.013 | 0.323 | 0.018 | 0.465 | 0.013 | 0.323 | 0.018 | 0.465 |
| 9-10 | 201-250 | 0.013 | 0.323 | 0.018 | 0.465 | 0.016 | 0.399 | 0.023 | 0.574 |
| 11-12 | 251-300 | 0.016 | 0.399 | 0.023 | 0.574 | 0.019 | 0.475 | 0.027 | 0.684 |
| 13-16 | 301-400 | 0.019 | 0.475 | 0.027 | 0.684 | 0.019 | 0.475 | 0.027 | 0.684 |
| 17-18 | 401-450 | 0.019 | 0.475 | 0.027 | 0.684 | 0.024 | 0.599 | 0.034 | 0.863 |
| 19-20 | 451-500 | 0.024 | 0.599 | 0.034 | 0.863 | 0.024 | 0.599 | 0.034 | 0.863 |

- a. Ductwork that exceeds 20 inches by dimension or exceeds a pressure of 1 inch gage (250 Pa) shall be constructed in accordance with ANSI/SMACNA HVAC Duct Construction Standards Metal and Flexible.

Commenter's Reason: The proposed change M143-12 wanted to return 14 inch round duct to its previous gage (prior to the code change adopted in 2009). SMACNA, the developer of the duct construction standard referenced in section 603 evaluated the request with consideration of limiting the application to single dwelling units. The above table permits the use of 30 gage (0.013 in) for dimensions up to 14 inch round if the static pressure is at or below ½ in. w.g. The table also provides options for 1 inch water gage. This should address all but the largest single dwelling units in which case the ductwork should be constructed as required by the ANSI/SMACNA HVAC Duct Construction Standard. The above modification:

1. Addresses the concern of the original proponent
2. Complies with methods used by SMACNA (ANSI Standard Developer)
3. Provides upper limits for size and pressure
4. Uses actual thickness not "gage" for both steel and aluminum
5. Provides valid options for "low" and "high" pressure single dwelling systems
6. Encourages the use of resource efficient material.

Cost Impact: This code change proposal will not increase the cost of construction

M143-12

Final Action: AS AM AMPC_____ D

M149-12

603.9

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

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. ~~Closure systems~~ Tapes and mastics used to seal metallic and fibrous glass ductwork shall be listed and labeled in accordance with UL 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-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 "181B-C." Closure systems used to seal ~~metal~~ all ductwork shall be installed in accordance with the manufacturer's ~~installation~~ instructions. ~~Unlisted duct tape is not permitted as a sealant on any duct.~~

Reason: This proposal simplifies this section by stating what is meant by "closure systems." Tapes and mastics are addressed in UL181A. There is no closure system listed specifically for metal ducts, but it is appropriate to require sealing products used for metal ducts to be listed to UL181A because if the sealing product is good enough for fibrous glass ducts it is good enough for metal ducts. This is the case in the field, as fibrous glass duct tapes are commonly used with metal ducts. The manufacturer's instructions should apply for all closure systems, not just those for metal ducts. The last sentence is unnecessary because this proposal requires all tapes to be listed, including those used with metal ducts.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

603.9#1-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal 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 ~~metallic and fibrous glass~~ ductwork shall be *listed and labeled* in accordance with UL 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. ~~Closure systems~~ Tapes and mastics used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-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 "181B-C." Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions.

Committee Reason: Approval is based on the proponent's published reason. The modification corrects the application of UL181A verses UL181B.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob Eugene, representing Underwriters Laboratories, LLC, requests Approval as Modified by this Public Comment.

Further modify the proposal 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 mastic Closure systems~~ used to seal fibrous glass ductwork shall be *listed* and *labeled* in accordance with UL 181A and shall be marked "181A-P" for pressure-sensitive tape, "181 A-M" for mastic or "181 A-H" for heat-sensitive tape. ~~Tapes and mastics Closure systems~~ used to seal metallic and flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked "181B-FX" for pressure-sensitive tape or "181B-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 "181B-C." Closure systems used to seal all ductwork shall be installed in accordance with the manufacturer's instructions.

Commenter's Reason: Products certified to UL181B are listed as a system and may include other components in addition to the tape or mastic itself. In order to properly seal the duct or connector in accordance with the listing, which include the manufacturer's installation instructions, a *closure system* is required.

M149-12

Final Action:

AS

AM

AMPC_____

D

M151-12

603.9

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

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. Closure systems used to seal ductwork *listed* and *labeled* in accordance with UL 181A shall be marked “181A-P” for pressure-sensitive tape, “181 A-M” for mastic or “181 A-H” for heat-sensitive tape. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181B-FX” for pressure-sensitive tape or “181B-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 “181B-C.” Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturer’s installation instructions. Unlisted duct tape is not permitted as a sealant on any duct.

Exception: ~~Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~ For ducts having a static pressure classification of less than 2 inches of water column (500Pa), 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 button-lock types.

Reason: Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

603.9-#2-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent’s published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, Dipl.-Ing. (FH), representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: This proposal will require that all longitudinal joints and seams are sealed—even in low-pressure systems. No data is supplied to prove that ducts will leak “significantly” (as stated in the reason statement) in these systems. In fact, there is no such data (SMACNA presentation – March 2010, slide 15 www.smacnawpa.org/links/documents/HVACAirDuctLeakageMarch2010presentation.pdf). Leakage rates for longitudinal joints in duct systems serving a single dwelling unit are extremely minimal, because the pressures are a fraction of 2 inches water column, the upper limit of this exception. Sealing these joints will not be an effective means of saving energy.

This proposal adds significant installation costs without giving any proof that sealing longitudinal seams is cost-effective. It will also significantly increase inspection time for residential systems without any proven benefit.

M151-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M154-12

603.12

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

603.12 Condensation. Provisions shall be made to prevent the formation of condensation on the exterior and interior surfaces of any duct.

Reason: Ducts such as toilet and kitchen exhaust and clothes dryer exhaust that are run in unconditioned spaces will be subject to the formation of condensation on the inside of the duct. It is common for exhaust ducts in ventilated attics to fill with water in low points and become blocked and/or leak into the exhaust fan or dryer. Condensation can also form in HVAC ducts where humid indoor air passes through such ducts that are chilled in unconditioned spaces. External insulation combined with a vapor barrier can prevent condensation on the outside of ducts and that same insulation with or without a vapor barrier can also prevent condensation on the inside of a duct, except for when the airflow initially starts. When the duct temperature comes up to the temperature of the air within it, the condensation will stop and the initial condensation will evaporate.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: This proposal will increase the cost of construction.

603.12-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: It is not enforceable to require that condensation be prevented. Prevention is absolute and how far must one go to achieve this?

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Shawn Strausbaugh, Arlington County, VA, representing International Code Council Plumbing, Mechanical, and Fuel Gas Code Action Committee (ICC PMG CAC), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

603.12 Condensation. Provisions shall be made to prevent the formation of condensation on the exterior and interior surfaces of any duct and the accumulation of condensation on the interior of any duct.

Commenter's Reason: The committee correctly expressed that condensation cannot be prevented from forming on the interior duct surface. If the duct wall temperature is below the dew point of the air in the duct, condensation will form, thus condensation cannot be absolutely prevented in the duct interior. The intent is to make that formation brief, before water can accumulate and leak from the duct or partially block the duct. If properly insulated, condensation will quickly cease as the duct wall temperature rises to that of the airflow and any condensate will vaporize. The intent is to prevent accumulation which would result in water filling ducts

and leaking from, exhaust fans, duct joints and appliances. The primary problem is bath, clothes dryer and kitchen exhaust ducts that run through cold attics and similar spaces.

M154-12

Final Action: AS AM AMPC____ D

M155-12

202, 604.7

Proposed Change as Submitted

Proponent: Ken Sagan, NRG Code Advocates, representing Reflective Insulation Manufacturers Association International
(ken@nrgcodeadvocates.com)

Add new text as follows:

REFLECTIVE INSULATION. Reflective insulation materials consist of one or more low-emittance surfaces, such as metallic foil or metallic deposits, unmounted or mounted on substrates. Reflective insulations derive their thermal performance from surfaces with an emittance of 0.1 or less, facing enclosed air spaces, yielding a reduction in radiant heat transfer.

Revise text as follows:

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. All 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 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 normal insulation thickness shall be used.
2. For duct wrap, the installed thickness shall be assumed to be 75 percent (25 percent compression) of normal 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 foam 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.
5. For reflective insulation, R-values shall be based on tested U-values using recognized industry procedures as a reflective insulation system on rigid duct in heating, ventilation and air conditioning systems. Packages of reflective insulation shall be labeled with the number of reflective sheets, the number and thickness of the air spaces in the assembly and the R-value of the assembly.

Reason: A type of reflective insulation (reflective plastic core insulation) is currently included in the IBC Code Definitions. This proposal attempts to provide additional information relating to that product category as a whole and for the products specified in this proposal.

The proposal proposes to clarify the process within the codes for accurately labeling and evaluating the performance of reflective insulation when installed on ducts. ASTM C1668-10 addresses this issue and provides specification on how to determine product performance.

Cost Impact: The code change proposal will not increase the cost of construction.

202-REFLECTIVE INSULATION-M-SAGAN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: There are no standards referenced for the performance and installation of such materials.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing Reflective Insulation Manufacturers Association International, requests Approval as Modified by this Public Comment.

Replace original proposal as follows:

REFLECTIVE DUCT INSULATION. An assembly that has one or more low-emittance surfaces of 0.1 or less, and at least one low-emittance surface that faces an enclosed air space.

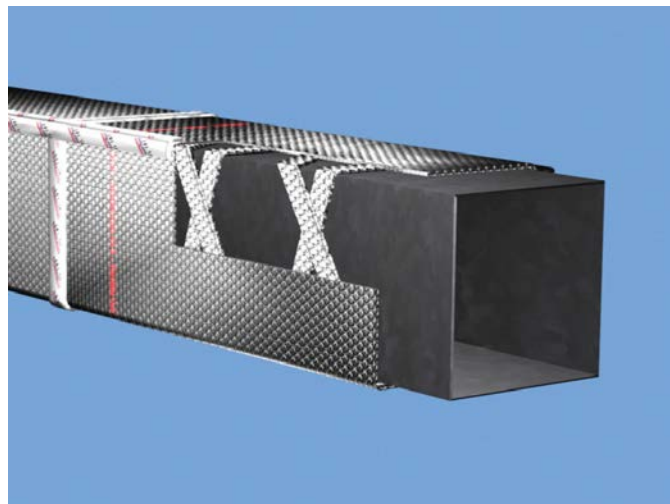
604.14 Reflective Duct Insulation. The R-values for reflective duct insulation used as external duct insulation shall be based on tested U-values.

604.14.1 Identification. Packaging of reflective duct insulation shall contain the name of the manufacturer, the number of reflective sheets, the number and thickness of air spaces required to attain the R-value of the assembly, and the flame spread and smoke development index.

Commenter's Reason: The original proposal placed new requirements in Section 604.7 of the IMC for reflective duct insulation. The intent of the original proposal was to clarify the accurate labeling and evaluation of the performance of reflective insulation when installed on ducts. However, upon closer examination, several of the requirements in 604.7 do not apply to reflective duct insulation. The proponent requested for disapproval so that the proposal could be re-worked.

This public comment establishes a new section for this type of insulation with better formatting.

The committee's stated reason for disapproval was the lack of a standard for this type of insulation. In fact, there is a standard; ASTM C 1668 "Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in Heating, Ventilation, and Air Conditioning (HVAC) Systems". It was not ready for submission for Group A. It has been recently revised and will be proposed during the 2018 cycle. For this cycle, the proposed language is essential to ensure that the materials are being properly specified for the appropriate use, and correctly installed.



M155-12

Final Action:

AS

AM

AMPC____

D

M158-12

202 (New), 608 (New), 608.1 (New)

Proposed Change as Submitted

Proponent: Timothy Burgos, InterCode Incorporated, representing 3M Company

Add new text as follows:

REFLECTIVE DUCT. A duct or conduit with a reflective interior surface utilized for conveying daylight or artificial light.

SECTION 608 **REFLECTIVE DUCTS**

608.1 Reflective Ducts. Reflective ducts that are designed and installed to provide light to the interior space of a building shall be constructed, braced, reinforced and installed to provide structural strength and durability in accordance with the requirements of Section 603. The installation of reflective ducts shall not affect the fire protection requirements specified in the *International Building Code*. Reflective ducts shall not be used for conveying air and are not required to be pressurized.

Reason: The purpose of this code change proposal is to add a new definition and section to the International Mechanical Code in order to differentiate between duct used to convey air and duct used to convey light. There are many new technologies that exist worldwide today that bring light from the exterior of a building to the interior space of a building. These technologies utilize a reflective duct to convey the light into the building. The reflective duct is similar in construction to duct used to convey air in the way it is braced, reinforced, and installed. Reflective duct differs because it is not used to condition a space. Additionally, reflective duct does not need to meet all the requirements of an air conveying duct, i.e. the insulation and pressurization requirements.

The language used to create the new Section 608.1 was adapted from Section 603 of the 2012 International Mechanical Code. The definition for reflective duct was adapted from the definition of duct found in the 2012 International Mechanical Code.



Reflective duct (the two ducts on the outside) in an open ceiling alongside a traditional HVAC duct.

Cost Impact: The code change proposal will not increase the cost of construction.

202-REFLECTIVE DUCTS-M-BURGOS.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: Such ducts are not mechanical in nature, are not within the scope of the code and thus are not appropriate for inclusion in the IMC. The IBC covers lighting systems and this text belongs in Chapter 12 of that code. There are no referenced standards for such products. The installation requirements such as roof flashings are IBC related.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing 3M Company, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

REFLECTIVE DUCT. A duct or conduit with a reflective interior surface utilized for conveying daylight or artificial light.

SECTION 608 REFLECTIVE DUCTS

608.1 Reflective Ducts. Reflective ducts that are designed and installed to provide light to the interior space of a building shall be constructed, braced, reinforced and installed to provide structural strength and durability in accordance with the requirements of Sections 603.4, 603.7, 603.10, and 603.12. The installation of reflective ducts shall not affect reduce the fire protection requirements resistance ratings specified in the *International Building Code*. Reflective ducts shall not be used for conveying air and are not required to be pressurized.

Commenter's Reason: Reflective duct systems that convey light are an existing technology worldwide, but new to this code. The purpose of this code change proposal is to add a new definition and section to the International Mechanical Code to correlate the duct construction requirements for duct used to convey air and duct used to convey light. The bracing, reinforcement, installation, structural strength and durability requirements are nearly identical between air duct and reflective duct and that is the reason we have placed this section in this chapter of the International Mechanical Code.

The Mechanical Committee disapproved the original proposal, stating that "such ducts are not mechanical in nature and are not in the scope of the code." It is true that reflective duct are not used to condition a space and are not required to meet **ALL** the requirements of an air conveying duct, i.e. the insulation and pressurization requirements. However, in order to ensure that the reflective duct is properly constructed and installed for the safety of the occupants and functionality of the system, many of the same construction requirements for air ducts are applicable to reflective ducts.

The language used to create the new Section 608.1 was adapted from Section 603 of the 2012 International Mechanical Code. The definition for reflective duct was adapted from the definition of duct found in the 2012 International Mechanical Code.

The Fire Safety Committee narrowly recommended disapproval for a similar code change proposal by a vote of 7 to 6. One of the concerns the committee had was with the use of the term "fire protection." In the International Building Code "fire protection systems" tend to deal with detection, alarm, and suppression systems. This public comment changed the term "protection" to "resistance" in order to clarify that reflective duct will not reduce the fire resistance rating of any building assembly.

M158-12

Final Action: AS AM AMPC_____ D

M161-12

802.10

Proposed Change as Submitted

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

Add new text as follows:

802.10 Door swing. Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches (305 mm) horizontally of the vent terminals. Door stops or closures shall not be installed to obtain this clearance.

Reason: As indicated in the photo, any appliance vent can be subject to damage as a result of a door swing even when the vent has been installed in accordance with the manufacturer's instructions. Most manufacturers do not address proximity to doors on a different plane. Even if the door doesn't come in contact with the vent terminal, the door could be left too close to the vent when the appliance is operating and possibly overheating the door causing problems.

Cost Impact: None

802.10(NEW)-M-MCMANN.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, Dipl.-Ing. (FH) representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

802.10 Door swing. Appliance and equipment vent terminals shall be located such that doors cannot swing within 12 inches (305 mm) horizontally of come in contact with the vent terminals. Required clearances to combustibles shall be maintained as required in Section 304.9. Door stops or closures shall not be installed to obtain this clearance.

Exception: Door stops and other door-swing limiting devices shall not be prohibited as a means to prevent a door from coming in contact with the vent terminals.

Commenter's Reason: The proposed section 802.10 is meant to prevent physical damage to vent terminals from swinging doors. Another section, 304.9, already deals with door swing as pertaining to clearances to combustibles. Therefore, the proposed section does not need to give a set 12-inch clearance, which is not even stated in 304.9. That section references the manufacturer's instructions. A metal and glass storm door, for example, would not be required to meet the clearance to combustibles, so there is no reason to keep it 12 inches away as proposed. It should only be kept from hitting the vent terminal.

Adding an exception for door stops and other door-swing limiting devices makes sense in this section because their purpose will be obvious to the occupant. Some might argue that they can be removed and should not be allowed, but handrails, fall protection, and other code-required safety devices can also be removed by an occupant. That does not mean that we keep them out of the

code. This is a minimum code, and we are dealing with a rare situation. The proposal is too restrictive as approved by the committee.

To be clear, if a combustible door swings near a vent terminal, section 304.9 is more restrictive than this modification, and therefore trumps it. But since this section is only meant to address physical damage, it does not need to be as restrictive where non-combustible doors are installed.

M161-12

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M165-12

908.8 (New), Chapter 15

Proposed Change as Submitted

Proponent: Tracy Quinn, Natural Resources Defense Council, on behalf of self
(tquinn@nrdc.org)

Add new text as follows:

908.8 Cooling Towers. Cooling towers greater than 150 tons in capacity shall comply with Sections 908.8.1 through 908.8.4.

908.8.1 Conductivity or Flow-based Control. Cooling towers shall include of controls that maximize the cycles of concentration based on local water quality conditions. Such controls shall automate system bleed and chemical feed based on conductivity or in proportion to metered makeup volume, metered bleed volume, or bleed time.

908.8.2 Flow Meter. A water meter or sub-meter shall be installed to measure the volume of makeup water entering the cooling tower. Where both potable and non-potable water are supplied to the tower, a meter or sub-meter shall be installed to measure each source separately.

908.8.3 Overflow Alarm. Cooling towers shall include of an overflow alarm to prevent overflow of the sump in case of makeup water valve failure. Such overflow alarm shall send an audible signal or provide an alert by means of the Building Management System to the tower operator in case of sump overflow.

908.8.4 Drift Eliminators. Cooling towers shall be equipped with drift eliminators that achieve drift reduction to 0.002 percent of the circulated water volume. Drift eliminators shall be tested using the Isokinetic Drift Measurement Test Cost for Water Cooling Tower – ATC – 140” testing code from the Cooling Technology Institute.

Add new standard to Chapter 15 as follows:

ATC-140-2011 Isokinetic Drift Measurement Test Cost for Water Cooling Tower – ATC-140” testing code.

Reason: This section includes water efficiency provisions for cooling towers and evaporative cooling systems that tend to waste large quantities of water.

The complexity of managing cooling systems combined with the high operational and financial cost of early failure of a cooling tower, can result in an overly conservative approach to tower bleed frequency. The codes as proposed here aim to ensure that all cooling towers covered by the IMC have the controls necessary to maximize cycles of concentration and minimize unintentional waters losses such as leaks and overflow. Below we have provided information specific to the revisions we have proposed. The information comes from a 2011 Codes and Standards Enhancement Initiative (CASE) for Cooling Tower Water Savings prepared by the California Statewide Utility Code and Standards Program on Cooling Tower Water Savings (attached), hereafter referred to as the CASE study.

Flow meter – “This measure provides a number of water-efficiency benefits. A flow meter on the makeup water line effectively submeters the cooling tower, allowing the operator to know how much water the tower is using and facilitating the identification of excessive water use due to leaks, for example.”

Alarm – “Unintended water losses can occur if the standard float valve that controls the flow of makeup water in the sump fails, resulting in overflow into the sewer line. The failure of the makeup water line control also results in uncontrolled dilution and no activation of chemical feed, putting the system at risk for scale. An overflow alarm prevents these losses from going undetected for days, weeks or longer. An overflow alarm system includes a float switch and an audible electronic signaling device or notification through a building management system. Industry contacts, including cooling tower manufacturers and water treatment companies, generally indicated that the prevalence of installed overflow alarms is very low.”

Drift Eliminators – “Efficient drift eliminators minimize losses due to drift, which is liquid water that is blown or splashed out of the tower during normal operations. Drift eliminators include secondary benefits, such as minimizing the spread of disease and preventing damage to adjacent property, such as parked cars, that would otherwise be splashed. According to representatives of cooling tower manufacturers, water treatment companies and drift eliminator distributors, most cooling towers have drift eliminators installed and the drift eliminators are likely to control drift losses to 0.005% or less. Current practice for new tower installations is to include drift eliminators and at least one manufacturer, Evapco, specifies equipment that limits losses to a maximum of 0.0001%.” The Cooling Technology Institute (CTI) has a test code for measuring drift that should be used to meet this requirement; “Isokinetic

Drift Measurement Test Cost for Water Cooling Tower – ATC – 140". The purpose of this code is to describe instrumentation and procedures for the testing and evaluation of drift from water-cooling towers. The code was revised in July 2011.

According to the CASE study, application of these code changes should result in a first year statewide water savings 32.3 million gallons in California (based on statewide annual sales of water-cooled chillers). Using the statewide average embedded energy value of 9.977 kWh/million gallons of water, the first year statewide energy savings is 323 MWh. Extracting this to an estimated national savings (based on population ratios), this code change could save 268 million gallons of water in the first year, and 2678 MWh.

Cost Impact: A cost-effectiveness analysis was performed as part of a Codes and Standards Enhancement Initiative (CASE) for Cooling Tower Water Savings, prepared by the California Statewide Utility Codes and Standards Program (attached).

From CASE: "Below are the present value costs and savings associated with the proposed measures installed on a 350 ton cooling tower over the 15 year analysis period."

Table 11. Life Cycle Cost of Proposed Measures

| Measure Name | Additional Costs-Current Measure Costs (Relative to Basecase) (\$) | | PV of Additional Maintenance Costs (Savings) (Relative to Basecase) (PV\$) | | PV of Water and Chemical Cost Savings - Per Proto Building (PV\$) | LCC Per Prototype Building (\$) | |
|------------------------|--|--------------------|--|--------------------|---|---------------------------------|------------------------------|
| | Per unit | Per Proto Building | Per unit | Per Proto Building | | Based on Current Costs | Based on Post-Adoption Costs |
| Cooling Tower Measures | \$3,624 | \$3,624 | \$0 | \$0 | \$11,165 | -\$7,540 | -\$7,540 |

Analysis: A review of the standard proposed for inclusion in the code, [ATC-140-2011] 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, 2012.

908.5.1-M-QUINN.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify proposal as follows:

908.8 Cooling Towers. Cooling towers greater than 150 tons in capacity shall comply with Section 908.8.1. through 908.8.4.

908.8.1 Conductivity or Flow-based Control. Cooling towers shall include controls that maximize the cycles of concentration based on local water quality conditions. Such controls shall automate system bleed and chemical feed based on conductivity or in proportion to metered makeup volume, metered bleed volume, or bleed time.

908.8.2 Flow Meter. A water meter or sub-meter shall be installed to measure the volume of makeup water entering the cooling tower. Where both potable and non-potable water are supplied to the tower, a meter or sub-meter shall be installed to measure each source separately.

908.8.3 Overflow Alarm. Cooling towers shall include of an overflow alarm to prevent overflow of the sump in case of makeup water valve failure. Such overflow alarm shall send an audible signal or provide an alert by means of the Building Management System to the tower operator in case of sump overflow.

908.8.4 Drift Eliminators. Cooling towers shall be equipped with drift eliminators that achieve drift reduction to 0.002 percent of the circulated water volume. Drift eliminators shall be tested using the Isokinetic Drift Measurement Test Cost for Water Cooling Tower ATC – 140" testing code from the Cooling Technology Institute.

Add new standard to Chapter 15 as follows:

ATC-140-2011 Isokinetic Drift Measurement Test Cost for Water Cooling Tower – ATC-140" testing code.

Committee Reason: Approval is based on the proponent's published reason. The modification eliminates a standard with which a limited number of testing agencies are able to conduct such testing. The modification simplifies the proposed text.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Tracy Quinn, Natural Resources Defense Council, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

908.8 Cooling Towers. Cooling towers ~~both open circuit and closed circuit type, and evaporative condensers~~ greater than 150 tons in capacity shall comply with Sections 908.8.1 and 908.8.2.

908.8.1 Conductivity or Flow-based Control of Cycles of Concentration. Cooling towers ~~and evaporative condensers~~ shall include controls that ~~maximize the cycles of concentration based on local water quality conditions. Such controls shall automate system bleed and chemical feed based on conductivity or in proportion to automate system bleed based on conductivity, fraction of metered makeup volume, metered bleed volume, recirculating pump run time, or bleed time.~~

908.8.2 Drift Eliminators. Cooling towers and evaporative condensers shall be equipped with drift eliminators that have a maximum drift rate of 0.005 percent of the circulated water flow rate as established in the equipment's design specifications.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The modifications in this comment provide clarifications and specificity that will be useful to code users and enforcement officials. Both open circuit and closed circuit cooling towers as well as evaporative condensers will clearly fall within the scope of this section. Paragraph 908.8.1 is modified to more objectively state the intent to automate the control of bleed operations, and the resulting cycles of concentration. New paragraph 908.8.2 addresses subject matter – drift eliminators – that was in the original M165-12 as submitted, before the floor modification to remove it was accepted at the code action hearing. NRDC and industry representatives supported the floor modification with the intention to work further to refine the original proposal's language on drift eliminators. By reducing the escape of liquid water and dissolved treatment chemicals, drift eliminators mitigate important health and safety concerns, including ice accumulation and the dispersion of chemicals, as well as reducing water loss. These objectives must be balanced with the need to maintain tower operation without excessive impedance that can degrade its efficiency. Drift eliminators are widely available today that can meet these objectives while achieving the drift reduction criterion stated in 908.8.2.

Baltimore Aircoil Company (BAC) is recognized as the world's largest manufacturer of evaporative cooling, thermal storage, and heat transfer equipment. BAC products are sold to the commercial building market as components for air conditioning systems, to the food industry for air conditioning and refrigeration applications, and to a broad range of industries for process and power equipment cooling. BAC has worked with NRDC as well as representatives of other organizations to develop a consensus proposal on cooling towers for the International Mechanical Code. As a result of these efforts, BAC supports the adoption of this consensus proposal in the IMC.

M165-12

Final Action:

AS

AM

AMPC_____

D

M175-12

1007.1, 1007.2, 1007.3

Proposed Change as Submitted

Proponent: Shawn Strausbaugh, Chair, Plumbing/Mechanical/Gas Code Action Committee

Revise as follows:

1007.1 General. All Steam and hot water boilers shall be protected with a low-water cutoff control except as required by Section 1007.2.

1007.2 Flow sensing control. Coil-type and water-tube-type boilers that require forced circulation of water through the boiler shall be protected with a flow sensing control.

1007.2.3 Operation. The Low-water cutoff controls and flow sensing controls required by Sections 1007.1 and 1007.2 shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer or when water circulation stops, respectively.

Reason: There is no exception to Section 1007.1 for coil-type hot water supply boilers that require forced circulation and use flow switches to stop combustion when water flow is lost. Flow switches that monitor forced circulation through a water tube- or coil-type boiler provide the same function as a low-water cutoff and should be recognized as an alternative to a low-water cutoff.

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 an assigned International Code or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the PMGCAC has held 2 open meetings, multiple conference calls and multiple workgroup calls which included members of the PMGCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Cost Impact: None

1007.1-M-STRAUSBAUGH.PMGCAC.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Bob Eugene, representing Underwriters Laboratories, LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1007.1 General. Steam and hot water boilers shall be protected with a low-water cutoff control.

Exception: A low-water cutoff is not required for coil-type and water-tube-type boilers that require forced circulation of water through the boiler and that are protected with a flow sensing control.

1007.3 Operation. The Low-water cutoff controls and flow sensing controls required by Sections 1007.1 and 1007.2 shall automatically stop the combustion operation of the appliance when the water level drops below the lowest safe water level as established by the manufacturer or when water circulation stops, respectively.

Commenter's Reason: The additional text clarifies that the flow sensing control is an exception to the general low-water cutoff control for the boilers specified.

M175-12

| | | | | |
|---------------|----|----|----------|---|
| Final Action: | AS | AM | AMPC____ | D |
|---------------|----|----|----------|---|

M181-12

1102.3 (New)

Proposed Change as Submitted

Proponent: Mona Casey, Founder, United Parents to Restrict Open Access to Refrigerant

Add new text as follows:

1102.3 Access port protection. Refrigerant access ports shall be protected in accordance with Section 1101.10 whenever refrigerant is added to or recovered from refrigeration or air conditioning systems.

Reason: The purpose of the code change proposal is to add requirements to the code for securing refrigerant access ports whenever intrusive access to the refrigeration or air conditioning units are necessary for adding or recovering refrigerant. This change compliments the current requirements in the code.

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

1102.3 (NEW)-M-CASEY.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposed text is not enforceable since permits are not required to service refrigeration systems. Such text is appropriate for the IPMC.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Mona Casey, representing United Parents to Restrict Open Access to Refrigerant, requests Approval as Submitted.

Commenter's Reason: Refrigerant is a hot topic in the HVAC industry today. With public safety at the forefront, followed by environmental concerns and bottom line cost, refrigerant containment is more important than ever.

The age of social media and Internet access allows society the ability to learn about things they shouldn't be doing. Huffing refrigerant is a prime example of that. Statistics nationwide show there have been more than 2000 reported cases of huffing refrigerant since 2009, according to the American Association of Poison Control. In those cases, the individuals had to be hospitalized.

To minimize the impact of ozone depleting compounds on the environment, Refrigerant R22 is being phased out. The downside to that is Refrigerant R22 has tripled in price since November 2011.

For liability and financial reasons, many contractors are becoming '*Refrigerant Responsible*', requiring strict charging practices for peak performance and the prevention of catastrophic failures in the refrigerant circuits. Additionally, tougher certification programs like NATE train new technicians on proper refrigerant charging, recovery and handling techniques. That said, any exposed refrigerant charging port is a weak link for containment. Exposed ports provide easy access to the general public and challenge the aforementioned concerns.

Although the building design standard addresses issues concerning sustainability, air quality, energy efficiency, and thermal, acoustic, and visual comfort, it fails to address the very thing the codes were founded on, public safety. Exposed ports pose a public safety issue. The code needs to address this mechanical issue so that going forward designers, engineers, technicians, property owners, and the public will all become refrigerant responsible. Thus, protecting the environment, minimizing costs associated with heating and cooling, preventing injuries, and most importantly, saving lives.

M181-12

Final Action: AS AM AMPC____ D

M188-12

Table 1202.4, 1203.15, 1208, 1210 (New), 1211 (New), 1212 (New), 1213 (New), 1214 (New), 1215 (New), 1216 (New), Chapter 15

Proposed Change as Submitted

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

Revise as follows:

TABLE 1202.4
HYDRONIC PIPE

| MATERIAL | STANDARD (see Chapter 15) |
|--|--|
| Polyethylene (PE) pipe, tubing and fittings (for ground source heat pump loop systems) | ASTM D 2513; ASTM D 3035; ASTM D 2447; ASTM D 2683; ASTM F 1055; ASTM D 2837; ASTM D 3350; ASTM D 1693 |

(Portions of table not shown remain unchanged)

1203.15 Polyethylene plastic pipe and tubing for ground source heat pump loop systems. Joints between polyethylene plastic pipe and tubing or fittings for ground source heat pump loop systems shall be heat fusion joints conforming to Section 1203.15.1, electrofusion joints conforming to Section 1203.15.2, or stab-type insertion joints conforming to Section 1203.15.3.

1203.15.1 Heat fusion joints. Joints shall be of the socket fusion, saddle fusion or butt fusion type, joined in accordance with ASTM D 2657. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683 or ASTM D 3261.

1203.15.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.

1203.15.3 Stab-type insert fittings. Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F 1924.

SECTION 1208 TESTS

1208.1 General. Hydronic piping systems other than groundsource heat pump loop 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, but not more than 20 minutes. Ground source heat pump loop systems shall be tested in accordance with Section 1208.1.1.

1208.1.1 Ground source heat pump loop systems. Before connection (header) trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 30 minutes with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the problem shall be identified and corrected.

SECTION 1210
GROUND-SOURCE HEAT PUMP LOOP SYSTEMS

1210.1 Ground-Source Heat Pump-Loop Water Piping. Ground source heat pump ground loop-piping and tubing material for water-based systems shall conform to the standards cited in this section.

1210.2 Used materials. Reused pipe, fittings, valves, and other materials shall not be permitted in ground-source heat pump loop systems.

1210.3 Material rating. Pipe and tubing shall be rated for the operating temperature and pressure of the ground source heat pump-loop system. Fittings shall be suitable for the pressure applications and recommended by the manufacturer for installation with the pipe and tubing material installed. Where used underground, materials shall be suitable for burial.

1210.4 Piping and tubing materials standards. Ground source heat pump ground-loop pipe and tubing shall conform to the standards listed in Table 1210.4.

TABLE 1210.4
GROUND SOURCE LOOP PIPE

| <u>MATERIAL</u> | <u>STANDARD (see Chapter 15)</u> |
|---|--|
| Chlorinated polyvinyl chloride (CPVC) | ASTM D2846; ASTM F441; ASTM F442 |
| Cross-linked polyethylene (PEX) | ASTM F876; ASTM F877 CSA B137.5 |
| Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe | ASTM F1282; CSA B137.9 |
| High Density Polyethylene (HDPE) | ASTM D3035; ASTM D2737; ASTM F714; AWWA C901; CSA B137.1; CSA C448 |
| Polypropylene (PP-R) | ASTM F2389; CSA B137.11 |
| Polyvinyl chloride (PVC) | ASTM D1785; ASTM D2241 |
| Raised temperature polyethylene (PE-RT) | ASTM F2623 |

1210.5 Fittings. Ground source heat pump pipe fittings shall be approved for installation with the piping materials to be installed, shall conform to the standards listed in Table 1210.5 and if installed underground shall be suitable for burial.

TABLE 1210.5
GROUND SOURCE LOOP PIPE FITTINGS

| <u>PIPE MATERIAL</u> | <u>STANDARD (see Chapter 15)</u> |
|---|--|
| Chlorinated polyvinyl chloride (CPVC) | ASTM D 2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6 |
| Cross-linked polyethylene (PEX) | ASTM F 877; ASTM F1807; ASTM F 1960; ASTM F 2080; ASTM F2159; ASTM F2434; CSA B137.5 |
| Polyethylene/aluminum/polyethylene (PE-AL-PE) | ASTM F 2434; ASTM F1282, CSA B137.9 |
| High Density Polyethylene (HDPE) | ASTM D2683; ASTM D3261; ASTM F1055; CSA B137.1; CSA C448 |
| Polypropylene (PP-R) | ASTM F2389; CSA B137.11 |

| <u>PIPE MATERIAL</u> | <u>STANDARD (see Chapter 15)</u> |
|---|---|
| Polyvinyl chloride (PVC) | <u>ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3</u> |
| Raised temperature polyethylene (PE-RT) | <u>ASTM D3261; ASTM F1807; ASTM F2159; B137.1</u> |

SECTION 1211 **JOINTS AND CONNECTIONS**

1211.1 Approval. Joints and connections shall be of an approved type. Joints and connections shall be tight for the pressure of the ground source -loop system. Joints used underground shall be approved for buried applications.

1211.1.1 Joints between different piping materials. Joints between different piping materials shall be made with approved transition fittings.

1211.2 Preparation of pipe ends. Pipe shall be cut square, reamed, and shall be free of burrs and obstructions. CPVC, PE, and PVC pipe shall be chamfered. Pipe ends shall have full-bore openings and shall not be undercut.

1211.3 Joint preparation and installation. Where required by Sections 1211.4 through 1211.6, the preparation and installation of mechanical and thermoplastic-welded joints shall comply with Sections 1211.3.1 and 1211.3.2.

1211.3.1 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

1211.3.2 Thermoplastic-welded joints. Joint surfaces for thermo plastic-welded joints shall be cleaned by an approved procedure. Joints shall be welded in accordance with the manufacturer's instructions.

1211.4 CPVC plastic pipe. Joints between CPVC plastic pipe or fittings shall be solvent-cemented or threaded joints complying with Section 1203.3.

1211.5 Cross-linked polyethylene (PEX) plastic tubing. Joints between cross-linked polyethylene plastic tubing and fittings shall comply with Sections 1211.4.1 and 1211.4.2. Mechanical joints shall comply with Section 1211.3.

1211.5.1 Compression-type fittings. Where compression- type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

1211.5.2 Plastic-to-metal connections. Soldering on the metal portion of the system shall be performed at least 18 inches (457 mm) from a plastic-to-metal adapter in the same water line.

1211.6 Polyethylene plastic pipe and tubing for ground source heat pump loop systems. Joints between polyethylene plastic pipe and tubing or fittings for ground source heat pump loop systems shall be heat fusion joints complying with Section 1211.6.1, electrofusion joints complying with Section 1211.6.2, or stab-type insertion joints complying with Section 1211.6.3.

1211.6.1 Heat-fusion joints. Joints shall be of the socket-fusion, saddle-fusion or butt-fusion type, joined in accordance with ASTM D 2657. Joint surfaces shall be clean and free of moisture. Joint surfaces shall be heated to melt temperatures and joined. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM D 2683 or ASTM D 3261.

1211.6.2 Electrofusion joints. Joints shall be of the electrofusion type. Joint surfaces shall be clean and free of moisture, and scoured to expose virgin resin. Joint surfaces shall be heated to melt temperatures

for the period of time specified by the manufacturer. The joint shall be undisturbed until cool. Fittings shall be manufactured in accordance with ASTM F 1055.

1211.6.3 Stab-type insert fittings. Joint surfaces shall be clean and free of moisture. Pipe ends shall be chamfered and inserted into the fittings to full depth. Fittings shall be manufactured in accordance with ASTM F 1924.

1211.7 Polypropylene (PP) plastic. Joints between PP plastic pipe and fittings shall comply with Sections 1211.7.1 and 1211.7.2.

1211.7.1 Heat-fusion joints. Heat-fusion joints for polypropylene (PP) pipe and tubing joints shall be installed with socket-type heat-fused polypropylene fittings, electrofusion polypropylene fittings or by butt fusion. Joint surfaces shall be clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F 2389.

1211.7.2 Mechanical and compression sleeve joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer's instructions.

1211.8 Raised temperature polyethylene (PE-RT) plastic tubing. Joints between raised temperature polyethylene tubing and fittings shall comply with Sections 1211.8.1 and 1211.8.2. Mechanical joints shall comply with Section 1211.3.

1211.8.1 Compression-type fittings. Where compression-type fittings include inserts and ferrules or O-rings, the fittings shall be installed without omitting the inserts and ferrules or O-rings.

1211.8.2 PE-RT-to-metal connections. Solder joints in a metal pipe shall not occur within 18 inches (457 mm) of a transition from such metal pipe to PE-RT pipe.

1211.9 PVC plastic pipe. Joints between PVC plastic pipe and fittings shall be solvent-cemented or threaded joints comply with Section 1203.3.

SECTION 1212 **VALVES**

1212.1 Where required. Shutoff valves shall be installed in ground source-loop piping systems in the locations indicated in Sections 1212.1.1 through 1212.1.6.

1212.1.1 Heat exchangers. Shutoff valves shall be installed on the supply and return side of a heat exchanger.

Exception: Shutoff valves shall not be required where heat exchangers are integral with a boiler or are a component of a manufacturer's boiler and heat exchanger packaged unit and are capable of being isolated from the hydronic system by the supply and return valves required by Section 1005.1.

1212.1.2 Central systems. Shutoff valves shall be installed on the building supply and return of a central utility system.

1212.1.3 Pressure vessels. Shutoff valves shall be installed on the connection to any pressure vessel.

1212.1.4 Pressure-reducing valves. Shutoff valves shall be installed on both sides of a pressure-reducing valve.

1212.1.5 Equipment and appliances. Shutoff valves shall be installed on connections to mechanical equipment and appliances. This requirement does not apply to components of a ground source loop system such as pumps, air separators, metering devices, and similar equipment.

1212.1.6 Expansion tanks. Shutoff valves shall be installed at connections to nondiaphragm-type expansion tanks.

1212.2 Reduced pressure. A pressure relief valve shall be installed on the low-pressure side of a hydronic piping system that has been reduced in pressure. The relief valve shall be set at the maximum pressure of the system design. The valve shall be installed in accordance with Section 1006.

SECTION 1213 **PIPING INSTALLATION**

1213.1 General. Piping, valves, fittings, and connections shall be installed in accordance with the conditions of approval.

1213.3 Protection of potable water. Where ground source heat pump ground loop systems have a connection to a potable water supply, the potable water system shall be protected from backflow in accordance with the *International Plumbing Code*.

1213.4 Pipe penetrations. Openings for pipe penetrations in walls, floors and ceilings shall be larger than the penetrating pipe. Openings through concrete or masonry building elements shall be sleeved. The annular space surrounding pipe penetrations shall be protected in accordance with the *International Building Code*.

1213.5 Clearance from combustibles. A pipe in a ground source heat pump piping system having an exterior surface temperature exceeding 250°F (121°C) shall have a minimum *clearance* of 1 inch (25 mm) from combustible materials.

1213.6 Contact with building material. A ground source heat pump ground-loop piping system shall not be in direct contact with building materials that cause the piping or fitting material to degrade or corrode, or that interfere with the operation of the system.

1213.7 Strains and stresses. Piping shall be installed so as to prevent detrimental strains and stresses in the pipe. Provisions shall be made to protect piping from damage resulting from expansion, contraction and structural settlement. Piping shall be installed so as to avoid structural stresses or strains within building components.

1213.7.1 Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

1213.8 Pipe support. Pipe shall be supported in accordance with Section 305.

1213.9 Velocities. Ground source heat pump ground-loop systems shall be designed so that the flow velocities do not exceed the maximum flow velocity recommended by the pipe and fittings manufacturer and shall be controlled to reduce the possibility of water hammer.

1213.10 Labeling and Marking. Ground source heat pump ground-loop system piping shall be marked with tape, metal tags or other method where it enters a building indicating "GROUND SOURCE HEAT PUMP-LOOP SYSTEM". The marking shall indicate any antifreeze used in the system by name and concentration.

1213.11 Chemical Compatibility. Antifreeze and other materials used in the system shall be chemically compatible with the pipe, tubing, fittings, and mechanical systems.

SECTION 1214 **WORKING FLUID**

1214.1 Makeup water. The transfer fluid shall be compatible with the makeup water supplied to the system.

SECTION 1215 **TESTS**

1215.1 Ground source heat pump loop systems. Before connection header trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 30 minutes, but not more than 35 minutes, with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the cause shall be identified and corrective action taken.

SECTION 1216 **EMBEDDED PIPING**

1216.1 Pressurizing during installation. Ground source heat pump ground loop piping to be embedded in concrete shall be pressure tested prior to pouring concrete. During pouring, the pipe shall be maintained at the proposed operating pressure.

Add new standard as follows:

CSA C448 SERIES-02-CAN/CSA-2002
Design and Installation of Earth Energy Systems - First Edition; Update 2: October 2009; Consolidated Reprint 10/2009

Reason: **Water based** geothermal PE piping is currently listed in the hydronics section where it doesn't quite fit. This special and growing application should have its own section, and it should cover other materials that could potentially be used. Green building rating systems are promoting geothermal ground loop heating and cooling systems, and the code should have more information. I am re-introducing this proposal to accomplish that and would accept friendly amendments to it for any other materials. While HDPE dominates the water based technology with an expected 95% of the systems, other materials can be utilized. Copper is used in direct expansion systems that do not run on water.

Cost Impact: None

Analysis: A review of the standard proposed for inclusion in the code, [CSA C448 SERIES-02-CAN/CSA-2002] 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, 2012.

T1202.4-M-CUDAHY.DOC

Public Hearing Results

Committee Action:

Approved as Modified

Modify as follows:

SECTION 1210 **PLASTIC PIPE GROUND-SOURCE HEAT PUMP LOOP SYSTEMS**

1210.1 Plastic pipe ground-source heat pump-loop water piping. Ground source heat pump ground loop-piping and tubing material for water-based systems shall conform to the standards cited in this section.

SECTION 1215 **TESTS**

1215.1 Ground source heat pump loop systems. Before connection header trenches are backfilled, the assembled loop system shall be pressure tested with water at 100 psi (689 kPa) for 30- 15 minutes, but not more than 35 minutes, with no observed leaks. Flow and pressure loss testing shall be performed and the actual flow rates and pressure drops shall be compared to the calculated

design values. If actual flow rate or pressure drop values differ from calculated design values by more than 10 percent, the cause shall be identified and corrective action taken.

(Portions of proposal not shown remain unchanged)

Committee Reason: Approval is based on the proponent's published reason. The modification adds "plastic pipe" to the titles to reflect the coverage of the text. The change to 15 minutes is consistent with current section 1208.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Jeremy Brown, representing NSF International, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

**TABLE 1210.4
GROUND SOURCE LOOP PIPE**

| MATERIAL | STANDARD (see Chapter 15) |
|---|--|
| Chlorinated polyvinyl chloride (CPVC) | ASTM D2846; ASTM F441; ASTM F442 |
| Cross-linked polyethylene (PEX) | ASTM F876; ASTM F877 CSA B137.5 |
| Polyethylene/aluminum/polyethylene (PE-AL-PE) pressure pipe | ASTM F1282; CSA B137.9 |
| High Density Polyethylene (HDPE) | ASTM D3035; ASTM D2737; ASTM F714; AWWA C901; CSA B137.1; CSA C448; <u>NSF 358-1</u> |
| Polypropylene (PP-R) | ASTM F2389; CSA B137.11 |
| Polyvinyl chloride (PVC) | ASTM D1785; ASTM D2241 |
| Raised temperature polyethylene (PE-RT) | ASTM F2623 |

**TABLE 1210.5
GROUND SOURCE LOOP PIPE
FITTINGS**

| PIPE MATERIAL | STANDARD (see Chapter 15) |
|---|---|
| Chlorinated polyvinyl chloride (CPVC) | ASTM D 2846; ASTM F437; ASTM F438; ASTM F439; CSA B137.6 |
| Cross-linked polyethylene (PEX) | ASTM F 877; ASTM F1807; ASTM F 1960; ASTM F 2080; ASTM F2159; ASTM F2434; CSA B137.5 |
| Polyethylene/aluminum/polyethylene (PE-AL-PE) | ASTM F 2434; ASTM F1282, CSA B137.9 |
| High Density Polyethylene (HDPE) | ASTM D2683; ASTM D3261; ASTM F2389; ASTM F1055; CSA B137.1; <u>NSF 358-1</u> |
| Polypropylene (PP-R) | CSA B137.11; CSA C448 |
| Polyvinyl chloride (PVC) | ASTM D2464; ASTM D2466; ASTM D2467; CSA B137.2; CSA B137.3 |
| Raised temperature polyethylene (PE-RT) | ASTM D3261; ASTM F1807; ASTM F2159; B137.1 |

NSF 358-1 2011 Polyethylene Pipe and Fittings for Water-Based Ground-Source 'Geothermal' Heat Pump Systems

(Portions of proposal not shown remain unchanged)

Commenter's Reason: I was the proponent of M-190, an identical proposal to M-188, with the exception of adding new NSF standards. At the time of the Code Hearing in Dallas, NSF 358-1 was not complete so the code change was disapproved. It is now

complete and published. This is the American National Standard for Polyethylene Pipe and Fittings for Water-Based Ground-Source "Geothermal" Heat Pump Systems and should be included as an option in the code. This standard deals with specific performance requirements related to geothermal systems. The standard is written in mandatory language. ICC voting members may obtain a free copy of this NSF standard from http://standards.nsf.org/apps/group_public/document.php?document_id=18123 or by emailing brown@nsf.org.

M188-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M192-12

Table 1202.5, Chapter 15

Proposed Change as Submitted

Proponent: Kevin J. Simko, Victaulic, representing Victaulic

Revise as follows:

| MATERIAL | STANDARD |
|----------------------------|--|
| Brass | ASTM F 1974 |
| Bronze | ASTM B 16.24 |
| Copper or copper alloy | ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; AS ME B16.29; <u>ASTM B 75; ASTM B 152; ASTM B 584</u> |
| Ductile iron and gray iron | ANSI/AWWA C110/A21.10; <u>A WWA</u> <u>C153/A21.53</u> ; ASTM A 395; ASTM A 536; ASTM F 1476; ASTM F 1548 |
| Ductile Iron | ANSI/AWWA C153/A21.53 |
| Gray Iron | ASTM A 126 |
| Malleable iron | ASME B16.3 |
| PEX fittings | ASTM F 877; ASTM F 1807; ASTM F 2159 |
| Plastic | ASTM D 2466; ASTM D 2467; ASTM D 2468; ASTM F 438; ASTM F 439; ASTM F 877; ASTM F2389; ASTM F 2735 |
| Steel | 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; <u>ASTM A 395; ASTM F</u> <u>1476; ASTM F 1548</u> |

Portions not shown remain unchanged.

Add new standards to Chapter 15 as follows:

ASTM A234 / A234M - 11a

Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service

ASTM A395 / A395M - 99(2009)

Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures

ASTM A536 - 84(2009)

Standard Specification for Ductile Iron Castings

ASTM B152 / B152M – 09

Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar

ASTM B584 – 11

Standard Specification for Copper Alloy Sand Castings for General Applications

ASTM F1548 - 01(2006)

Standard Specification for the Performance of Fittings for Use with Gasketed Mechanical Couplings Used in Piping Applications

AWWA C153/A21.53-06
Ductile-Iron Compact Fittings for Water Service

Reason: The materials currently listed in Table 1202.5 do not fully represent the materials being used for hydronic systems in the industry. The code is overly restrictive with regard to pipe materials and does not allow for the use of materials that offer improved mechanical and electrochemical properties compared with allowed materials. The addition of these standard materials will allow the use of high grade materials that provide improved performance, while still allowing the use of currently approved materials. Many of these materials are also currently referenced in other piping codes.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM A234 / A234M - 11a, A395 / A395M - 99(2009), A536 - 84(2009), B152 / B152M - 09, B584 - 11, F1548 - 01(2006); AWWA C153/A21.53-06] 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, 2012.

T1202.5-M-SIMKO.DOC

Public Hearing Results

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Pennie L. Feehan, Pennie L. Feehan Consulting, representing CDA – Copper Development Association, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

**TABLE 1202.5
HYDRONIC PIPE FITTINGS**

| MATERIAL | STANDARD |
|------------------------|---|
| Copper or copper alloy | ASME B16.15; ASME B16.18; ASME B16.22; ASME B16.23; ASME B16.26; ASME B16.29; ASTM B 75; ASTM B 152; ASTM B 584 |

(Portions of code change not shown remain unchanged)

Commenter's Reason: Brass and Bronze are copper alloys. Moving the standards under the applicable heading cleans-up the table and provides the appropriate terminology and correct information to the end user.

ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV and ASME B 16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings – DWV, are Drain, Waste, and Vent fittings and should not be listed in table 1202.5.

ASTM B 75 – Standard Specification for Seamless Copper Tube, ASTM B 152 – Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar, ASTM B584 – Standard Specification for Copper Alloy Sand Casting for General Applications, are tubing, plate, rolled bar, and general castings are not fittings and should not be listed in table 1202.5.

M192-12

Final Action:

AS

AM

AMPC____

D

M199-12

1203.1 through 1203.8.3, Chapter 15

Proposed Change as Submitted

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

Revise as follows:

1203.3.1 Brazed joints. Brazed joints between copper pipe or tubing and fittings shall be made with brazing alloys having a liquid temperature exceeding 1000°F (538°C). Joint surfaces to be brazed shall be cleaned bright by manual or mechanical means. The ends of the tubing shall be cut square and reamed to full inside diameter. Burrs on the outside end of the pipe or tubing shall be removed. Where required by the brazing alloy manufacturer's instructions, an approved brazing flux shall be applied to the joint surfaces where required. The joint shall be brazed with a brazing filler metal conforming to AWS A5.8. Brazing filler metal shall be applied at the point where the pipe or tubing enters the socket of the fitting.

1203.3.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions. Joints shall include compression, flanged, grooved, press type and threaded.

1203.3.3 Soldered joints. Solder joints surfaces shall be cleaned. between copper pipe or tubing and fittings shall be made in accordance with the methods of ASTM B 828 with the following sequence of joint preparation and operation: measuring and cutting, reaming, cleaning, fluxing, assembly and support, heating, applying the solder, cooling and cleaning. The ends of the pipe or tubing shall be cut square and reamed to the full inside diameter. Burrs on the outside end of the pipe or tubing shall be removed. Joint surfaces to be joined shall be cleaned bright by manual or mechanical means. A Flux conforming to ASTM B 813 shall be applied to pipe or tubing and fittings. Such flux shall become noncorrosive and nontoxic after soldering shall be applied. Pipe or tubing shall be inserted to the base of the fitting. Excess flux shall be removed from the exterior of the joint. The assembled joint shall be supported to create a uniform capillary space around the joint. An LP gas or acetylene air fuel torch shall be used to apply heat to the assembled joint. The heat shall be applied with the flame perpendicular to the pipe or tubing. The flame shall be moved alternately between the fitting cup and pipe or tubing. The joint shall be soldered with a Solder in compliance with conforming to ASTM B 32 shall be applied to the joint surfaces until capillary action draws the molten solder into the cup of the fitting. The soldered joint shall not be disturbed until cool. Remaining flux residue shall be cleaned from the exterior of the joint. The joining of water supply piping shall be made with lead-free solder and fluxes. "Lead free" shall mean a chemical composition equal to or less than 0.2-percent lead.

1203.3.4 Flared joints. Flared joints shall be made by a tool designed for that operation.

1203.3.5 Push-fit joints. Push-fit joints shall be installed in accordance with the manufacturer's instructions.

1203.3.6 Press joints. Press joints shall be installed in accordance with the manufacturer's instructions.

1203.3.7 Grooved and shouldered mechanical joints. Grooved and shouldered mechanical joints shall conform to the requirements of ASTM F 1476 and shall be installed in accordance with the manufacturer's instructions.

1203.3.8 Mechanically formed tee fittings. Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.

1203.3.8.1 Full flow assurance. Branch tubes shall not restrict the flow in the run tube. A dimple/depth

stop shall be formed in the branch tube to ensure that penetration into the outlet is of the correct depth. For inspection purposes, a second dimple shall be placed 1/4 inch (6.4 mm) above the first dimple. Dimples shall be aligned with the tube run.

1203.3.8.2 Brazed joints. Mechanically formed tee fittings shall be brazed in accordance with Section 1203.3.1.

1203.3.4 3.9 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: For CPVC pipe joint connections, a primer is not required where all of the following conditions apply:

1. The solvent cement used is third-party certified as conforming to ASTM F 493.
2. The solvent cement is yellow in color.
3. The solvent cement is used only for joining ½ inch (12.7 mm) through 2-inch (51 mm) diameter CPVC pipe and fittings.
4. The CPVC pipe and fittings are manufactured in accordance with ASTM D 2846.

1203.3.510 Threaded joints. Threads shall conform to ASME B1.20.1. Schedule 80 or heavier plastic pipe shall be threaded with dies specifically designed for plastic pipe. Thread lubricant, pipe-joint compound or tape shall be applied on the male threads only and shall be *approved* for application on the piping material.

1203.3.611 Welded joints. Joint surfaces shall be cleaned by an *approved* procedure. Joints shall be welded with an *approved* filler metal.

~~**1203.3.7 Grooved and shouldered mechanical joints.** Grooved and shouldered mechanical joints shall conform to the requirements of ASTM F 1476 and shall be installed in accordance with the manufacturer's installation instructions.~~

~~**1203.3.8 Mechanically formed tee fittings.** Mechanically extracted outlets shall have a height not less than three times the thickness of the branch tube wall.~~

~~**1203.3.8.1 Full flow assurance.** Branch tubes shall not restrict the flow in the run tube. A dimple/depth stop shall be formed in the branch tube to ensure that penetration into the outlet is of the correct depth. For inspection purposes, a second dimple shall be placed 1/4 inch (6.4 mm) above the first dimple. Dimples shall be aligned with the tube run.~~

~~**1203.3.8.2 Brazed joints.** Mechanically formed tee fittings shall be brazed in accordance with Section 1203.3.1.~~

~~**1203.4 ABS plastic pipe.** Joints between ABS plastic pipe or fittings shall be solvent-cemented or threaded joints conforming to Section 1203.3.~~

~~**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.~~

~~**1203.7 Copper or copper-alloy pipe.** Joints between copper or copper-alloy pipe or fittings shall be brazed, mechanical, soldered, threaded or welded joints conforming to Section 1203.3.~~

~~**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 joints conforming to Section 1203.8.3.~~

~~**1203.8.1 Flared joints.** Flared joints shall be made by a tool designed for that operation.~~

~~**1203.8.2 Push-fit joints.** Push-fit joints shall be installed in accordance with the manufacturer's instructions.~~

~~**1203.8.3 Press joints.** Press joints shall be installed in accordance with the manufacturer's instructions.~~

Add new standard to Chapter 15 as follows:

ASTM B828 - 02(2010)

Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings

Reason: The above proposal adds important language from the applicable standards, relocated, renumbered, and deleted other redundant sections to help the end user.

Cost Impact: This code change will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, [ASTM B828 - 02(2010)], 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, 2012.

1203.3.1-M-FEEHAN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The code is not an instruction manual for piping installation. Workmanship cannot be enforced. The Air Diffusion Council installation guide for flex duct is not in the code and likewise, this proposed text should not be in the code.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Pennie L. Feehan, Pennie L. Feehan Consulting, representing CDA – Copper Development Association, requests Approval as Modified by this Public Comment.

Replace original proposal as follows:

1203.3.1 Brazed joints. Joint surfaces shall be cleaned bright by manual or mechanical means. An approved flux shall be applied where required. The joint shall be brazed with a filler metals having a melting point range between 1,100°F (593°C) and 1500°F (815°C) and conforming to AWS A5.8.

1203.3.2 Mechanical joints. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

1203.3.3 Soldered joints. Solder joints shall be made in accordance with the methods of ASTM B 828. All cut ends shall be cut square and reamed to the full inside diameter of the tube end. All joint surfaces shall be cleaned bright by manual or mechanical means. A-Flux conforming to ASTM B 813 shall be applied to all joint surfaces. The joint shall be soldered with a solder conforming to ASTM B 32.

Commenter's Reason: This proposal adds language that provides clear directions to the end user, adds the ASTM B 828 standard to the IMC and provides uniformity with the IPC.

M199-12

Final Action: AS AM AMPC____ D

M209-12

1303.3 through 1303.7

Proposed Change as Submitted

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

Revise as follows:

1303.3 Joint preparation and installation. Where required by Sections 1303.4 through 1303.10, the preparation and installation of brazed, mechanical, threaded and welded joints shall comply with Sections 1303.3.1 through 1303.3.4~~5~~.

1303.3.1 Brazed joints. All Brazed joint between copper pipe or tubing and fittings shall be made with brazing alloys having a liquid temperature above 1000°F (538°C). All joints surfaces to be brazed shall be cleaned. An approved brazing flux shall be applied to the joint surfaces where required by manufacturer's recommendation. The joints shall be brazed with a brazing filler metal conforming to AWS A5.8. Brazing filler metal shall be applied at the point where the pipe or tubing enters the socket of the fitting.

1303.3.5 Flared joints. Flared joints shall be made by a tool designed for that operation.

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.~~

1303.6 Copper or copper-alloy pipe. ~~Joints between copper or copper-alloy pipe or fittings shall be brazed, mechanical, threaded or welded joints complying with Section 1303.3.~~

1303.7 Copper or copper-alloy tubing. ~~Joints between copper or copper-alloy tubing or fittings shall be brazed or mechanical joints complying with Section 1303.3 or flared joints. Flared joints shall be made by a tool designed for that operation.~~

Reason: The proposed removes unnecessary language and adds important language from the applicable standards.

Cost Impact: This code change will not increase the cost of construction.

1303.3-M-FEEHAN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The proposal has merit but needs to be reworked and brought forward in a public comment.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Pennie L. Feehan, Pennie L. Feehan Consulting, representing CDA – Copper Development Association, requests Approval as Modified by this Public Comment.

Replace original proposal as follows:

1303.3.1 Brazed joints. All joint surfaces shall be cleaned bright by manual or mechanical means. An approved flux shall be applied where required. The joints shall be brazed with a filler metals having a melting point range between 1,100°F (593°C) and 1500°F (815°C) and conforming to AWS A5.8.

Commenter's Reason: This proposal adds language that provides clear directions to the end user and provides uniformity with the IPC.

M209-12

| | | | | |
|---------------|----|----|-----------|---|
| Final Action: | AS | AM | AMPC_____ | D |
|---------------|----|----|-----------|---|

M214-12

1404.2.1 (New)

Proposed Change as Submitted

Proponent: Timothy Burgos, InterCode Incorporated, Representing Rectorseal Corporation and Ken Sagan, NRG Code Advocates, representing self (ken@nrgcodeadvocates.com)

Add new text as follows:

1404.2.1 Protection of piping insulation. Piping insulation exposed to the weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind. The means of protection shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted as a means of such protection.

1404.2.1(NEW)-M-BURGOS-SAGAN.DOC

Public Hearing Results

Committee Action:

Disapproved

Committee Reason: The method of protection is not specified. "Exposed to the weather" is vague. The text only applies where insulation is exposed to weather. This belongs in the IECC. Prescriptive text or standards are needed. The reference to wind damage is unclear.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Vickie Lovell, InterCode Incorporated, representing Rectorseal Corporation, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1404.2.1 1204.3 Protection of piping insulation. Piping insulation exposed to the weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind. The means of protection shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted as a means of such protection.

Commenter's Reason: This public comment is necessary because the original code change proposal was proposed for Chapter 14 rather than appropriately placed in Chapter 12.

The rest of the text should be approved as submitted. Currently, the International Energy Conservation Code (IECC) contains the language for protection of piping insulation, but this language needs to be in the International Mechanical Code (IMC).

Protection of piping insulation is not only an energy conservation issue. Piping insulation is in place to ensure the proper function and operation of the mechanical system. A requirement for the protection of piping insulation is consistent with the intent of the IMC.

The language for protection of piping insulation was taken directly from Section C403.2.8.1 of the 2012 IECC so it is already accepted code language by the membership of the International Code Council. Additionally, Section 603.16 of the IMC speaks to weather protection of ducts. A requirement for protection of pipe insulation from weather is appropriate.

M214-12

Final Action: AS AM AMPC____ D

M215-12

307.3 (New) (IPC [M]314.3 New)

Proposed Change as Submitted

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

Add new text as follows:

307.3 (IPC [M] 314.3) Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturers' installation instructions.

Reason: Pumps that are not connected in this fashion will permit the appliances to keep operating, spilling waste water where ever the appliance is located. When this condition continues over time, it could result in damage to building components or other property. This overflow condition may result in mold issues among other things. Most pump manufacturers already have this feature incorporated into the pump but the code does not require it to be connected. Damage as a result of not connecting this feature could prove to be very costly. This is not as much of a concern when appliances are readily accessible to occupants where leakage may be noticed in a timely manner.

Cost Impact: None

307.6 (NEW)-FG-MCMANN

Public Hearing Results

This code change was contained in the Updates to the 2012 Proposed Changes posted on the ICC website. Please go to <http://www.iccsafe.org/cs/codes/Pages/12-13-ProposedChanges-A.aspx>

Committee Action:

Approved as Submitted

Committee Reason: Approval is based on the proponent's published reason.

Assembly Action:

None

Individual Consideration Agenda

This item is on the agenda for individual consideration because a public comment was submitted.

Public Comment:

Dan Buuck, Dipl.-Ing. (FH), representing National Association of Home Builders (NAHB), requests Disapproval.

Commenter's Reason: Because Section 307.2.3, Auxiliary and secondary drain systems, already addresses situations where building components can be damaged by condensate, this proposal would only apply to uninhabitable spaces with concrete or other impervious floor surfaces. The proposal is overly restrictive, because it does not take into account situations where floor drains are present or regular maintenance will prevent prolonged spillage—effectively avoiding the damage that this proposal is meant to prevent.

Also, there are facilities which need to have uninterrupted cooling, for processes, storage or health reasons. The occupants of these buildings cannot afford to have the cooling system shut down just because some water might drain on the floor. They would have to have a duplicate system installed at great cost for the small possibility of condensate spillage. This is not a one-size-fits-all solution.

M215-12

Final Action:

AS

AM

AMPC____

D