

**RM2-13**  
**M1305.1**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1305.1 Appliance access for inspection service, repair and replacement.** *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances*, or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*. ~~Installation of room heaters shall be permitted with at least an 18-inch (457 mm) working space. A platform shall not be required for room heaters.~~

**Exception:** The installation of room heaters shall comply with manufacturer's instructions.

**Reason:** This revision is a simple text cleanup to eliminate permissive language and unclear text. The current next to last sentence says that room heaters are allowed to have a working space of 18 inches, but does not actually require that. What is an 18 inch work space? 18" x 18", 18" x 30" ?? The last sentence says that a platform is not required, yet nowhere in this section is a platform ever required. The working space is assumed to be the floor area. In the case of room heaters, it is simple to defer to the manufacturer's instructions for the required service access. This is generally not an issue anyway because room heaters are necessarily out in the open.

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

M1305.1-RM-HALL-PMGCAC

**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was 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 Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.**

#### **Modify the proposal as follows:**

**M1305.1 Appliance access for inspection service, repair and replacement.** *Appliances* shall be accessible for inspection, service, repair and replacement without removing permanent construction, other *appliances*, or any other piping or ducts not connected to the *appliance* being inspected, serviced, repaired or replaced. A level working space at least 30 inches deep and 30 inches wide (762 mm by 762 mm) shall be provided in front of the control side to service an *appliance*.

**Exception:** The installation of room heaters shall comply with manufacturer's instructions.

**Commenter's Reason:** The exception is redundant. M1410.1 already covers this. If we are to make an exception here directing the access for room heaters to meet the manufacturer's instructions, then we will need to do the same for radiant heating systems (M1406.1), duct heaters (M1407.1), vented floor furnaces (M1408.1) and so on and on.

#### **RM2-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_                      D

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**RM3-13**  
**M1305.1.3.1**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1305.1.3.1 Electrical requirements.** A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

**Reason:** The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

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

M1305.1.3.1-RM-HALL-PMGCAC

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**Committee Action Hearing Results**

**Committee Action:** **Approved as Submitted**

**Committee Reason:** Approval was based upon the proponent's published reason. No additional cost is involved to simply locate the lamp where impact is unlikely.

**Assembly Action:** **None**

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**Individual Consideration Agenda**

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

*Public Comment:*

**Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M1305.1.3.1 Electrical requirements.** A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by ~~location or~~ lamp guards or one of the following methods:

1. Exposed lamps shall not be located over the passageway access opening, the appliance, or the required passageway between the passageway access opening and the appliance.
2. Exposed lamps shall be located not less than 6 feet 8 inches above the walking surface of the passageway and above the passageway access opening.

**Commenter's Reason:** The language approved by the committee is very subjective and would lead to a lack of uniform enforcement. This public comment would solve that problem by defining the space where lamp guards are required. This will aid enforcement and simplify compliance by removing any ambiguity for the code official and the installer.

**RM3-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_           D

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**RM4-13**  
**M1305.1.4.3**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1305.1.4.3 Electrical requirements.** A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

**Reason:** The typical lamp holder (fixture) used for attics and crawl spaces is a porcelain lamp holder with a naked incandescent lamp in it. It is often placed such that service personnel can impact it with their body, tools or materials. The result is broken glass, falling hot metal lamp filaments, possible lacerations, a shock hazard and sudden darkness to top it all off. The use of simple lamp cages/guards or locating the lamp holders out of harm's way will protect service personnel, which is the intent of this entire code section.

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

M1305.1.4.3-RM-HALL-PMGCAC

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**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Same reason as RM3-13

**Assembly Action:**

**None**

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**Individual Consideration Agenda**

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

*Public Comment:*

**Dan Buuck, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M1305.1.4.3 Electrical requirements.** A luminaire controlled by a switch located at the required passageway opening and a receptacle outlet shall be installed at or near the *appliance* location in accordance with Chapter 39. Exposed lamps shall be protected from damage by location or lamp guards.

**Exception:** Lamp guards shall not be required where exposed lamps are not located over the passageway access opening, the appliance, or the passageway between the passageway access opening and the appliance.

**Commenter's Reason:** The language approved by the committee is very subjective and would lead to a lack of uniform enforcement. This public comment would solve that problem by defining the space where lamp guards are required. This will aid enforcement and simplify compliance by removing any ambiguity for the code official and the installer.

**RM4-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_\_           D

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## RM8-13

M1308.1, M1308.2.1 (New), M1308.2.2 (New), M1308.2.3 (New)

### Proposed Change as Submitted

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1308.1 Protection against physical damage.** ~~In concealed locations where piping, other than cast iron or galvanized steel, is installed through holes or notches in studs, joists, rafters or similar members less than 1 1/2 inches (38 mm) from the nearest edge of the member, the pipe shall be protected by steel shield plates. Such shield plates shall have a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage). Such plates shall cover the area of the pipe where the member is notched or bored and shall extend not less than 2 inches (51 mm) above sole plates and below top plates. Where piping will be concealed within light-frame construction assemblies, the piping shall be protected against penetration by fasteners in accordance with Sections M1308.2.1 through M1308.2.3.~~

**Exception:** Cast iron piping and galvanized steel piping shall not be required to be protected.

**Add new text as follows:**

**M1308.2.1 Piping through bored holes or notches.** Where piping is installed through holes or notches in framing members and the piping is located less than 1 1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the pipe shall be protected by shield plates that cover the width of the pipe and the framing member and that extend 2 inches (51 mm) to each side of the framing member. Where the framing member that the piping passes through is a bottom plate, bottom track, top plate or top track, the shield plates shall cover the framing member and extend 2 inches (51 mm) above the bottom framing member and 2 inches (51 mm) below the top framing member.

**M1308.2.2 Piping in other locations.** Where the piping is located within a framing member and is less than 1 1/2 inches (38 mm) from the framing member face to which wall, ceiling or floor membranes will be attached, the piping shall be protected by shield plates that cover the width and length of the piping. Where the piping is located outside of a framing member and is located less than 1 1/2 inches (38 mm) from the nearest edge of the face of the framing member to which the membrane will be attached, the piping shall be protected by shield plates that cover the width and length of the piping.

**M1308.2.3 Shield plates.** Shield plates shall be of steel material having a thickness of not less than 0.0575 inch (1.463 mm) (No. 16 gage).

**Reason:** This proposal was approved for the 2015 IFGC. This proposal provides clear requirements for where shield plates are needed. Section M1308.1 uses the term "light frame construction assemblies" to describe wall, floor and roof assemblies that can be made up from either wood members or light frame, cold formed steel members.

Section M1308.2.1 covers applications where piping runs perpendicular to a framing member and passes through a bored hole or notch in the framing member. This text is nearly the same as what is currently in the IRC. If the piping is within 1 1/2 inches of the face of the member where wall, ceiling or floor membranes will be attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the width of the framing member plus 2 inches on either side of the framing member. Protection of the piping on either side of the framing member is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. Section M1308.2.1 also covers the application where piping runs perpendicular to and penetrates top and bottom plates, or top and bottom tracks. Protection of the piping above the bottom framing member (or below the top framing member) is needed because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping just outside of the framing member. The code fails to address the situation where piping is run within the C-channel of a metal stud or joist and it also fails to address piping run parallel to a framing member.

Section M1308.2.2 covers applications where the piping runs alongside of a framing member or in the case of a light frame, cold formed steel framing member, piping that runs parallel to the length of and within the framing member (in other words, within the channel section). If the piping is within 1 1/2 inches of the face of the member where wall, ceiling or floor membranes will be

attached, then the piping is required to be protected by a shield plate that covers the width of the piping by the length of piping that is within the 1 ½ inch proximity of the framing member's fastening face. Piping that is located behind the fastening face of the member and within 1 ½ inches of the fastening face of the member obviously needs protection from fastener penetration. Piping that is located adjacent to and within 1 ½ inches of the fastening face of the member needs protection because it is too easy for a membrane/fastener installer to miss the framing member's fastening face or penetrate the member at an angle and hit the piping that is just outside of the framing member. A similar requirement in Section E3802.1 applies to wiring run parallel to framing members.

The opposition to this proposal for the IPC was related to the requirement to protect the length of piping that is run parallel to a framing member and less than 1 ½ inches from the member face to which wall board will be screwed or nailed. The concern was expressed that it would be difficult to protect the pipe for its full length, making the assumption that the pipe ran from the bottom plate up through the top plate in walls. First of all, it is unlikely that an installer would install piping from plate to plate that close to the stud, since it would be nearly impossible to drill holes that close to the stud. Secondly, the obvious way to avoid installing protection for the pipe is to simply keep it at least 1 ½ inches away from the framing member. With a little planning, the installation of pipe protection could be easily avoided.

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:** The code change proposal will increase the cost of construction.

M1308.1-RM-HALL-PMGCAC

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### **Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was based upon the proponent's published reason. The proposal will provide protection for refrigeration piping in walls.

**Assembly Action:**

**None**

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### **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 Fitting Association (PPFA) , requests Disapproval.**

**Commenter's Reason:** This change could have serious negative implications, including requiring extensive shielding for floor, wall, and ceiling radiant heating systems based on hydronic tubing in residential construction. The proposal will increase cost of construction and the level of hazard found in the fuel gas code, which does have shielding requirements, is far greater compared with hydronic systems found in the mechanical code. Urge disapproval.

*Public Comment 2:*

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

**Commenter's Reason:** The protection requirements contained within this code text is overly aggressive. A basic example of this would be having a 2" hydronic pipe installed vertical, secured to a 2 x 4 stud. If this pipe extended the full distance of the 8' stud, a shield plate will have to be installed the entire length of the stud, on both sides of the stud, extending out beyond the hydronic pipe; or a shield plate that will measure at least 8' x 4". This leaves no area to attach a wall membrane.

This same proposal was disapproved by IMC, IPC, and IFGC committees. More interesting, the same IRC-Plumbing and Mechanical committee that approved this proposal, previously disapproved the identical companion proposal RP13-13.

*Public Comment 3:*

**Gary Kozan, CPD, Ridgeway Plumbing, representing Florida Association of Plumbing Heating Cooling Contractors, requests Disapproval.**

**Commenter's Reason:** This proposal represents an unnecessary rewrite of existing text, and adds new requirements to protect every pipe that falls within 1-1/2 inches from a stud. There is no justification that residential refrigerant lines or condensate lines need more protection than currently provided. Identical proposals have been previously rejected by the IMC, IPC, and IRC-P committees. Let's maintain consistency by also disapproving in the IRC-M.

**RM8-13**

Final Action:

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**RM9-13**  
**M1401.3**

**Proposed Change as Submitted**

**Proponent:** Richard Grace, Fairfax County VA, representing The Virginia Plumbing and Mechanical Inspectors Association and the Virginia Building and Code Officials Association

**Revise as follows:**

**M1401.3 Equipment/appliance Sizing.** Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

**Exception:** Heating and cooling equipment and appliances shall not be limited to the capacities determined in accordance with Manual S where any of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with Manual J fall within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with Manual J and the manufacturer's next larger standard size unit is specified.
3. The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.

**Reason:** Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.

Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

Item 3 - The current code language does not have provisions for sizing appliances for minimal dwelling unit or dwelling addition loads, other than forcing owners and contractors to change appliances to less desirable systems. For example; a 2 story townhouse, in climate zone 4, with 600 square feet per floor wants to utilize a two-zone system, or a separate heat pump system for each floor. A 1.5 ton unit per floor would exceed the requirements of Manual S, however a 1.5 ton unit could be the smallest available appliance made by the desired manufacturer. Current language would require a complete design change, such as utilizing a single appliance to serve the entire dwelling rather than the more desirable two-zone system, or requiring a system that utilizes electric baseboard heating and window-mounted air conditioning units. This is absurd, and an unfair to an owner that desires to reduce energy costs.

**Cost Impact:** none

M1401.3-RM-GRACE.DOC

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**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The text should be better defined with some calculations. The concept should be adapted for regional differences. The proposal should be reworked in a public comment.

**Assembly Action:**

**None**

## **Individual Consideration Agenda**

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

### *Public Comment 1:*

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

**Modify the proposal as follows:**

**M1401.3 Equipment/appliance Sizing.** Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S or other approved sizing methodologies, based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

**Exception:** Heating and cooling equipment and appliances sizing shall not be limited to the capacities determined in accordance with Manual S or other approved sizing methodologies, where either of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with ~~Manual J~~ the approved heating and cooling calculation methodology are within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with ~~Manual J~~ the approved heating and cooling calculation methodology and the manufacturer's next larger standard size unit is specified.
- ~~3. The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.~~

**Commenter's Reason:** After listening to the discussions presented during the Committee Action Hearings, we have incorporated those concerns within this modification. The first being the addition of "other approved sizing methodologies". ACCA's Manual S is not the **only** approved, appropriate sizing methodology available to size residential HVAC equipment. The current language would not permit other sizing methodologies such as ASHRAE's Handbook series. The second modification was to reword the language to provide clarity to the text. The third modification was to remove the third exception based on concerns voiced during testimony about the broad aspects that such an exception would permit.

The following is from the original reason statement:

- Item 1 - Current technology is widely available that incorporates multi-stage or VRF systems for increased efficiency. Some of these appliances have such a wide span of functionality that they extend beyond the allowable requirements outlined in Manual S. However, this technology allows the appliance to operate between minimum and maximum capacities, based on loads imposed, thus eliminating the problems associated with single-stage, oversized appliances. Additionally, the appliance will operate efficiently during times where outdoor air temperatures exceed those used to calculate the loads in Manual J.
- Item 2 - Often times, the appliance manufacturer's published total and sensible capacities are at odds with the requirements of Manual S. There are many cases where the total capacity of the appliance will fall within the parameters of Manual S in relation to the calculated total gain, however the sensible capacity of the appliance may fall short of the calculated sensible gain, thus unable to provide efficient sensible cooling for the space. When the manufacturer's next standard size larger is chosen to meet the sensible gain, the total capacity of the appliance may then exceed the requirements of Manual S. Choosing the larger appliance will enable a more efficient and effective system.

### *Public Comment 2:*

**Luis Romeo Escobar, representing ACCA (Air Conditioning Contractors of America), requests Disapproval.**

**Commenter's Reason:** The proposed exceptions to ACCA Manual S should be disapproved for the following reasons:

1. Variable refrigerant flow (VRF) technology is addressed in the revised Manual S. The committee that led the revision effort included representatives of VRF manufacturers. The new Manual S over size limits have been vetted by these committee members and is based on the available OEM expanded performance data. ACCA is following ICC procedures to ensure that the updated Manual S is the one referenced in the 2015 IRC and IECC.
2. Exceptions #2 and #3 are not based on sound technical grounds, but instead are contrived to benefit sales of a particular product class. This is specifically against the entire intent of Manual S and exactly what the industry needs to get away from.
3. The cost impact of this proposed change is not "none" as indicated by the proponents. Larger-than-necessary equipment will generally have higher initial costs (longer pay-back), higher energy costs due to constant cycling on-and-off of the

equipment, shortened equipment lifespan (again, due to the wear-and-tear of constant cycling), and will have higher maintenance costs if the proponents' example of two oversized units for one house is the case (homeowners are generally charged based on the number of units being serviced).

4. In the reasoning for item 3 the proponents state that a homeowner will see reduced energy costs by installing two oversized units as opposed to one properly sized unit – this patently absurd and unsubstantiated. The proponents, unfortunately not unlike many design practitioners, seem to think that installing two units is the only way to properly zone a home, which is not the case.
5. The main reason why the industry has a standard to avoid oversizing is in order to ensure that there is proper humidity control in the home. Severely oversized equipment does not stay on long enough for the coil to reach a low enough temperature for adequate moisture removal. This can result in the presence of mold and mildew, not to mention lead to an uncomfortable interior ambience (the dry-bulb temperature will be low, but the humidity high so it will feel clammy to the occupant). Clearly, this proposal would in no way makes a home safer, but instead puts the occupants in greater risk of developing serious health issues from the presence of moisture.
6. Manual S is not a suggestion, as the proponents erroneously purport. It is an industry developed, ANSI recognized standard that sets clear oversize limits that must be adhered to. While the old Manual S did have permissive language that may not have been adequately addressed by the directions on the inside cover, great care has been taken to ensure that the normative sections of the new Manual S are written in mandatory, enforceable language that is acceptable for the i-codes. It will undergo a second ANSI public review, during which anyone (proponents included) may submit a comment to correct any deficiencies.
7. Any exceptions to Manual S should be based on industry research, and not on personal anecdote. To date, no credible research has been produced that supports the claim that hugely oversized HVAC equipment is desirable or leads to a safer, more sustainable, more affordable, or more resilient home.
8. For situations in which the OEM expanded performance data is not available, the new Manual S provides a path for compliance in which the manufacturer certifies that the equipment meets the home's physical requirements.
9. Manual S already has procedures that allow for regional differences (the comparison of heating degree days to cooling degree days for qualification of different heat pump sizing limits).
10. One common problem that is used as justification for gross oversizing is that the specified OEM doesn't offer equipment with small enough capacity for the load requirements. Unfortunately, this will continue to be that case as long as the Manual S requirements are not enforced. This proposal is effectively asks code officials to compensate for a lack of OEM product offerings, which is not the purpose of the building codes (in fact, it will serve as a catch 22 that will prolong the same problem).

**RM9-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_\_                    D

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# RM21-13

## M1411.3.3 (New)

### Proposed Change as Submitted

**Proponents:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Andrew Scott Jones, President, A Better Deal Heating and Air Conditioning, Inc., a Texas Corporation, representing himself.

#### **Add new text as follows:**

**M1411.3.3 Drain Line Maintenance.** Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

#### **Reason:**

**(Hall-PMGCAC):** This new language was approved for the 2015 IMC. 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, crawlspace, closet, etc. The cut must be repaired by reconnecting the drain line with a PVC coupling and solvent cement.

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

**(Jones):** This language is identical to the language of M32-12 which was recently adopted in Portland, Oregon. We are advised by JB Engineering that this language will be in the IMC and IPC for 2015. There appears to be no reason not to accept this identical language in the IRC. 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, possibly 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 ten 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 through the cutting/repair process, the repair could be accomplished by installing a \$15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

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

#### **Cost Impact:**

**(Hall-PMGCAC):** The code change will increase the cost of construction.

**(Jones):** The code change will increase the cost of construction, totaling an estimated \$15.00 per unit.

M1411.3.3 (NEW)-RM-HALL-PMGCAC-JONES.DOC

### Committee Action Hearing Results

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposal will increase the cost of construction and goes beyond the minimum code threshold. It is not costly to cut and repair the drain pipe. Cleanouts should be optional. Such drains can be cleaned from the terminal outlet end.

**Assembly Action:**

**None**

## **Individual Consideration Agenda**

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

### *Public Comment 1:*

**Andrew Scott Jones, A Better Deal Heating and Air Conditioning, Inc., representing self, requests Approval as Submitted.**

**Commenter's Reason:** The Committee Stated in response to RM 21-13 that "The proposal will increase the cost of construction and goes beyond a minimum code threshold. It is not costly to cut and repair the drain pipe. Cleanouts should be optional. Such drains can be cleaned from the terminal outlet end." The comment incorrectly states that the terminal outlet end will work, as condensate drain lines need to be cleared in both directions. The new proposal can be complied with even without purchasing any piece of equipment, as the problem can be "plumbed around." There is a real problem with cutting clogged drain lines, as water can leak all over insulation, not to mention the time consumed in cutting, clearing the drain and repairing the cut with a collar. Eventually, the line will have to be replaced itself.

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, possibly 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 ten 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 through the cutting/repair process, the repair could be accomplished by installing a \$15.00 line clearing device rather than a simple coupling. Drain lines can also be plumbed without installing a device at the time of installation.

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

### *Public Comment 2:*

**Vickie Lovell, INTERCODE, INC., representing Rectorseal, requests Approval as Submitted.**

**Commenter's Reason:** The proponent disagrees with the committee that cleanouts for condensate lines should be optional for the following reasons:

1. Committee stated that the proposal will increase the cost of construction. Proponent agrees. The cost of a manual cleanout costs the owner about \$15.00 at the time of equipment installation. However, the cost of the damage from a leak often goes beyond the cost of the repair, especially if the leak is undetected for some time.
2. Committee stated that it is not costly to cut and repair the drain pipe. Proponent disagrees. To call a professional and pay for a service call and repair and any other damage to the interior spaces is not inexpensive in comparison to the price of cleanout installed with the equipment.
3. Committee stated that such drains can be cleaned from the terminal outlet end. Proponent disagrees. This may or may not be easily accomplished depending on accessibility. In in a multi-story home, or a large single story home where multiple air conditioning units are tied into a common condensate line, a clog in the disposal line will cause water to back up into the drain pans of a lower unit tied into the condensate disposal line. This will occur even if all units are equipped with water-level detection devices due to the fact that the equipment on the lower level will shut down due to a backup, but the equipment on the higher level will continue to operate until water reaches the water-level detection device at that level.

The code does not prohibit drain piping to be cut, but it should. When a line is cut, there is the risk of an ineffective repair which exposes the owner to another leak, more damage, and another repair. A manual cleanout installed at the time of the HVAC equipment is a far superior, nominal-cost alternative to cutting a drain line which allows for removal of the clog within the line without cutting the condensate line to do so. These common-sense devices provide visual inspection that allows for viewing of the check valve and the flow of condensate.

*Public Comment 3:*

**Stuart Oakner, representing MSD Research, Inc., requests Approval as Submitted.**

**Commenter's Reason:** Condensate drain lines that are cut in order to be cleared have no guidelines on how to be joined back together therefore creating a situation in which the drain line may not meet the original code requirements on drain line installations. Cutting condensate drain lines that are filled with water lead to water and mold damage as there is not always enough space to catch water when the line is cut. There is not always room to cut drain lines as the initial installation does not call for drain clearing access, this can lead to the reconfiguring of the drain line to gain access which could create a new drain line that does not meet the original code requirements.

The terminal outlet of drains is not always accessible and even when it is it can lead to severe water damage by having to blow back into the drain line toward the already filled unit drain pan. The code language approved in the fMC, M32-12 states: Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut. Therefore this same language should be allowed in the IRC section RM21-13.

**RM21-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_                    D

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**RM22-13**  
**M1411.4 (New)**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Guy McMann, Jefferson County Co., representing Colorado Association of Plumbing and Mechanical Officials (CAPMO) (gmcman@jeffco.us)

**Add new text as follows:**

**M1411.4 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 manufacturer's instructions.

**Reason:**

**(Hall-PMGCAC):** Most condensate pumps are factory equipped with float switch controls for this purpose. This new text simply requires the switch to be utilized. Spaces such as attics and crawls are out of sight and out of mind, therefore condensate overflow will not be noticed until damage occurs. The overflow kill switch will shut off the equipment that produces the condensate before water damage can occur.

**(McMann):** This was approved in the Fuel Gas Code and the IMC. 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

M1411.4 (NEW)-RM-HALL-PMGCAC-MCMANN.DOC

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**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposal could cause a heating system to shut off in freezing weather resulting in freeze damage to piping.

**Assembly Action:**

**None**

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**Individual Consideration Agenda**

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

*Public Comment 1:*

**Vickie Lovell, INTERCODE, INC. representing Rectorseal requests Approval as Submitted.**

**Commenter's Reason:** The reason for disapproval from the RM Committee is not satisfactory. They stated that the approval of this "proposal could cause a heating system to shut off in freezing weather resulting in freeze damage to piping."

In reality, freeze damage to piping in the winter can occur for numerous reasons unrelated to condensation overflow. So, to NOT connect a condensate pump to an appliance, including those appliances that come with a condensate pump as part of the original equipment, for a reason that may not even occur seems very short-sighted, especially in climates where a hard freeze is not likely or even impossible to occur.

Most of the content of the codes is intended to be proactive to specifically prevent all kinds of unsafe conditions or costly problems. Condensation overflow can result in both unsafe and costly problems. It is a solvable problem that equipment and component manufacturers have recognized and provided homeowners with a solution. To not address this in the code is puzzling.

This proposal already approved during the Group A hearings and final action for the 2015 International Mechanical and Fuel Gas Codes, should also be approved in the 2015 residential mechanical requirements.

*Public Comment 2:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.**

**Commenter's Reason:** This change is needed for consistency with the IMC and IFGC which will both contain this text in the 2015 editions. The committee recommended disapproval because of the concern that a failed pump might turn off a condensing furnace or boiler and cause the house to freeze if the occupants were away for extended periods. This section would apply only to appliances located in out of sight spaces where condensate spillage would go unnoticed. A condensate pump safety shutoff switch is just one of many controls that can shut down a heating system and therefore adds little additional risk. Section M1411.4 would apply to electric and oil fired appliances only because Chapter 24 covers gas appliances and Chapter 24 will duplicate the same provision that will be in the 2015 IFGC.

**RM22-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_\_                    D

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**RM27-13**  
**M1501.2 (New)**

**Proposed Change as Submitted**

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

**Add text as follows:**

**M1501.2 Transfer air.** Air transferred from occupiable spaces, other than kitchens, bathrooms and toilet rooms, shall not be prohibited from serving as makeup air for exhaust systems. Transfer openings between spaces shall be of the same cross-sectional area as the free area of the makeup air openings. Where louvers and grilles are installed, the required size of openings shall be based on the net free area of each opening. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers have 25-percent free area and metal louvers and grilles have 75-percent free area.

**Reason:** The IMC contains language allowing makeup air to be provided from areas other than the room where the exhaust system is located (transfer air). It is just as important to clarify the allowable use of transfer air for exhaust systems in the IRC as it is in the IMC. Without this provision, Section M1503.4 can be interpreted that the total amount of makeup air is required to be introduced in the direct vicinity of the exhaust. This is not required in commercial construction, and so the IRC should be brought into alignment with the IMC in this area.

Most of the language is taken from existing sections of the code. They include: Transfer air: IMC Section 403; Transfer openings: Section M1602 Item 6; and Louvers and grilles: Section G2407.10.

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

M1501.2-RM-BUUCK.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text is difficult to comprehend. Calculations should have been submitted to illustrate. The intent to state that outdoor air can be delivered to other than the kitchen is not clear.

**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, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

~~**M1501.2 Transfer air.** Air transferred from occupiable spaces, other than kitchens, bathrooms and toilet rooms, shall not be prohibited from serving as makeup air for exhaust systems. Transfer openings between spaces shall be of the same cross-sectional area as the free area of the makeup air openings. Where louvers and grilles are installed, the required size of openings shall be based on the net free area of each opening. Where the design and free area of louvers and grilles are not known, it shall be assumed that wood louvers have 25-percent free area and metal louvers and grilles have 75-percent free area.~~

**M1503.4.1 Location** Kitchen exhaust makeup air shall be discharged into the same room in which the exhaust system is located or into rooms or duct systems that communicate through one or more permanent openings with the room in which such exhaust

system is located. Such permanent openings shall have a net cross-sectional area not less than the required area of the makeup air supply openings.

**Commenter's Reason:** The reason proposal RM27 on Transfer Air was disapproved by the committee in Dallas was that it felt the text was too complicated. This public comment would accomplish the same thing with language that better fits the IRC. The provision is also being relocated to the range hood section, because it is meant to deal solely with kitchen exhaust makeup air.

The concern driving this code change is that kitchen exhaust makeup air has only been a commercial concept until fairly recently. Makeup air in a commercial kitchen has very specific requirements which are not necessary in a residential setting. For example, the makeup air opening in a commercial kitchen needs to be located in the direct vicinity of the draft hood. Homeowners, however, have valid reasons for not wanting the opening in the kitchen, including comfort, practicality, and aesthetics. Locating the opening in another room or bringing the makeup air in through the duct system allows the unconditioned air to mix and temper which is vital in harsher climates. When these openings are required in the kitchen, there is a much greater possibility that they will be covered or otherwise disabled.

**RM27-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

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**RM31-13**  
**202, M1503.4**

**Proposed Change as Submitted**

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

**Add new definitions as follows:**

**AIR, MAKEUP.** Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration

**AIR, OUTDOOR.** 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 resulting from wind, indoor/outdoor temperature differences 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 resulting from wind, indoor/outdoor temperature differences and imbalances between supply and exhaust airflow rates.

**Revise text as follows:**

**M1503.4 Makeup air required.** ~~Kitchen Exhaust hood~~ systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m<sup>3</sup>/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 not less than one motorized damper a means of closure and that shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system.

**Exception:** Intentional openings for makeup air are not required for kitchen exhaust systems capable of exhausting not greater than 600 cubic feet per minute provided that one of the following conditions is met:

1. Where the floor area within the air barrier of a dwelling unit is at least 1500 square feet, and where natural draft or mechanical draft space-or water-heating appliances are not located within the air barrier.
2. Where the floor area within the air barrier of a dwelling unit is at least 3000 square feet, and where natural draft space-or water-heating appliances are not located within the air barrier.

**Reason:** The language in 1503.4 is confusing and needs to be reworked. This proposal accomplishes the following. Detailed rationale follows the bullets.

- Recognizes that makeup air (MUA) requirements are indifferent to the type of exhaust system (same MUA requirements should apply whether it's a hood, down draft, through the wall vent, or any other type)
- Clarifies where MUA comes from (transfer and outdoor air), and updates definitions to align with IMC
- Clarifies what type of MUA system should be specified (at a minimum, one motorized, automatically controlled damper)
- Provides an exception to relax the MUA requirements where the home is assumed to have sufficient natural infiltration to minimize the chance of backdrafting for the combustion appliances within the air barrier.

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, several definitions from the 2015 IMC are inserted clarify how the MUA system operates – things like where the MUA comes from, where the air must be introduced, etc. These definitions are also aligned with ASHRAE 62.

Third, this change clarifies the minimum required component of a MUA system (at least one motorized damper). A motorized damper is required because gravity dampers 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.

Fourth, MUA should not be required where the home is deemed sufficiently leaky to minimize the chance of backdrafting for the combustion appliances within the air barrier. This exception assumes that mechanical draft combustion appliances can be operated safely to a pressure of -15 Pascals, and that direct vent appliances can be operated safely to a pressure of -50 Pascals. It also assumes that the home has a leakage of 3 ACH 50 and that there is good pressure distribution throughout the home. Ceiling height is assumed to be 8.5 ft. Equations used to estimate building leakage at the pressures of -15 Pa and -50 Pa were sourced from 2009 ASHRAE Fundamentals 16.15 (equations 41, 43 assuming a pressure exponent of 0.65).

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](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](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>.
- 2009 ASHRAE Handbook of Fundamentals.

**Cost Impact:** This proposal has the potential to reduce the cost of construction by adding exceptions for MUA requirements when a dedicated MUA system is not needed.

M1503.4#1-RM-MOORE.DOC

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** Disapproval is based upon the preference for RM34 which allows a gravity damper. The proposed definitions are vague.

**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:** The committee disapproved this proposal in deference to RM34, which specifically approved gravity dampers for makeup air. Please cross reference my public comment on RM34 which explains why the committee got this one wrong, and why gravity dampers for makeup air are generally a bad solution that can pose a threat to life safety.

In keeping with the original intention of this section of the code, RM31 prohibits gravity dampers for kitchen exhaust makeup air. In addition to taking this measure to safeguard the life safety of occupants, RM31 introduces several improvements to this section that accomplish the following.

1. Recognizes that makeup air (MUA) requirements are indifferent to the type of exhaust system (same MUA requirements should apply whether it's a hood, down draft, through the wall vent, or any other type)
2. Clarifies where MUA comes from (transfer and outdoor air), and updates definitions to align with IMC
3. Clarifies what type of MUA system should be specified (at a minimum, one motorized, automatically controlled damper)
4. Provides an exception to relax the MUA requirements where the home is assumed to have sufficient natural infiltration to minimize the chance of back drafting for the combustion appliances within the air barrier.

Detailed rationale for the previous four bullets is as follows:

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, several definitions from the 2015 IMC are inserted to clarify how the MUA system operates – things like where the MUA comes from, where the air must be introduced, etc. These definitions are also aligned with ASHRAE 62, and are important because they provide code officials, builders, and contractors with a better understanding and terminology for MUA.

Third, this change clarifies the minimum required component of a MUA system (at least one motorized damper). A motorized damper is required because gravity dampers 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 ACCA Manual D, 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.

Fourth, MUA should not be required by a minimum code when the home is deemed sufficiently leaky to minimize the chance of back drafting for the combustion appliances within the air barrier. This exception assumes that mechanical draft combustion appliances can be operated safely to a pressure of -15 Pascals, and that direct vent appliances can be operated safely to a pressure of -50 Pascals. It also assumes that the home has a leakage of 3 ACH 50 and that there is good pressure distribution throughout the home. Ceiling height is assumed to be 8.5 ft. Equations used to estimate building leakage at the pressures of -15 Pa and -50 Pa were sourced from 2009 ASHRAE Fundamentals 16.15 (equations 41, 43 assuming a pressure exponent of 0.65).

**References:**

- ACCA. 2009. *Residential Duct Systems. Manual D*. Air Conditioning Contractors of America. Washington, DC.
- 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](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](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>.
- 2009 ASHRAE Handbook of Fundamentals.

**RM31-13**

Final Action:                    AS                    AM                    AMPC \_\_\_\_\_                    D

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# RM33-13

## M1503.4

### Proposed Change as Submitted

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

**Revise as follows:**

**M1503.4 Makeup air required.** Exhaust hood systems capable of exhausting in excess of ~~400~~ 600 cubic feet per minute (0.19 m<sup>3</sup>/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.

**Reason:** The threshold for makeup air was originally set at 400 cfm, because it was believed that most residential kitchen exhaust systems fall below that number. Many down-draft exhaust systems, however, are rated between 400 and 600 cfm, penalizing homeowners who prefer these systems by adding a lot of cost and complexity to their homes. Everyone can agree that there are certain 'monster' exhaust hoods (e.g. 1200 cfm) that need makeup air, but the current threshold is set too low.

The PMG CAC supported this change for the IMC during the Group A Final Action Hearings.

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

M1503.4-RM-BUUCK.DOC

### Committee Action Hearing Results

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed increase to 600 cfm will increase the possibility of depressurization that could result in CO poisoning. The proposed text requires makeup air for the entire exhaust rate, as opposed to just the amount that is in excess of 400.

**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, CBO, representing National Association of Home Builders (NAHB), requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M1503.4 Makeup air required.** Exhaust hood systems capable of exhausting ~~in excess of 600~~ more than 400 cubic feet per minute (0.19 m<sup>3</sup>/s) shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 400 cubic feet per minute. 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.

**Exception:** Where all appliances in the house are direct-vent, power-vent, unvented, or electric, makeup air shall be provided where exhaust fans are capable of exhausting more than 600 cubic feet per minute (0.28 m<sup>3</sup>/s). Exhaust hood systems capable of exhausting more than 600 cubic feet per minute shall be provided with makeup air at a rate approximately equal to the exhaust air rate that is in excess of 600 cubic feet per minute.

**Commenter's Reason:** As originally written in the 2009 IRC, 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 and potential occupant discomfort caused by needlessly introducing excessive amounts of unconditioned air.

Currently this section of the code does not take into effect the difference between homes where all appliances in the home are of sealed combustion, power-vent, unvented or electric, power and those which contain one or more naturally vented appliances. Because the potential for appliance back drafting is greatly reduced where naturally vented appliances are not present, the 400 cfm threshold can be raised to 600 cfm where only sealed combustion, power-vent, unvented, or electric, power appliances are used in the dwelling. This would allow for the use of more effective, common residential 500 to 600 cfm down-draft exhaust fans without the need to unnecessarily add makeup air.

**RM33-13**

Final Action:                   AS                   AM                   AMPC\_\_\_\_\_                   D

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**RM34-13**  
**M1503.4**

**Proposed Change as Submitted**

**Proponent:** Dan Buuck, National Association of Home Builders (NAHB); David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1503.4 Makeup air required.** Exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m<sup>3</sup>/s) 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 not less than one damper. Each damper shall be a gravity damper or an electrically operated damper that automatically opens when the exhaust system operates means of closure and shall be automatically controlled to start and operate simultaneously with the exhaust system. Dampers shall be accessible for inspection, service, repair and replacement without removing permanent construction or any other ducts not connected to the damper being inspected, serviced, repaired or replaced.

**Reason:** The first change adds the words 'mechanically or naturally'. It is important to explicitly state that both mechanical ventilation (i.e. a fan) and natural ventilation (i.e. a passive opening) is allowed by this provision for the following reasons. First of all, it is not being interpreted the same in all jurisdictions. Secondly, there is no precedence for mechanical makeup air in the IRC. The second change deals with the type of damper that is allowed. The only reason to require a 'means of closure' to the makeup air system is to limit the amount of conditioned air that leaves the building when the exhaust is not running. Both electrically-operated and gravity dampers achieve this goal, and it is important to clarify that both are allowed. Again, it is not being interpreted the same in all jurisdictions. (Some are allowing gravity dampers, but not all.) Secondly, allowing a gravity damper is in keeping with similar applications within the IRC—nowhere are automatic (motorized) dampers required for makeup or ventilation air. Finally, a gravity damper has the added benefit of equalizing depressurization in the house for any other reason (e.g. bath fans and clothes dryers). The last sentence was taken and modified from Section M1305.1 on appliance access. It emphasizes that both types of dampers, gravity and motorized, require maintenance and may need to be replaced at some time.

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

M1503.4-RM-BUUCK-HALL-PMGCAC

**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was based upon the proponent's published reason. Running the exhaust fan at less than full speed will allow the gravity damper to open partially, thereby limiting the entry of outdoor air.

**Assembly Action:**

**None**

**Individual Consideration Agenda**

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

*Public Comment 1:*

**Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.**

**Commenter's Reason:** This was not approved by the mechanical committee. Sustaining the committee action will only cause confusion and inconsistent enforcement. Not striking the word "hood" does not capture downdraft systems. Gravity dampers are unreliable as everything affects them. They are subject to pressure differentials that renders them unreliable. Running the fan at lower speeds does not assure the damper will partially open if at all as one committee member stated. Gravity dampers will permit

unwanted air to come in under many conditions when the fan is not operating that will be very undesirable in hot humid locations and in cold climates. The point of the original text was to make sure the damper is only open when the fan is operating, *not when the wind is blowing*. This can only be achieved with an electrically powered damper and will be much more effective.

**Public Comment 2:**

**Mike Moore, Newport Ventures, representing Broan-NuTone, requests Disapproval.**

**Commenter's Reason:** In its current form, M1503.4 does not permit gravity dampers to be used in makeup air systems, and for good reason. Makeup air dampers must be able to operate at very low depressurization levels to ensure that combustion appliances like water heaters and furnaces do not back draft when a large range hood is operating. For example, Appendix 14 of ACCA Manual D states, "Properly vented combustion equipment can back draft when the space pressure is as small as -1 to -5 Pascals."

Unfortunately, gravity dampers for residential applications are rarely provided with data on the minimum depressurization level required for them to open.\* Without consistent data on operation of gravity dampers as a function of depressurization, and with no code requirements for the minimum depressurization level at which gravity dampers must operate, approving gravity dampers could introduce a life safety risk in tight homes with combustion appliances and large kitchen exhaust systems; therefore, this proposal should be disapproved.

*\*To determine what data are available on non-motorized damper operation (e.g., "gravity", "static pressure regulating", "fresh air intake", "barometric", "pressure relief" etc.), we reviewed the installation manuals of 30 products from 7 manufacturers that are available through the nation's largest HVACR distributor's website. Of these, only 7 products were provided with data on the pressure differential at which the damper would begin to open, with an average of 17 Pascals across the products with published data. This cut-in operation pressure is over 3 times the recommended depressurization limit for combustion appliances according to ACCA!*

Here's an example of a gravity damper that would be approved if RM34 is approved. Can you guess what depressurization level is required to open this damper? If you don't know the answer, then RM34 should be disapproved.



Images: Contractor-made gravity damper that came off a single family home built in 2000. Notice the canvas hinge (picture on right) attached with rivets (shown on left). It's clever, but I wouldn't count on it for life safety.



**RM34-13**

Final Action:

AS

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D

## RM35-13 M1503.4

### Proposed Change as Submitted

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

**Revise as follows:**

**M1503.4 Makeup air required.** Kitchen exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. ~~Such Gravity or mechanical~~ makeup air systems shall be equipped with a motorized means of closure and shall be automatically controlled to ~~start and~~ operate simultaneously with the exhaust system

**Reason:** This proposal clarifies that the makeup air systems may be mechanical or gravity depending on the designer's preferences. This also clarifies that in either case, a motorized damper will be required to ensure a positive means of closure. Striking the word "hood" captures downdraft equipment which could be construed as not being included.

**Cost Impact:** None

M1503.4-RM-MCMANN.DOC

### Committee Action Hearing Results

**Committee Action:**

**Disapproved**

**Committee Reason:** Motorized dampers should not be the only option. The term "naturally" implies infiltration which is inappropriate. One remedy can't cover all conditions.

**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:**

**M1503.4 Makeup air required.** Kitchen exhaust systems capable of exhausting in excess of 400 cubic feet per minute (0.19 m3/s) shall be mechanically or naturally provided with makeup air at a rate approximately equal to the exhaust air rate. ~~Gravity or mechanical~~ Makeup air systems shall be equipped with not less than one a motorized damper means of closure and that shall be automatically controlled to operate simultaneously with the exhaust system.

**Commenter's Reason:** The committee made a mistake at the Dallas hearings in approving gravity dampers for makeup air. This change is needed to clarify that gravity dampers are not an appropriate solution for makeup air for the following reasons:

1. The pressure differentials at which combustion appliances are expected to back draft are very low (-1 to -5 Pascals; -0.004 to -0.020 inches of water column)\*, and code officials have no guarantee that gravity dampers will work at these low depressurization levels required to avoid back drafting of combustion appliances.
2. Few manufacturers provide any data on operation of gravity dampers, and where provided, results typically show that the gravity dampers do not open at the low depressurization levels required to avoid back drafting of combustion appliances.\*\*

3. The original intention of this section was to require motorized dampers, as per conversation with the original proponent of M1503.4 in an ICC PMG CAC committee conference call on June 4, 2013.

*\* Appendix 14 of ACCA Manual D states, "Properly vented combustion equipment can back draft when the space pressure is as small as -1 to -5 Pascals."*

*\*\*To determine what data are available on non-motorized damper operation (e.g., "gravity", "static pressure regulating", "fresh air intake", "barometric", "pressure relief" etc.), we reviewed the installation manuals of 30 products from 7 manufacturers that are available through the nation's largest HVACR distributor's website. Of these, only 7 products were provided with data on the pressure differential at which the damper would begin to open, with an average of 17 Pascals across the products with published data. This cut-in operation pressure is over 3 times the recommended depressurization limit for combustion appliances according to ACCA Manual D!*

**RM35-13**

Final Action:

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D

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**RM36-13**  
**M1506, M1507, and Chapter 44**

**Proposed Change as Submitted**

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

**Revise as follows:**

**M1506.1 Ducts construction.** Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

**M1506.2. Duct length.** The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

**Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

**M1506.23 Exhaust openings.** Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

**TABLE M1506.2**  
**DUCT LENGTH**

Duct Type	Flex Duct								Smooth-Wall Duct							
	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Fan Airflow Rating CFM @ 0.25 in. wc <sup>1</sup>	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter <sup>2</sup> in.	Maximum Length <sup>3,4,5</sup> ft.															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
3. This table assumes that elbows are not used. Fifteen feet (5 m) of allowable duct length shall be deducted for each elbow installed in the duct run.
4. NL = no limit on duct length of this size.
5. X = not allowed. Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

**M1507.1 General.** Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

**M1507.2 Flow Rate Verification.** The flow rate for ventilating equipment shall be verified in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or the flow rate shall be verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

**Add new standard to Chapter 44 as follows:**

ANSI/AMCA 210-ANSI/ASHRAE 51-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

**Reason:** Section M1507 establishes the minimum design flow rates required for local exhaust and whole house mechanical ventilation (WHMV) fans. However, field tests of ventilating fans often show that actual flow rates fall short of design. Failure of fans to meet design rates can generally be attributed to one of two reasons: either the ductwork is poorly matched to the fan, or the fan's actual airflow does not match its label (i.e., has not been verified via a standardized laboratory test). By providing a prescriptive duct sizing table, this proposal takes the guess work out of whether a fan should operate per the design rate. By requiring that either the fan flow rate be verified by the manufacturer in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or be field verified by the installer or approved third party, this proposal provides a minimum level of quality assurance and control to the installation of ventilation fans.

The proposed table is taken directly from ASHRAE 62.2-2010, addendum F. Confirmation that a ventilation fan's flow rate is in compliance with ANSI/AMCA 210-ANSI/ASHRAE 51 is as simple as looking for an HVI sticker in the fan housing. Ventilating fans exceeding the maximum CFM in Table M1506.2 would comply with Section M1506.2 by using the exception (i.e., installing ducts in accordance with the manufacturer's design criteria or by field confirmation of the flow rate).

**Cost Impact:** Incremental costs associated with this proposal are expected to be minimal to zero, since this proposal reflects the minimum design practice needed to ensure that installed rates match design rates.

**Analysis:** A review of the standard proposed for inclusion in the code, [ANSI/AMCA 210-ANSI/ASHRAE 51-07] 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 1, 2013.

M1506.2 (NEW)-RM-MOORE.DOC

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The table is confusing as it appears that smooth-wall ducts are not allowed to be longer than flex ducts. Verification of flow rates will be difficult for code officials.

**Assembly Action:**

**None**

## Individual Consideration Agenda

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

### Public Comment 1:

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

Modify the proposal as follows:

### SECTION M1506 EXHAUST DUCTS AND EXHAUST OPENINGS

**M1506.1 Duct construction.** Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

**M1506.2. Duct length.** The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

**Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

**M1506.3 M1506.2 Exhaust openings.** Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

**M1507.1 General.** Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

**M1507.2 Flow Rate Verification.** The flow rate for Ventilating equipment shall be verified listed and labeled in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51, or the flow rate of the installed system shall be verified by the installer or an approved third party using a flow hood, flow grid, or other airflow measuring device.

**TABLE M1506.2  
DUCT LENGTH**

Duct Type	Flex Duct									Smooth Duct							
	Fan Airflow Rating CFM @ 0.25 in. wg <sup>1</sup>	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter <sup>2</sup> in.	Maximum Length <sup>3,4,5</sup> ft.																
3	X	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	X	114	34	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X	
6	NL	NL	158	91	55	18	4	X	NL	NL	NL	168	112	53	25	9	
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54	
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133	

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.

2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.

3. This table assumes no elbows. Deduct 15 feet (5 m) of allowable duct length for each elbow.
4. NL = no limit on duct length of this size.
5. X = not allowed, any length of duct of this size with assumed turns and fitting will exceed the rated pressure drop.

## CHAPTER 44 REFERENCED STANDARDS

### Add new standard as follows:

ANSI/AMCA 210-ANSI/ASHRAE 51, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

**Commenter's Reason:** This proposal is intended to ensure that ventilating fans are factory or field tested to achieve minimum ventilation flow rates. By requiring that either the fan flow rate be listed and labeled in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or be field verified by the installer or approved third party, this proposal provides a minimum level of quality assurance and control to the specification of ventilating fans.

After receiving committee input in Dallas, this public comment improved upon the original proposal by making the following changes:

- Removed the maximum duct length table, which the committee found to be confusing
- Removed reference to "exhaust and supply" ducts, since this section only applies to exhaust ducts.
- Inserted clarification for code officials that fans shall be "listed and labeled" in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51. Listing and labeling of these products is currently maintained by the Home Ventilating Institute.

The Home Ventilating Institute is an example of an organization that for the past 4 decades has maintained a list of ANSI/AMCA 210-ANSI/ASHRAE 51 compliant range hoods and fans for bathrooms and toilet rooms in its certified products directory, which is freely available to the public (<http://www.hvi.org/proddirectory/index.cfm>) and contains over 3000 listings. For fans that are HVI certified to ANSI/AMCA 210-ANSI/ASHRAE 51, confirmation that the flow rate is in compliance with ANSI/AMCA 210-ANSI/ASHRAE 51 is as simple as looking for an HVI sticker in the fan housing.

### *Public Comment 2:*

#### **Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.**

### Modify the proposal as follows:

**M1506.1 Duct construction.** Where exhaust duct construction is not specified in this chapter, construction shall comply with Chapter 16.

**M1506.2. Duct length.** The length of exhaust and supply ducts used for ventilating equipment shall not exceed the maximum lengths determined in accordance with Table M1506.2.

**Exception:** Duct length shall not be limited where the duct system complies with the manufacturer's design criteria or where the flow rate of the installed ventilating equipment is verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.

**M1506.3 Exhaust openings.** Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

**TABLE M1506.2  
DUCT LENGTH**

Duct Type	Flex Duct								Smooth-Wall Duct							
	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Fan Airflow Rating CFM @ 0.25 in. wc <sup>1</sup>																
Diameter <sup>2</sup> in.	Maximum Length <sup>3,4,5</sup> ft.															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

1. Fan airflow rating shall be in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.
2. For non-circular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
3. This table assumes that elbows are not used. Fifteen feet (5 m) of allowable duct length shall be deducted for each elbow installed in the duct run.
4. NL = no limit on duct length of this size.
5. X = not allowed, Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

**M1507.1 General.** Where local exhaust or whole-house mechanical ventilation is provided, the equipment shall be designed in accordance with this section.

~~**M1507.2 Flow Rate Verification.** The flow rate for ventilating equipment shall be verified in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51 or the flow rate shall be verified by the installer or approved third party using a flow hood, flow grid, or other airflow measuring device.~~

ANSI/AMCA 210-ANSI/ASHRAE 51-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

**Commenter's Reason:** The committee felt that verifying the flow rate would be difficult for code enforcement personnel. The only other concern was with the table which was printed such that it was hard to read in the original proposal.

The committee reason for recommending disapproval was based on the fact that the proposed table was printed with some numbers offset such that it was difficult to read. They also felt that the code official would not be able to verify the fan flow rates. Fans are labeled by HVI which demonstrates that the fan flow rate specified by the manufacturer is accurate. The offset numbers in the table have been corrected as shown in this public comment. Without this text, exhaust fans will continue to be installed with ducts that will not allow the fan to reach its intended flow rate. A 50 cfm fan with high resistance ductwork might exhaust only a small fraction of the 50 cfm. Installing the proper size fan is pointless if the proper size and length of ductwork is not connected to it.

**RM36-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

**RM37-13, Part I**  
**202, M1506.2**

**Proposed Change as Submitted**

**THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IRC-PLUMBING AND MECHANICAL COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.**

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

**PART I - IRC MECHANICAL**

**Add new definition as follows:**

**ENVIRONMENTAL AIR.** Air that is conveyed to or from occupied areas through ducts that are not part of the heating or air-conditioning system, such as ventilation for human usage, domestic kitchen range exhaust, bathroom exhaust and domestic clothes dryer exhaust.

**Revise text as follows:**

**M1506.2 Exhaust openings.** Air exhaust openings shall terminate not less than 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building and 10 feet (3048 mm) from mechanical air intakes except where the opening is located 3 feet (914 mm) above the air intake. Openings shall comply with Sections R303.5.2 and R303.6.

**Cost Impact:** No impact.

M1506.2-RM-MOORE.DOC

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**Committee Action Hearing Results**

**PART I – IRC – Mechanical**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** The proposed text is consistent with the IMC.

**Assembly Action:**

**None**

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**Individual Consideration Agenda**

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

*Public Comment 1:*

**Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.**

**Commenter's Reason:** It makes perfect sense for exhaust requirements to be located in the exhaust chapter. This requirement was installed in this chapter a few cycles ago and is a convenient location for the user.

*Public Comment 2:*

**Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.**

**Commenter's Reason:** RM37 is presented as a two-part proposal but approval of one part without the other would duplicate or completely remove the separation requirements for environmental exhaust.

If Part I is disapproved and Part II is approved, the separation requirements will exist in both M1506.2 and R303.5.2 and this would add unnecessary language to the code.

If Part I is approved and Part II is disapproved, the text that's been deleted in Part I won't exist in R303.5.2.

There are at least two important reasons Part II should not be approved, so the consequences of approving Part II should be carefully evaluated prior to voting in support of Part I.

**RM37-13, Part I**

Final Action:           AS                   AM                   AMPC \_\_\_\_           D

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## RM37-13, Part II

### R303.5, R303.5.1, R303.5.2

#### Proposed Change as Submitted

**THIS IS A 2 PART CODE CHANGE. BOTH PARTS WILL BE HEARD BY THE IRC-PLUMBING AND MECHANICAL COMMITTEE AS 2 SEPARATE CODE CHANGES. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEE.**

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

#### **PART II - IRC BUILDING**

**R303.5 Opening location.** Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

**R303.5.1 Intake openings.** Mechanical and gravity outdoor air intake openings shall be located a minimum of 10 feet (3048 mm) from any hazardous or noxious contaminant source, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in this code. Where a ~~source of~~ contaminant source is located within 10 feet (3048 mm) of an intake opening, such opening shall be located not less than 3 feet (914 mm) below the contaminant source. For the purpose of this section, environmental air other than domestic clothes dryer exhaust ~~the exhaust from dwelling unit toilet rooms, bathrooms and kitchens~~ shall not be considered as hazardous or noxious.

**R303.5.2 Exhaust openings.** Exhaust air shall not be directed onto walkways. Air exhaust openings shall terminate not less than: 3 feet (914 mm) from property lines; 3 feet (914 mm) from operable and nonoperable openings into the building; and 10 feet (3048 mm) from mechanical air intakes except where the exhaust opening is located not less than 3 feet (914 mm) above the air intake.

**Exception:** The minimum termination distances from the building's operable openings, nonoperable openings, and mechanical air intakes shall not be required where the exhaust source is environmental air other than domestic clothes dryer exhaust.

**Reason:** The language on exhaust and intake openings is redundant and confusing in that it is spread throughout the code, and permits exhausts to be located near intakes but does not permit intakes to be located near exhausts. This change seeks to simplify the language, reorganize into one section, and ensure that the allowances for intakes are consistent with the allowances for exhaust. Improvements include the following:

1. Include exhaust from occupied areas among the list of non-hazardous exhaust. R303.5.1 states that exhaust from toilet rooms, bathrooms, and kitchens shall not be considered as hazardous. This list is not comprehensive, notably excluding exhaust from occupied areas like living rooms or bedrooms, which are likely to contain even less contaminants than exhaust from toilet rooms, bathrooms, and kitchens. To fix this, I've borrowed the definition of "Environmental Air" from the IMC and excluded clothes dryer exhaust and parking garage exhaust, since this section does not currently permit these.
2. Move the text of M1506.2 to R303.5.2, and reduce the text of M1506.2 to a reference.
3. Add an exception to R303.5.2 that aligns with the language in R303.5.1. To simplify, the code currently states that A can be close to B, but B can't be close to A, which doesn't make sense. R303.5.1 specifically eliminates the minimum separation distance between intakes and exhaust terminations of toilet rooms, bathrooms, or kitchens. However, M1506.2 still states that all exhaust terminations must still observe minimum separation distances from intakes. Adding the exception to R303.5.2 brings consistency to these two sections.

**Cost Impact:** No impact.

M1506.2-RM-MOORE.DOC

## Committee Action Hearing Results

**PART II – IRC – Building  
Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was based upon the proponent's published reason. The proposed text provides design flexibility for exhaust outlet locations.

**Assembly Action:**

**None**

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### Individual Consideration Agenda

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

*Public Comment 1:*

**Guy McMann, Jefferson County Colorado, representing Colorado Association of Plumbing and Mechanical Officials (CAPMO), requests Disapproval.**

**Commenter's Reason:** It makes perfect sense for exhaust requirements to be located in the exhaust chapter. This requirement was installed in this chapter a few cycles ago and is a convenient location for the user.

*Public Comment 2:*

**Paul Rimel, City of Staunton, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.**

**Commenter's Reason:** This proposal would radically change the current requirements by permitting zero separation from domestic range and bathroom exhaust to both mechanical and gravity intake openings. The exception to R303.5.2 would literally allow an exhaust outlet from a kitchen or bathroom to be directly adjacent to a mechanical air intake or operable/nonoperable opening with no vertical separation required between the two. As a point of reference, Section 501.3.1 (#3) of the 2012 IMC has the same separation distances as the text being relocated from M1506.2 to R303.5.2 however, the IMC has no exception because those distances are intended to apply to all environmental exhaust outlets without any further reduction. This exception has never appeared in any ICC code previously and it should not be added now.

Just because the exhaust from a range hood or bath fan isn't considered hazardous or noxious, that doesn't mean the minimum distance from a mechanical air intake should change from 10 feet horizontal (or 3 feet vertical) to zero or, that the minimum distance from an operable or nonoperable opening should change from 3 feet (either horizontally or vertically) to zero.

The 4<sup>th</sup> sentence of bullet point #3 in the reason statement is misleading in that it states "M1506.2 still states that all exhaust terminations must still observe minimum separation distances from intakes." M1506.2 has been reduced to no more than a reference but more importantly, the text moved from there to R303.5.2 now includes a brand new exception that completely eliminates all separation requirements for domestic range and bath fan exhausts!

Additionally, Part I of this proposal includes domestic clothes dryer exhaust in the definition of environmental air but Part II excludes dryer exhaust from the less stringent separation requirements that apply to other non-hazardous exhaust terminations. If clothes dryer exhaust is not hazardous or noxious by definition, then why should it be subject to more restrictive separation distances than other types of environmental exhaust? The new text in the last sentence of R303.5.1 "environmental air other than domestic clothes dryer exhaust" implies that dryer exhaust is hazardous or noxious which would likely cause many users of the code to incorrectly apply the more stringent requirements of R303.5.1 to clothes dryer exhaust instead of the correct but somewhat obscure requirements located in M1502.3. This is especially true for those who support the popular notion that all intake/exhaust requirements should be consolidated into a single location in Chapter 3.

In the majority of cases, it would be very difficult to terminate a clothes dryer exhaust at least 10 feet horizontally or 3 feet vertically from all building openings in conventional residential construction and the common practice of terminating through a ground floor band board would be virtually eliminated in houses without basements due to the proximity of nearby crawlspace vents. There is no precedent in the code that deems domestic clothes dryer exhaust to be hazardous or noxious and the proponent has offered no reason or supporting data that indicates dryer exhaust should be treated any differently than other types of environmental air. This is obviously not the intent of the definition proposed in Part I since that definition makes no such distinction.

**RM37-13, Part II**

Final Action:                      AS                      AM                      AMPC\_\_\_\_                      D

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**RM38-13**  
**M1506.2**

**Proposed Change as Submitted**

**Proponent:** Mike Winkler, Chair of the IRC Interpretations Committee, representing our committee

**Revise as follows:**

**M1506.2 Exhaust openings. Location of exhaust outlets.** Air Exhaust ~~air- openings~~ outlets shall terminate not less than 3 feet (914mm) from property lines. Exhaust air outlets shall terminate not less than 3 feet from operable and non-operable openings that have the potential for allowing exhaust air back into the building, except where the exhaust air outlet is located not less than 3 feet (914mm) above such openings. ~~and Exhaust air outlets shall terminate not less than 10 feet (3048mm) from mechanical air intakes, except where the exhaust air outlet opening is located not less than 3 feet (914mm) above the mechanical air intake.~~

**Reason:** The IRC interpretation committee is attempting to revise the language for two reasons. First, to have the title be consistent with the IMC and second, to clarify the intent. The IRC interpretation committee received a request for a formal interpretation and could not reach a consensus regarding what exactly the current text requires. A "non-operable" opening could be viewed as a fixed louver or as a fixed glass window panel. Neither can be operated but one will let air into the building and the other will not.

The text is also revised so that the terms "opening" and "exhaust air outlet" are used consistently throughout the section. The current text stated *opening* where it meant *exhaust outlet* near the end of the 1<sup>st</sup> sentence. The exhaust outlets are now clearly distinct from the "openings", since "opening" in this context refers to air intake openings. The current text stated that exhaust openings had to be exactly 3 feet above the air intake, so, if it was 4 feet above, the allowance would not apply. The text was poorly formatted in a long run-on sentence which made it unclear if the exception for being 3 foot above applied only to the mechanical air intakes or if it also applied to other openings that could let exhaust back into the building. Breaking the run-on sentence into separate thoughts makes it perfectly clear that it applies in both cases. The proposed revisions mean to clarify what the interpretation committee believes to be the actual intent of this section, as well improve to readability of the text overall.

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

M1506.2-RM-WINKLER.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** Approval of RM37 Parts I and II makes this proposal unnecessary.

**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:**

**M1506.2 Location of exhaust openings.** Exhaust air outlets shall terminate as follows:

1. Not less than 3 feet (914 mm) from property lines.
2. Not less than 3 feet (914 mm) from air intake openings into the building, including doors, louvers and grilles and operable windows.

3. Not less than 10 feet (3048 mm) from mechanical air intake openings except where the exhaust air outlet is located not less than 3 feet (914 mm) above the mechanical air intake opening.

~~**M1506.2 Location of exhaust outlets.** Exhaust air outlets shall terminate not less than 3 feet (914mm) from property lines. Exhaust air outlets shall terminate not less than 3 feet from openings that have the potential for allowing exhaust air back into the building, except where the exhaust air outlet is located not less 3 feet (914mm) above such openings. Exhaust air outlets shall terminate not less than 10 feet (3048mm) from mechanical air intakes, except where the exhaust air outlet is located not less than 3 feet (914mm) above the mechanical air intake.~~

**Commenter's Reason:** The committee disapproved RM38 because they thought that RM37 accomplished the same thing and they approved RM37. However, RM38 intended to clarify what is meant by "operable and non-operable" openings and RM37 did not do this. RM38 is needed regardless of what happens to RM37, as they have different intents.

By approving this proposal as modified, the structure of the language within R303.5.2 is improved and clarified, and the requirement that prohibits exhaust terminals from being located near inoperable windows is removed.

**RM38-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_\_                    D

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**RM39-13**  
**M1506.3 (New)**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Add new text as follows:**

**M1506.3 Exhaust fans.** Exhaust fans shall not discharge through common ducts.

**Reason:** Some installers attempt to join the outlets of two or more bathroom exhaust fans into a common discharge duct. This presents multiple problems including: 1) The common duct is typically undersized which prevents the fans from achieving their intended flow rate. 2) The backdraft dampers in such fans are not designed to be airtight or to prevent reverse flow from other fans. The result is that discharge from one fan is pushed back through any fan that is not operating. 3) The fan manufacturers provide no guidance for this nor do they recommend the practice. 4) The tees used for such arrangements often create flow resistance and direct the flow such that the air streams oppose each other. 5) If fans in different dwelling units were joined to a common duct, there would be direct communication between the two dwellings.

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

M1506.3 (NEW)-RM-HALL-PMGCAC

**Committee Action Hearing Results**

**Committee Action:**

**Approved as Modified**

**Modify the proposal as follows:**

**M1506.3 Exhaust fans.** The discharge from two or more exhaust fans shall not be combined in a common duct.

**Committee Reason:** Approval was based upon the proponent's published reason. The modification clarifies that a central fan with multiple inlets is allowed. The intended prohibition is the connecting together of the discharge side of 2 or more fans. As modified, the proposal will not increase the number of roof penetrations.

**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 Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.**

**Commenter's Reason:** This new code section will remove a perfectly acceptable design system that has not been proven to be a problem either in the past or the present. When a system is designed properly (duct sizing, fittings, and backdraft dampers), all of the problems associated with the original proponents reason statement are eliminated. The way to prevent problems associated with an installation is not to eliminate the option for the design, but to educate the installer as to the design criteria during the inspection process.

Additionally, if this language is approved, it will eliminate the ability to provide one common opening through the exterior of a dwelling unit for exhaust, or more simply put, require many additional openings to be cut into the exterior envelope, ensuring additional energy waste associated with this installation.

The CAH proposal for this code change stated that the following for the cost impact: "The code change proposal will not increase the cost of construction." What this statement failed to include was what the cost impact would be to the homeowner after requiring multiple holes to be installed in their thermal envelope rather than only one hole, or what additional heat losses and gains are associated with these "holes", and the cost impact on the HVAC equipment meant to offset this requirement. There WILL be a cost associated with this requirement.

**RM39-13**

Final Action:                   AS                   AM                   AMPC\_\_\_\_\_                   D

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# RM40-13

## M1507.3

### Proposed Change as Submitted

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

#### **Add new text as follows:**

**M1507.3 Sound Ratings.** Ventilation fans shall have a sound performance in accordance with the following:

1. For whole-house or continuous ventilation fans: maximum of 1.0 sone.
2. For intermittent local exhaust fans: maximum of 3.0 sone.

#### **Exceptions:**

1. Fans having a maximum rated airflow exceeding 400 cfm.
2. HVAC air handlers and fans mounted with not less than 4 ft (1 m) of ductwork between the fan and the intake grille.

*(Renumber subsequent sections.)*

**Reason:** Ventilation fans only work when they're turned on, and the number one reason typically given by home owners for not turning on a ventilation fan is, "it's too noisy".<sup>1,2,3</sup> As homes have become tighter, the use of whole house mechanical ventilation (WHMV) for maintaining acceptable indoor air quality and local exhaust fans to capture and expel pollutants at their source (esp. in bathrooms and kitchens) has become necessary. Installing a fan that will not be operated due to noise is a disservice to the homeowner, a liability to their health, and a risk to the home's durability (can lead to excess condensation on windows, increased potential for mold and rot, etc.).

This proposed requirement mirrors that adopted by the state of California and ASHRAE 62.2. Maximum sone levels have been enforced by Washington State's code since the late 1980s. The sone values proposed above have been widely accepted by the industry. A sone is linear measure of loudness, meaning that a three sone fan is three times as loud as a one sone fan. The Home Ventilating Institute describes the sone scale as follows:

- 0.5 sone: rustling leaves
- 1.0 sone: refrigerator
- 3.0 sone: typical office
- 4.0 sone: typical television operating

For a fan which operates only occasionally (like a bath fan), a maximum sone level of 3.0 is considered acceptable. For a fan which is designed to operate continuously (e.g., a WHMV fan), a maximum sone level of 1.0 is necessary to avoid occupants turning off the fan from noise irritation.

The overwhelming majority of intermittent exhaust fans listed in the HVI products directory achieve a sone rating of 3 or less, so this requirement weeds out only the worst performers and therefore should have little to no impact to builders when specifying HVI certified products. The 1.0 sone requirement for WHMV fans has been achieved by over 500 fans listed in the Home Ventilating Institute's certified product directory ([www.hvi.org](http://www.hvi.org)). Further, the 1.0 sone requirement for WHMV fans can be viewed as a cost-saving measure. To find out why, see the cost impact section below.

#### **References:**

1. Nagda, N. L., M. D. Koontz, R. C. Fortmann, and I. H. Billick (1989) "Prevalence, Use, and Effectiveness of Range-Exhaust Fans." *Environment International* 15(1-6): 615-620.
2. Parrott, K., J. Emmel, and J. Beamish (2003) "Use of Kitchen Ventilation: Impact on Indoor Air Quality." In *The Forum for Family and Consumer Issues*, edited, North Carolina State University, Raleigh North Carolina.
3. Singer, B.C., W. W. Delp, and M. G. Apte (2011) *Experimental Evaluation of Installed Cooking Exhaust Fan Performance*. LBNL-4183E. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.
4. Email communication with Don Stevens, Panasonic, dated 11/29/2012.

**Cost Impact:** Whole house mechanical ventilation (WHMV) fans are required by IRC N1103.5.1 to have a minimum fan efficacy greater than or equal to minimum required for Energy Star fans, meaning that whole-house mechanical ventilation fans are likely to also be Energy Star rated. To achieve the Energy Star rating, a fan must have a noise rating less than or equal to 1.0 sone. So, a WHMV fan which meets the energy efficacy requirements of the IRC is also likely to have a sone rating of 1.0 or less; therefore, no additional costs are expected from this change. Supposing a jurisdiction does not adopt Chapter 11 of the IRC, a builder could theoretically install a WHMV fan that has a sone rating of 3 or higher. If he does, the homeowners are not likely to operate the fan

due to unacceptable noise levels, and when they experience poor indoor air quality as a result, a call-back is the next step. The cost of a call-back far outweighs the incremental cost of a 1.0 sone WHMV fan, making the 1.0 sone WHMV fan a cost-savings measure for those builders who are not currently specifying them.

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The code official cannot easily identify the sone ratings of fans from the HVI directory. The proposal could require more costly fans and this is not appropriate for a minimum code.

**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:**

**M1507.3 Sound Ratings.** Ventilation fans intended to operate continuously or as a component of a whole-house mechanical ventilation system shall have a maximum sound performance of 1.0 sone in accordance with the following:

1. ~~For whole-house or continuous ventilation fans: maximum of 1.0 sone.~~
2. ~~For intermittent local exhaust fans: maximum of 3.0 sone.~~

#### **Exceptions:**

1. Fans having a maximum rated airflow exceeding 400 cfm.
2. ~~HVAC air handlers and~~ Fans mounted with not less than 4 ft (1 m) of ductwork between the fan and the intake grille.
3. Heating and cooling equipment air handlers.

**Commenter's Reason:** Based on the committee's resistance to a maximum sound requirement for intermittently operating fans, this proposal has been modified to only address sound requirements for whole-house mechanical ventilation fans and fans that are intended to be operated continuously (e.g., a bath fan at 20 cfm per section M1507.4). This change is proposed to ensure that the fans which are critical to maintaining indoor air quality meet minimum requirements for acceptable levels of noise.

Ventilation fans only work when they're turned on, and the number one reason typically given by home owners for not turning on a ventilation fan is, "it's too noisy".<sup>1,2,3</sup> As homes have become tighter, the use of whole house mechanical ventilation (WHMV) for maintaining acceptable indoor air quality has become necessary. Installing a fan that will not be operated due to noise is a disservice to the homeowner, a liability to their health, and a risk to the home's durability (can lead to excess condensation on windows, increased potential for mold and rot, etc.).

This proposed requirement mirrors that adopted by the state of California and ASHRAE 62.2. Maximum sone levels for WHMV fans have been enforced by Washington State's code since the late 1980s. The sone values proposed above have been widely accepted by the industry. A sone is linear measure of loudness, meaning that a 1.0 sone fan is over three times as loud as the best rated fans in the HVI directory (i.e., 0.3 sones). The Home Ventilating Institute describes the sone scale as follows:

- 0.5 sone: rustling leaves
- 1.0 sone: refrigerator
- 3.0 sone: typical office
- 4.0 sone: typical television operating

For a fan which is designed to operate continuously (e.g., a WHMV fan), a maximum sone level of 1.0 is necessary to reduce the number of occupants that would turn off the fan due to noise irritation.

The 1.0 sone requirement for WHMV fans has been achieved by over 500 fans listed in the Home Ventilating Institute's certified product directory ([www.hvi.org](http://www.hvi.org)), with many fans operating at less than 0.3 sones.

**References:**

1. Nagda, N. L., M. D. Koontz, R. C. Fortmann, and I. H. Billick (1989) "Prevalence, Use, and Effectiveness of Range-Exhaust Fans." *Environment International* 15(1-6): 615–620.
2. Parrott, K., J. Emmel, and J. Beamish (2003) "Use of Kitchen Ventilation: Impact on Indoor Air Quality." In *The Forum for Family and Consumer Issues*, edited, North Carolina State University, Raleigh North Carolina.
3. Singer, B.C., W. W. Delp, and M. G. Apte (2011) *Experimental Evaluation of Installed Cooking Exhaust Fan Performance*. LBNL-4183E. Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, California.

**RM40-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_\_                    D

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**RM41-13**  
**M1507.3.1**

**Proposed Change as Submitted**

**Proponent:** Jerry Anderson, City of Overland Park, KS, representing self (jerry.anderson@opkansas.org)

**Revise as follows:**

**M1507.3.1 System design.** The whole-house ventilation system shall consist of one or more supply or exhaust fans, or a combination of such, and associated ducts and controls. Local exhaust or supply fans are permitted to serve as such a system. Systems designed to supply air shall supply outdoor air. ~~Outdoor air ducts connected to the return side of an air handler shall be considered to provide supply ventilation.~~

**Reason:** The purpose of this code change is to make it clear that the airflow for mechanical ventilation systems designed to supply air shall take that air from the outdoors. The sentence being deleted is no longer necessary. It doesn't matter how the outdoor air is distributed. What matters in this code section is that supply air comes from the outdoors.

**Cost Impact:** No cost associated with this change.

M1507.3.1-RM-ANDERSON.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was 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 Government, representing Virginia Plumbing and Mechanical Inspectors Association (VPMIA) and Virginia Building and Code Officials Association (VBCOA), requests Disapproval.**

**Commenter's Reason:** This proposal completely changed the intent of this section. This language can now be interpreted as requiring 100% outdoor air to be delivered; no recirculation of indoor air is permitted with this language.

**RM41-13**

Final Action:

AS

AM

AMPC\_\_\_\_\_

D

**RM42-13**  
**M1507.3.2**

**Proposed Change as Submitted**

**Proponent:** Jerry Anderson, representing the City of Overland Park, Kansas

**Revise as follows:**

**M1507.3.2 System controls.** ~~The~~ Whole-house mechanical ventilation systems designed for intermittent operation in accordance with Section M1507.3.3 shall utilize a 24 hour timer control capable of cycling the fan(s) on and off as needed. Whole-house mechanical ventilation systems shall be provided with controls that enable manual override.

**Reason:** The purpose of the code change is to require an automatic timer switch for those fans that are designed to be run intermittently. In the exception to Section M1507.3.3 the code allows for whole-house mechanical ventilation systems to be operated intermittently. The word "intermittently" can mean different things to different people. A local exhaust fan operated manually by a wall switch could easily be considered to be an intermittent fan system. I think that the code assumes that there will be some sort of automation built into intermittent systems. I don't think that the code intends the systems to be manually operated. Therefore, I have inserted language which makes it clear that a manual switch is not allowed.

**Cost Impact:** There would be a small cost associated with the timer switch, if they are not already being provide for.

M1507.3.2-RM-ANDERSON.DOC

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**Committee Action Hearing Results**

**Committee Action:** **Disapproved**

**Committee Reason:** The proposal will increase the cost of construction. Twenty-four hours is not the proper time interval.

**Assembly Action:** **None**

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**Individual Consideration Agenda**

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

*Public Comment:*

**Gerald Anderson, representing the City of Overland Park, Kansas, representing self, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M1507.3.2 System controls.** Whole-house mechanical ventilation systems designed for intermittent operation in accordance with Section M1507.3.3 shall utilize a ~~24 hour timer control~~ device capable of cycling the fan(s) on and off automatically as needed. Whole-house mechanical ventilation systems shall be provided with controls that enable manual override.

**Commenter's Reason:** The purpose of the code change is to require an automatic timer switch for those fans that are designed to be run intermittently. In the exception to Section M1507.3.3 the code allows for whole-house mechanical ventilation systems to be operated intermittently. The word "intermittently" can mean different things to different people. A local exhaust fan operated manually by a wall switch could easily be considered to be an intermittent fan system. I think that the code assumes that there will be some sort of automation built into intermittent systems. I don't think that the code intends the systems to be manually operated. Therefore, I have inserted language which makes it clear that a manual switch is not allowed.

**RM42-13**

**Final Action:** AS AM AMPC\_\_\_\_\_ D

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**RM44-13**  
**M1508.1 (New)**

**Proposed Change as Submitted**

**Proponent:** Craig Conner, representing self

**Add text as follows:**

**M1508.1 Venting and Depressurization.** Gas-and oil-fired space- heating and gas-and oil-fired water-heating combustion appliances in new dwelling units shall comply with at least one of the following:

1. Space- heating and water-heating combustion appliances located within a dwelling unit's air barrier shall be of the direct-vent 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. Mechanical ventilation shall be provided in accordance with Section M1507. 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 design exhaust rate. Makeup air systems shall be equipped with not less than one gravity or motorized damper. Motorized dampers shall be automatically controlled to operate simultaneously with the exhaust systems.
3. Space-heating and water-heating combustion appliances shall not be located within a dwelling unit's air barrier. For purposes of this option, appliances located in a mechanical room separated from the conditioned space by an air barrier shall be considered to be outside of a dwelling unit's air barrier.

**Exceptions:** The section shall not apply to:

1. Dwelling units with a tested air tightness of greater than 3 ACH50
2. Dwelling units having a tested depressurization that is within the limits specified by an approved test.

**Reason:** Backdrafting combustion appliances can lead to serious health consequences. The IECC and common practices are increasing the potential for backdrafting in homes. The IECC requires a building envelope tested to be 3 ACH50 or less in the middle and northern climate zones. This change is designed to greatly reduce the likelihood of backdrafting in those tight homes.

Back drafting is most likely to occur if three things are true- construction is airtight, exhaust-only ventilation is used, and atmospherically vented (natural draft) combustion appliances are in conditioned spaces. The IECC has both testing and prescriptive measures to increase envelope tightness and should routinely produce airtight construction. Mechanical ventilation is required for residences, 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. These options prevent back drafting by eliminating at least one of major contributor; eliminating the natural draft (atmospherically vented) combustion appliances, eliminating the large exhaust-only ventilation, or taking the combustion outside the air barrier. An exception adds a depressurization test option, which tests for excessive depressurization levels in dwelling units.

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

M1508 (NEW)-RM-CONNER.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** Same reason as RM32-13.

**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 Dan Buuck, CBO, representing National Association of Home Builders (NAHB), request Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M1508.1 Venting and Depressurization.** Gas-and oil-fired space- heating and gas-and oil-fired water-heating combustion appliances in new dwelling units shall comply with one or more of the following:

1. Space- heating and water-heating combustion appliances located within a dwelling unit's air barrier shall be of the direct-vent type.
2. Space heating appliances and water heating combustion appliances located within a dwelling unit's air barrier shall be of the ~~direct-vent or~~ *mechanical draft* type or a combination of mechanical draft and direct-vent types. Mechanical ventilation shall be provided in accordance with Section M1507. Makeup air shall be provided for each of the dwelling unit's ~~three~~ two largest exhaust systems, other than the kitchen exhaust system, at a rate approximately equal to or greater than the design exhaust rate. Makeup air systems shall be equipped with not less than one gravity or motorized damper. Motorized dampers shall be automatically controlled to operate simultaneously with the exhaust systems. Kitchen exhaust systems shall be provided makeup air in accordance with Section M1503.4.
3. Space-heating and water-heating combustion appliances shall not be located within a dwelling unit's air barrier. ~~For purposes of this option, appliances located in a mechanical room separated from the conditioned space by an air barrier shall be considered to be outside of a dwelling unit's air barrier.~~

**Exceptions:** The section shall not apply to:

1. Dwelling units with a tested air tightness of greater than 3 ACH50.
2. Dwelling units having a tested depressurization that is within the limits specified by an approved test.
3. Dwelling units that do not have an exhaust-only whole-house mechanical ventilation system.
4. Space-heating and water-heating combustion appliances that are located in a mechanical room and provided with combustion air supplied entirely from ducts to the outdoors or direct openings to the outdoors.

**Committer's Reason:**

**Conner:** This modification:

- lets the existing kitchen exhaust section in the IRC continue to handle kitchen exhaust
- clarifies the language on the option for equipment in mechanical rooms
- makes it clear that eliminating exhaust-only ventilation is one option, but not a requirement

**Buuck:** Builders are concerned that more stringent energy codes have made previously acceptable building practices unsafe due to tighter building envelope requirements. This code change would create a new section to address depressurization concerns for the house as a system.

This public comment fixes a conflict in Item 2 with Section M1503.4 which addresses makeup air for kitchen exhaust systems. The originally proposed language requires makeup air to be "provided for each of the dwelling unit's three largest exhaust systems at a rate approximately equal to or greater than the design exhaust rate." This would apply to kitchen exhaust systems as well, and they are already covered in their own section.

The original proposal does not differentiate between appliances which draw their combustion air entirely from indoors and those that are supplied with outdoor combustion air only (either the one or two permanent opening method). Appliances that are supplied with air from permanent openings to the outside and located in a separate room will be "invisible" to depressurization elsewhere in the dwelling. (G2407.6).

Although creating a mechanical room that is separated from the conditioned space by an air barrier (see Item 3) may seem reasonable at first, this would be extremely difficult in those regions of the country where the furnace is in the same space as the water heater. It would be very difficult to create an air barrier around all the ductwork penetrating the mechanical room enclosure. In the residences where this option works, locating the appliances in a mechanical room closed off from the rest of the dwelling and supplying that room with combustion air directly from the outdoors protects the appliances from the effects of exhaust systems elsewhere in the dwelling.

The word "combustion" was added to Item 2 to correlate it with the language used in Items 1 and 3.

**RM44-13**

Final Action:                      AS                      AM                      AMPC \_\_\_\_\_                      D

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# RM45-13

## M1601.1.1

### Proposed Change as Submitted

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1601.1.1 Above-ground duct systems.** Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
- ~~6. *Duct systems* shall be constructed of materials having a flame spread index not greater than 200.~~
- ~~7.6.~~ Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
  - ~~7.1-6.1.~~ These cavities or spaces shall not be used as a plenum for supply air.
  - ~~7.2-6.2.~~ These cavities or spaces shall not be part of required fire-resistance-rated assembly.
  - ~~7.3-6.3.~~ Stud wall cavities shall not convey air from more than one floor level.
  - ~~7.4-6.4.~~ Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
  - ~~7.5-6.5.~~ Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

**Reason:** Considering the subject of items #2 and #3, it is not apparent what item #6 is intended to address. Item #2 requires factory-made ducts to have a maximum flame spread index of 50, so why does item #6 state an index of 200 maximum?? Current section M1601.2 requires factory-made ducts to comply with UL 181, and UL 181 requires all ducts to have a maximum flame spread index of 50. If item #6 addresses factory-made ducts, then it conflicts with Item #2 and Section M1601.2. If item #6 was intended to address plastic ducts, it then begs the question as whether plastic ducts are allowed above ground in dwellings. An ICC formal interpretation on this exact question was issued and it states that plastic ducts are allowed above ground if they can meet class 0 or class 1, meaning that the maximum flame spread index could not exceed 50. With the broad definition of "*duct systems*" in the IRC, the purpose of item #6 is even more unclear. Item #6 is confusing and appears to be unnecessary because the code already addresses the various duct materials in other 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:** The code change proposal will not increase the cost of construction.

M1601.1.1 #1-RM-HALL-PMGCAC

## **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposal eliminates the use of plastic ducts, registers and grills.

**Assembly Action:**

**None**

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### **Individual Consideration Agenda**

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

#### *Public Comment 1:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.**

**Commenter's Reason:** Reason: Section 603.8.3 of the IMC specifically prohibits the use of plastic ducts and fittings in above-ground applications. Plastic ducts and fittings are not allowed in the IMC because they have not demonstrated equivalency with established performance, flame spread and smoke generation requirements for above ground ducts and fittings. As currently worded, Section 1601.1.1 item 6 can be interpreted to allow plastic ducts and fittings in above-ground applications.

Current requirements for aboveground ducts (SMACNA, NAIMA and UL) include performance requirements such as corrosion resistance, mold growth resistance, puncture, static load, impact, leakage, erosion, and other requirements as specified in the appropriate document. All of these ducts are required to meet a smoke generation index of 50 or less in addition to the flame spread index of 25 or less. All ducts should be required to meet the established performance, flame and smoke generation requirements which are vital to these systems.

#### *Public Comment 2:*

**Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C., representing General Plastics, requests Approval as Modified by this Public Comment.**

**Replace the proposal as follows:**

**M1601.1.1 Above-ground duct systems.** Above-ground *duct systems* shall conform to the following:

1. *Equipment* connected to *duct systems* shall be designed to limit discharge air temperature to a maximum of 250°F (121°C).
2. Factory-made air ducts shall be constructed of Class 0 or Class 1 materials as designated in Table M1601.1.1(1).
3. Fibrous duct construction shall conform to the SMACNA *Fibrous Glass Duct Construction Standards* or NAIMA *Fibrous Glass Duct Construction Standards*.
4. Minimum thickness of metal duct material shall be as listed in Table M1601.1.1(2). Galvanized steel shall conform to ASTM A 653. Metallic ducts shall be fabricated in accordance with SMACNA Duct Construction Standards Metal and Flexible.
5. Use of gypsum products to construct return air ducts or plenums is permitted, provided that the air temperature does not exceed 125°F (52°C) and exposed surfaces are not subject to condensation.
6. Plastic duct systems shall be constructed of materials having a flame spread index not greater than 200.
7. Stud wall cavities and the spaces between solid floor joists to be used as air plenums shall comply with the following conditions:
  - 7.1 These cavities or spaces shall not be used as a plenum for supply air.
  - 7.2 These cavities or spaces shall not be part of a required fire-resistance-rated assembly.
  - 7.3 Stud wall cavities shall not convey air from more than one floor level.
  - 7.4 Stud wall cavities and joist-space plenum shall be isolated from adjacent concealed spaces by tight-fitting fire blocking in accordance with Section R602.8.
  - 7.5 Stud wall cavities in the outside walls of building envelope assemblies shall not be utilized as air plenums.

**Commenter's Reason:** While the PMG CAC indicated that they did not know the origin of this requirement, it was pointed out at the Dallas hearing that the requirement was based on the allowance of plastic duct systems above ground. Since this is the purpose of this section, rather than deleting the requirement, I have added clarity so that it would be understood what is permitted.

This code requirement can be traced back to a change that I proposed to allow plastic ducts above ground. The Committee chose to add an Item 6 rather than accept my more extensive change on plastic ducts. The Committee recognized that by inserting Item 6 my

change to allow plastic ducts was also accomplished.

It is unfortunate that this requirement has been misinterpreted. Adding the word "plastic" may eliminate all the misinterpretations.

**RM45-13**

Final Action:                   AS                   AM                   AMPC\_\_\_\_                   D

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## RM53-13

### M1601.4.1

#### **Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org); Vickie Lovell, InterCode Inc., representing DuctMate Industries (Vickie@intercodeinc.com)

#### **Revise as follows:**

**M1601.4.1 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 or tapes. Closure systems used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked “181 B-FX” for pressure sensitive tape or “181 BM” 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. Crimp joints for round metallic ducts shall have a contact lap of not less than 1 inch (25.4 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws or rivets equally spaced around the joint. Closure systems used to seal metal ductwork shall be installed in accordance with the manufacturers’ instructions. Round metallic ducts shall be mechanically fastened by means of at least three sheet metal screws or rivets spaced equally around the joint. Unlisted duct tape shall not be permitted as a sealant on any duct.

#### **Exceptions:**

1. Spray polyurethane foam shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification 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:**

**(Hall-PMGCAC):** 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 text was approved for the 2015 IMC.

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.

**(Lovell):** This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC. That reason statement is supplied below:

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.

The identical proposal that was approved As Submitted in the Mechanical Code hearings in Portland is being submitted to the 2015 IECC residential requirements for consistency.

**Cost Impact:**  
**(Hall-PMGCAC):** The code change proposal will not increase the cost of construction.

**(Lovell):** This proposal reduces the cost of installation.

M1601.4.1 #2-RM-HALL-LOVELL-PMGCAC

### **Committee Action Hearing Results**

**Committee Action:** **Disapproved**

**Committee Reason:** The proposal increases the cost of construction and provides insufficient benefit for the added cost. Duct leakage within the thermal envelope is not a problem.

**Assembly Action:** **None**

### **Individual Consideration Agenda**

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

#### *Public Comment 1:*

**Vickie Lovell, INTERCODE, INC., representing Rectorseal, requests Approval as Submitted.**

**Commenter's Reason:** We respectfully disagree with the committee's reason for disapproval. Leakage in ducts with snap-lock and button type seam IS a problem unless a sealant or gasket is used. The small increase in cost provides a realized cost-benefit from the optimum performance of the HVAC system to cool and heat the house.

The IMC code development committee and the voting audience agreed and voted for approval of this code change proposal for the 2015 IMC. The ICC PMG Code Action Committee and the IECC Code Development Committee also recommended approval of this proposal.

#### *Public Comment 2:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.**

**Commenter's Reason:** The committee believed that ducts should be able to leak into the conditioned spaces, however, this section addresses ducts in all locations including those outside of the conditioned space. Duct leakage is detrimental even within the conditioned space because the system will not deliver air to the intended spaces if the ducts leak air into unintended locations. The system will result in overheated or over cooled spaces and under heated or under cooled spaces which causes thermostat adjustments to overcome the thermal discomfort of the occupants. This results in poor energy performance.

#### **RM53-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

**RM54-13**  
**M1601.4.10 (New)**

**Proposed Change as Submitted**

**Proponent:** Josh O'Connor, representing self

**Add new text as follows:**

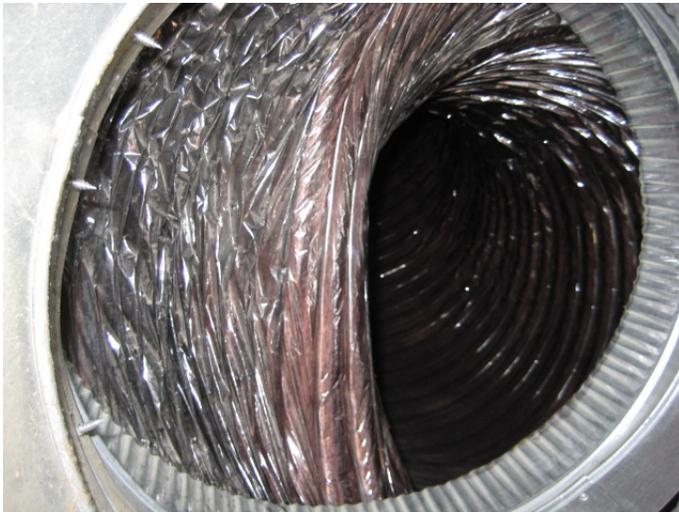
**M1601.4.10 Wall Pass-Through.** The opening in a concrete or masonry foundation wall through which supply and return air ducts from an HVAC unit are intended to pass shall have a width of not less than 42 inches.

**Reason:** National homebuilders are making this opening only 32 inches wide. This is not wide enough for the supply and return air ducts to have a straight run through the wall from the supply and return ports on the HVAC unit.

When the air ducts have to veer sharply in one direction after they come off of the port in order to get to the opening in the wall, airflow is restricted inside the duct. NOTE: the ports open straight forward, facing the wall of the house. When the duct veers, it blocks the opening of the port. The ducts need a straight run.

Three (3) photos are attached to this proposal form. (photos were taken at my residence, after rain hood was removed from the HVAC unit)





Cost Impact: NONE

M1601.4.10-RM-O'CONNOR.DOC

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**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The opening size depends on the size of the ducts, not some arbitrary dimension such as 42 inches. Proper fittings should be used.

**Assembly Action:**

**None**

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**Individual Consideration Agenda**

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

*Public Comment:*

**Josh O'Connor, representing self, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**~~M1604.4.10~~ R404.6 Wall Pass-Through.** The opening in a concrete or masonry foundation wall through which supply and return air ducts from an HVAC unit are intended to pass shall have a width of not less than 42 inches.

**Commenter's Reason:** This proposal should never have been placed in Mechanical because this proposal addresses the building of the foundation wall, not the installation of mechanical. This proposal was disapproved in Committee Action Hearings in Mechanical.

**RM54-13**

Final Action:                    AS                    AM                    AMPC\_\_\_\_\_                    D

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**RM56-13**  
**M1601.4.3**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M1601.4.3 Support.** ~~Metal ducts shall be supported by 1/2-inch (13 mm) wide 18-gage metal straps or 12-gage galvanized wire at intervals not exceeding 10 feet (3048 mm) or other approved means. Nonmetallic ducts shall be supported in accordance with the manufacturer's installation instructions. Ducts shall be supported in accordance with SMACNA HVAC Duct Construction Standards—Metal and Flexible.~~

**Reason:** This section should just reference the SMACNA standards as opposed to specifying a support interval. The 10 foot interval requirement is too broad and is inappropriate for many sizes and types of ducts . Many ducts require closer supports. This text could be easily interpreted as allowing 10 feet maximum support intervals for all ducts. This section is not being enforced since nobody installs 18 gage metal straps to support residential 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:** The code change proposal will increase the cost of construction.

M1601.4.3-RM-HALL-PMGCAC

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**Committee Action Hearing Results**

**Committee Action:** **Disapproval**

**Committee Reason:** Multiple attempts to modify the proposal indicate that it needs to be reworked in a public comment.

**Assembly Action:** **None**

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**Individual Consideration Agenda**

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

*Public Comment:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.**

**Replace proposal as follows:**

**M1601.4.3 Support.** ~~Metal ducts shall be supported by 1/2-inch (13 mm) wide 18-gage metal straps or 12-gage galvanized wire at intervals not exceeding 10 feet (3048 mm) or other approved means. Nonmetallic ducts shall be supported in accordance with the manufacturer's installation instructions. Factory made ducts listed in accordance with UL181 shall be supported in accordance with the manufacturer's installation instructions. Field- and shop-fabricated fibrous glass ducts shall be supported in accordance the SMACNA Fibrous Glass Duct Construction Standards or the NAIMA Fibrous Glass Duct Construction Standards. Field- and shop-fabricated metal and flexible ducts shall be supported in accordance with the SMACNA HVAC Duct Construction Standards—Metal and Flexible.~~

**Reason:** The 10 foot interval requirement is too broad and is inappropriate for many sizes and types of ducts . Many ducts require closer supports. This text could be easily interpreted as allowing 10 feet maximum support intervals for all ducts. This section should just reference the appropriate support requirements as specified in the applicable manual or listing. Definitions are added to clarify intent of terminology for the different type of ducts

**RM56-13**

Final Action:                   AS                   AM                   AMPC\_\_\_\_\_                   D

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**RM58-13**  
**M1602.4 (New), M1602.4.1 (New)**

**Proposed Change as Submitted**

**Proponent:** Jeff Sonne, Florida Solar Energy Center, representing the Florida Solar Energy Center, (jeff@fsec.ucf.edu)

**Add new text as follows:**

**M1602.4 Balanced return air.** Provisions shall be made to prevent unbalanced air flows and pressure differentials caused by restricted return air flow. Pressure differentials caused by air distribution systems across individually closed interior doors, where return air intakes are centrally located, shall be limited to 0.01 inch WC (2.5 pascals). Pressure differentials across fire walls and other partitions within ceiling space plenums shall be limited to 0.01 inch WC (2.5 pascals) by providing air duct pathways or air transfer pathways from the high pressure zone to the low pressure zone.

**M1602.4.1 Prescriptive alternatives.** The following are alternatives to the requirements of Section M1602.4 and apply only to habitable rooms.

1. Transfer ducts or other transfer pathways shall be provided and shall have an area that is not less than 1½ times the cross sectional area of the supply duct or supply ducts serving the room or space. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.
2. Transfer grilles shall be provided and shall have an area of not less than 0.50 square inches for each 1 cfm of supply air. In addition, the room entry door shall have an unrestricted 1 inch (25.4 mm) or greater undercut.

**Reason:** Restricted return air affects building pressures and increases air infiltration which in turn increases energy use and can cause comfort, building durability, and health and safety issues. A similar balanced return air requirement is already in the Florida Building Code for these reasons.

Supporting publication: Cummings, J., C. Withers, "Balanced Return Air, Duct Airtightness, and Combustion/Dilution Air Code Compliance in 40 Central Florida Homes" Florida Solar Energy Center, FSEC-CR-1789-06, Nov. 29, 2006. (<http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1789-06.pdf>)

**Cost Impact:** The code change proposal will increase the cost of construction. A Florida HVAC contractor indicates the extra material cost for a three bedroom home is \$60 and 1.5 hours of labor. In his opinion, a very small price for the extra comfort and avoidance of problems.

M1602.4 (NEW)-RM-SONNE.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text:

1. Increases the cost of construction.
2. Is too confusing.
3. Is above minimum code.
4. Is Florida specific.
5. Will be difficult to inspect.

**Assembly Action:**

**None**

## **Individual Consideration Agenda**

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

### *Public Comment:*

**Jeff Sonne representing Florida Solar Energy Center, requests Approval as Submitted.**

**Committee Reason:** The proposed text:

1. Increases the cost of construction.
  - a. Comment: while installing return air pathways adds to first cost, it reduces energy waste that results from increased air infiltration and yields a reduced life-cycle cost. Monitored energy savings finds payback of 3 years.
2. Is too confusing.
  - a. Comment: this has been successfully implemented in Florida with little difficulty. Comparison of homes built prior to the code change to those after the code change showed a 74% reduction in pressure differentials across closed interior doors, from an average of 9.1 pascals to 2.4 pascals.
3. Is above minimum code.
  - a. Comment: Providing return air pathways should be minimum code requirements and has been accepted as good practice for decades.
4. Is Florida specific.
  - a. Comment: While much of the research has been done in Florida, the problem exists across the United States, wherever unequal return and supply air flows occur within an enclosed space.
    - i. In hot and humid climates, the unbalanced return air causes significant increase in air flow across the building envelope, adding to space conditioning loads and increasing latent loads and indoor relative humidity.
    - ii. In cold climates, unbalanced return air also causes significant increase in air flow across the building envelope, which increases space conditioning loads, may push indoor relative humidity to unacceptably low levels, and may lead to freezing of pipes.
5. Will be difficult to inspect.
  - a. Comment: The prescriptive alternatives are widely used in Florida, and there have been few problems in verifying compliance in Florida code jurisdictions. Inspection of these alternatives is straightforward.
  - b. Contractors readily learn what steps are required to achieve the 2.5 pascal target.

**RM58-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

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**RM59-13**  
**M1804.4 (New)**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Add new text as follows:**

**M1804.4 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:** This new language was approved for the 2015 IMC. 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 and/or interfering with the operation of the vent terminal.

**Cost Impact:** None

M1804.4 (NEW)-RM-HALL-PMGCAC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** This text is not needed because it is covered in section G2427.6.

**Assembly Action:**

**None**

**Individual Consideration Agenda**

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

*Public Comment 1:*

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

**Commenter's Reason:** This was approved by the Mechanical and Fuel Gas committees and is applicable in this Section. The Committee concern was that this will already be covered in Chapter 24. Chapter 24 will have this exact same text because it was approved in the IFGC. Chapter 24 extracts the IFGC text. Putting this text in Chapter 18 will cover vent terminals from oil and biomass-fired appliances.

*Public Comment 2:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Submitted.**

**Commenter's Reason:** The committee stated that this proposed text is already provided in Section G2427.6 of the IRC. The venting provisions related to doors and windows found in Chapter 24 have nothing to do with the door swing issue addressed by the proposed new text. Chapter 24 deals with the concern for vent gasses entering the building, not the concern for the door impacting the vent terminal. Neither the codes nor the manufacturer's instructions cover the issue of doors swinging into vent terminals.

Chapter 18 covers other than gas-fired appliance vent terminals. The new text in this proposal will automatically be added to Chapter 24 as it is taken from the IFGC.

**RM59-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_\_           D

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**RM62-13**  
**M2001.1**

**Proposed Change as Submitted**

**Proponent:** David Hall CFM, Georgetown Texas representing the ICC PMG Code Action Committee (dave.hall@georgetown.org)

**Revise as follows:**

**M2001.1 Standards.** ~~Packaged~~ oil-fired boilers ~~and their control systems shall be~~ listed and labeled in accordance with UL 726. ~~Packaged~~ electric boilers ~~and their control systems shall be~~ listed and labeled in accordance with UL 834. Solid-fuel-fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed, ~~and constructed and certified~~ in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3 663 388 watts) or less shall meet the requirements of ASME CSD-1. Gas fired boilers shall conform to the requirements listed in Chapter 24.

**Reason:** This revised language was approved for the 2015 IMC. Current wording is not correct since ASME CSD-1 is not a construction standard. The proposed wording starts with the vessel construction requirements and continues with the acceptable standards for complete appliances. The proposed wording is no change from the intent of the previous wording.

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

M2001.1-RM-HALL-PMGCAC

**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was 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:*

**Shawn Strausbaugh of Arlington County, Virginia representing the ICC PMG Code Action Committee requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M2001.1 Standards.** Packaged oil-fired boilers be listed and labeled in accordance with UL 726. Packaged electric boilers shall be listed and labeled in accordance with UL 834. Solid-fuel-fired boilers shall be listed and labeled in accordance with UL 2523. Boilers shall be designed, constructed and certified in accordance with the requirements of ASME CSD-1 and as applicable, the ASME *Boiler and Pressure Vessel Code*, Section I or IV. Controls and safety devices for boilers with fuel input ratings of 12,500,000 Btu/hr (3 663 388 watts) or less shall meet the requirements of ASME CSD-1. Gas fired boilers shall conform to the requirements listed in Chapter 24.

**Commenter's Reason:** The proposed wording was recommended for approval by the committee but the text does not match the parallel section in the IMC. Boilers are not constructed in accordance with ASME CSD-1. The intent of this proposal was to match the IMC, therefore a slight modification is needed to accomplish this.

**RM62-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_\_           D

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**RM72-13**  
**M2103.3, Chapter 44**

**Proposed Change as Submitted**

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

**Revise as follows:**

**M2103.3 Piping joints.** Copper and copper alloys systems shall be soldered in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31. Piping joints that are embedded shall be installed in accordance with the following requirements:

**Add new standard to Chapter 44 as follows:**

ANSI/AWS A5.31M/A5.31:2012 Specification for Fluxes for Brazing and Braze Welding Edition: 2nd

**Reason:** Because hydronic systems are not potable system, inspectors and installers are not following the proper methods of installing copper pipe and tubing. Fluxes used for soldering copper tube and fittings must meet the requirements of ASTM B813.

**Cost Impact:** None

**Analysis:** A review of the standard proposed for inclusion in the code, [ANSI/AWS A5.31M/A5.31-2012] 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 1, 2013.

M2103.3-RM-FEEHAN.DOC

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**Committee Action Hearing Results**

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** The proposal will improve joint quality.

**Assembly Action:**

**None**

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**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 VA Plumbing & Mechanical Inspectors Association (VPMIA) & VA Building Code Officials Association (VBCOA), requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**M2103.3 Piping joints.** Copper and copper alloys systems shall be soldered in accordance with ASTM B828. Fluxes for soldering shall be in accordance with ASTM B813 and shall become noncorrosive and non-toxic after soldering. Brazing fluxes shall be in accordance with AWS A5.31. Piping joints that are embedded shall be installed in accordance with the following requirements:

Items 1 through 6 (*no change to current text*)

**Commenter's Reason:** The additional language shown struck out is not needed in the code text as fluxes are required to be non corrosive and non toxic per ASTM B813. The field inspector must rely on the standard to specify this and will not be able to test for the non corrosiveness or toxicity in the field.

**RM72-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_\_           D

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## RM77-13

### M2301.2.2 (New), M2301.2.2, M2301.2.2.2 (New), Chapter 44

#### Proposed Change as Submitted

**Proponent:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

#### Revise as follows:

**M2301.2.2 Collectors and panels.** Solar collectors and panels shall comply with Sections M2301.2.2.1 and M2301.2.2.2.

**M2301.2.2.1 ~~M2301.2.2~~ Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.

**M2301.2.2.2 Collector sensors.** Collector sensor installation, sensor location and the protection of exposed sensor wires from ultraviolet light shall be in accordance with SRCC 300.

#### Add new standard to Chapter 44 as follows:

##### SRCC

Solar Rating & Certification Corporation  
400 High Point Drive, Suite 400  
Cocoa, Florida 32926

##### SRCC 300-13 Standard 300 For Solar Water Heating Systems

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

This proposal revises existing Section M2301.2.2 into a parent section and two subsections. This was done in order to reference requirements related to collector sensors that are contained in SRCC 300. These collector sensor requirements are based on the manner in which the New York State Field Inspection Guidelines for Solar Heating Systems reference the SRCC standards.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where solar systems are provided, this proposal may increase the cost of construction.

**Analysis:** A review of the standard proposed for inclusion in the code, [SRCC 300-13] 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 1, 2013.

M2301.2.2 (NEW)-RM-HALL-THOMPSON-SEHPCAC.DOC

## Committee Action Hearing Results

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text is in the wrong location in the code. SRCC 300 is not appropriate for Solar voltaic systems.

**Assembly Action:**

**None**

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## Individual Consideration Agenda

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

*Public Comment:*

**Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.**

**Commenter's Reason:** The IRC Committee's reason for disapproval of RM77 was that "The proposed text is in the wrong location in the code" and that "SRCC 300 is not appropriate for "solar voltaic systems." However, the proposal was not to portions of the code that addressed "solar voltaic systems." It was to portions of Section M2301 which, in the 2012 IRC, addresses solar thermal systems. It is Section M2302 of the 2012 IRC that addresses "solar voltaic systems." SRCC 300 is a standard that is related to solar thermal systems. Thus the proposal appears to be appropriate as properly evaluated by the committee's evaluation criteria.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

**RM77-13**

Final Action:

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## RM78-13

R202, M2301.2.2, M2301.2.7, M2302.2.1, M2302.2.2, M2301 (New)

### Proposed Change as Submitted

**Proponent:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

#### Delete as follows:

~~**M2301.2.2 Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

~~**M2301.2.7 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 of this code to prevent entry of water, rodents and insects.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire retardant treated wood equivalent to that required for the roof construction.~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.~~

#### Add new definitions as follows:

### SECTION R202 DEFINITIONS

**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.

**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

**PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.

**SOLAR THERMAL COLLECTOR.** A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

**SOLAR THERMAL LOOP.** The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

**SOLAR THERMAL ABSORBER.** A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

**SOLAR THERMAL PANEL.** A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

**SOLAR THERMAL PANEL SYSTEM.** A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

**SOLAR THERMAL SYSTEM.** An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

Add new text as follows:

## **SECTION M2301** **GENERAL**

**M2301.1 General.** This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

**M2301.2 Solar energy equipment and appliances.** Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

**M2301.3 Solar energy system structural requirements.** Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

**M2301.3.1 Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems, solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

**M2301.3.2 Systems that serve as roof coverings.** Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

**M2301.3.3 Ground mounted systems.** Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

**M2301.4 Corrosion prevention.** Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

**M2301.5 Interference.** Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

**M2301.6 Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

**M2301.7 Rooftop mounted system fire classification.** Rooftop mounted solar systems shall comply with Section 902.1.

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

- a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
- b. Although it may appear at first glance that existing Sections M2301.2.2 and M2302.2.1 of the 2012 IRC, which address roof-mounted collectors, panels and modules, are being deleted, this proposal moves and clarifies those requirements in proposed new Sections M2301.3 through M2301.3.3.
- c. Although it may appear at first glance that existing Sections M2302.2.2 and M2301.2.7 of the 2012 IRC, which address roof and wall penetrations, are being deleted, this proposal moves and clarifies those requirements in proposed new Section M2301.6. New Section M2301.6 also clarifies where the flashing as sealing requirements are located in the code.
- d. The definitions for the following are based on definitions as they will appear in the 2015 IBC: photovoltaic panel, photovoltaic module, photovoltaic shingle, building integrated photovoltaic product and photovoltaic panel system.
- e. Proposed Section M2301.2 is a modification of Section 1401.4 of the 2012 International Mechanical Code.
- f. Proposed Sections M2301.3 through M2301.3.3 provide requirements related to the structural implications of various types of solar systems as related to the way in which they are mounted, supported and located. ICC ES AC428 and AC365 acceptance criteria may also be valuable in the approval of systems for compliance with this section, subject to the evaluation of the local building official.
- g. Proposed Sections M2301.4, M2301.5 and M2301.6 are derived from the California Solar Permitting Guidebook.
- h. Existing Section M2302.2.2 is revised and renumbered/relocated to proposed Section M2301.6.
- i. Proposed Section M2301.7 is essentially a pointer that alerts manufacturers, designers and contractors to the fact that Section 902.1 may have significant implications on solar systems. In cases where the building is located within 3 feet of lot lines, testing for fire classification is required for rooftop systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.2-RM-HALL-THOMPSON-SEHPCAC.DOC

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text is in the wrong location 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:*

**Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.**

Replace the proposal as follows:

**SECTION R324**  
**SOLAR ENERGY SYSTEMS**

**R324.1 General.** Solar energy systems shall comply with the provisions of Section R324.

**R324.1.1 Ground mounted collectors, panels and modules.** Ground mounted solar collectors, panels and modules shall be subject to the fire separation distance requirements of Section R302.1.

**Commenter's Reason:** The IRC Building Committee's reason for disapproval was that "The proposed text is in the wrong location in the code." The committee approved RM98 Part II, which created a new Section R324 for general solar provisions, references and revises Chapter 23 so that it only addresses solar thermal systems, and relocates the solar photovoltaic provisions to Section R324.4 and Chapter 9. This proposal recognizes these new solar scenarios and revises RM78 to add a subsection to the new "general" solar energy system provisions of Section R324.1, as proposed by RM98 Part II. This new subsection addresses fire separation distance requirements for both solar thermal and solar photovoltaic ground mounted solar systems. As proposed, this public comment will work whether or not RM78 is ultimately approved.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

**RM78-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

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## RM80-13

R202, M2301.2.2, M2301.2.7, M2302.2.1, M2302.2.2, M2301 (New)

### Proposed Change as Submitted

**Proponent:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

#### Delete as follows:

~~**M2301.2.2 Roof-mounted collectors.** The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant-treated wood equivalent to that required for the roof construction.~~

~~**M2301.2.7 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 of this code to prevent entry of water, rodents and insects.~~

~~**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire retardant treated wood equivalent to that required for the roof construction.~~

~~**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents and insects.~~

#### Add new definitions as follows:

### SECTION R202 DEFINITIONS

**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.

**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

**PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.

**SOLAR THERMAL COLLECTOR.** A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.

**SOLAR THERMAL LOOP.** The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

**SOLAR THERMAL ABSORBER.** A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

**SOLAR THERMAL PANEL.** A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

**SOLAR THERMAL PANEL SYSTEM.** A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

**SOLAR THERMAL SYSTEM.** An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.

Add new text as follows:

## **SECTION M2301** **GENERAL**

**M2301.1 General.** This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

**M2301.2 Solar energy equipment and appliances.** Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

**M2301.3 Solar energy system structural requirements.** Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

**M2301.3.1 Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems, solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

**M2301.3.2 Systems that serve as roof coverings.** Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

**M2301.3.3 Ground mounted systems.** Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

**M2301.4 Corrosion prevention.** Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

**M2301.5 Interference.** Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

**M2301.6 Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

**M2301.7 Rooftop mounted system fire classification.** Rooftop mounted solar systems shall comply with Section 902.1.

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

- a. Proposed new Section M2301 creates general provisions which are applicable to both solar thermal and solar photovoltaic systems. Solar system designers and installers, as well as code enforcement officials, are often confused as to what is applicable to solar systems.
- b. Although it may appear at first glance that existing Sections M2301.2.2 and M2302.2.1 of the 2012 IRC, which address roof-mounted collectors, panels and modules, are being deleted, this proposal moves and clarifies those requirements in proposed new Sections M2301.3 through M2301.3.3.
- c. Although it may appear at first glance that existing Sections M2302.2.2 and M2301.2.7 of the 2012 IRC, which address roof and wall penetrations, are being deleted, this proposal moves and clarifies those requirements in proposed new Section M2301.6. New Section M2301.6 also clarifies where the flashing as sealing requirements are located in the code.
- d. The definitions for the following are based on definitions as they will appear in the 2015 IBC: photovoltaic panel, photovoltaic module, photovoltaic shingle, building integrated photovoltaic product and photovoltaic panel system.
- e. Proposed Section M2301.2 is a modification of Section 1401.4 of the 2012 International Mechanical Code.
- f. Proposed Sections M2301.3 through M2301.3.3 provide requirements related to the structural implications of various types of solar systems as related to the way in which they are mounted, supported and located. ICC ES AC428 and AC365 acceptance criteria may also be valuable in the approval of systems for compliance with this section, subject to the evaluation of the local building official.
- g. Proposed Sections M2301.4, M2301.5 and M2301.6 are derived from the California Solar Permitting Guidebook.
- h. Existing Section M2302.2.2 is revised and renumbered/relocated to proposed Section M2301.6.
- i. Proposed Section M2301.7 is essentially a pointer that alerts manufacturers, designers and contractors to the fact that Section 902.1 may have significant implications on solar systems. In cases where the building is located within 3 feet of lot lines, testing for fire classification is required for rooftop systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.2-RM-HALL-THOMPSON-SEHPCAC.DOC

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text does not belong in the mechanical section of the code. Ground mounted systems should not be considered as structures. The wrong UL standard is referenced.

**Assembly Action:**

**None**

## **Individual Consideration Agenda**

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

### *Public Comment 1:*

**Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.**

Modify the proposal as follows:

#### **SECTION R202 DEFINITIONS**

~~**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.~~

~~**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracking hardware, designed to generate DC power when exposed to sunlight.~~

~~**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.~~

~~**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.~~

~~**PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.~~

~~**SOLAR THERMAL COLLECTOR.** A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it.~~

~~**SOLAR THERMAL LOOP.** The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.~~

~~**SOLAR THERMAL ABSORBER.** A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.~~

~~**SOLAR THERMAL PANEL.** A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.~~

~~**SOLAR THERMAL PANEL SYSTEM.** A system that incorporates discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.~~

~~**SOLAR THERMAL SYSTEM.** An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy and transfer it to a gas or liquid passing through the system. The heated gas or liquid is then stored or used to provide hot water, space heating, or cooling.~~

#### **SECTION ~~M2301~~ R324 GENERAL**

~~**R324.1 M2301.1 General.** Solar energy systems shall comply with the provisions of Section R324.1.1 thru R324.2.5. This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.~~

~~**R324.1.1 M2301.2 Solar energy equipment and appliances.** Solar thermal and solar photovoltaic energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.~~

~~**R324.1.2 M2301.4 Corrosion prevention.** Solar thermal and solar photovoltaic equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.~~

~~**R324.1.3 M2301.5 Interference.** Solar thermal and solar photovoltaic collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.~~

**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23, Section R324.1 and Sections R324.2.1 through R324.2.5.

**R324.2.1 M2301.3 Solar energy system Structural requirements.** Structural requirements for solar thermal energy systems shall be based upon the type, location and configuration of the system.

**R324.2.2 M2301.3.1 Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems, and solar thermal panel systems, ~~and photovoltaic panel systems~~ that are mounted above the roof covering shall be designed in accordance with the International Building Code Section R301 to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

**R324.2.3 M2301.3.2 Systems that serve as roof coverings.** Where solar thermal systems, or solar thermal panel systems, ~~and building integrated photovoltaic systems including photovoltaic shingles,~~ serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

**M2301.3.3 Ground mounted systems.** ~~Ground-mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.~~

**R324.2.4 M2301.6 Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

**R324.2.5 M2301.7 Rooftop mounted system fire classification.** Rooftop mounted solar thermal systems shall comply with Section 902.1.

**Commenter's Reason:** The committee's reasons for disapproval were that 1) "the proposed text does not belong in the mechanical section of the code 2) "ground mounted systems should not be considered as structures" and 3) "the wrong UL standard is referenced."

Response to Reason 1: This public comment moves the general solar provisions of the original proposal to a new Section R324.1, which aligns with the IRC Building Committee's recommendation to approve RM98, which created a new Section R324 titled "Solar energy."

Response to Reason 2: Ground mounted systems are indeed structures. Section R202 defines "structure" as "that which is built or constructed." This public comment, however, references Section 301 of the IRC instead of sending the user directly to the IBC.

Response to Reason 3: This proposal did not and does not reference any UL standards.

This proposal is coordinated with, does not conflict with, and is not dependent upon the final action on RM98. This public comment further revises the original proposal to fill in gaps related to solar thermal, and to delete requirements related to solar photovoltaic that may conflict or be redundant with RM98.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC as well as interested parties to discuss and debate proposed changes and public comments.

### *Public Comment 2:*

**Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

#### **SECTION R202 DEFINITIONS**

**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of ~~tracking hardware~~ a tracker, designed to generate DC power when exposed to sunlight.

**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

**PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.

**SOLAR THERMAL COLLECTOR.** A device that incorporates one or more solar thermal absorbers to absorb incident solar radiation, to convert it to thermal energy, and to transfer the thermal energy to a gas or liquid coming in contact with it. A device that absorbs incident solar radiation, converts it to thermal energy, and transfers thermal energy to a heat transfer medium.

**SOLAR THERMAL LOOP.** The portion of the solar thermal system that transports a heated gas or liquid to a collector or storage.

**SOLAR THERMAL ABSORBER.** A component of a solar collector for absorbing radiant energy and transferring that energy as heat into a fluid.

**SOLAR THERMAL PANEL.** A solar thermal collector individually mounted or mounted to or within a frame, fastened, and designed to provide a field installable unit.

**SOLAR THERMAL PANEL SYSTEM.** A system that incorporates one or more discrete solar thermal panels that convert solar radiation into solar energy, including structural support systems such as frames or racks.

**SOLAR THERMAL SYSTEM.** An assembly of components and subsystems that, in combination, convert solar radiant energy into thermal energy that is transferred directly or indirectly and transfer it to a gas or liquid and passing through the system. The heated gas or liquid that is then stored or used to provide hot water, space heating, or cooling.

#### **SECTION M2301 GENERAL**

**M2301.1 General.** This chapter provides for the design, construction, installation, alteration and repair of solar energy systems. Solar thermal systems shall comply with Sections M2301 and M2302. Photovoltaic solar energy systems shall comply with Sections M2301 and M2303.

**M2301.2 Solar energy equipment and appliances.** Solar energy system equipment, appliances and components shall be used and installed in accordance with the manufacturer's instructions and the provisions of this code.

**M2301.3 Solar energy system Structural requirements.** Structural requirements for solar energy systems shall be based upon the type, location and configuration of the system.

**M2301.3.1 Systems mounted directly to or above the roof covering.** Rooftop solar thermal systems solar thermal panel systems, and photovoltaic panel systems that are mounted above the roof covering shall be designed in accordance with the International Building Code to support the system and withstand applicable loads. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8. Systems mounted directly to or above the roof covering shall be constructed of noncombustible materials or fire-retardant treated wood.

**M2301.3.2 Systems that serve as roof coverings.** Where solar thermal systems, solar thermal panel systems, and building integrated photovoltaic systems including photovoltaic shingles, serve as the roof covering, they shall conform to the requirements for roof coverings in Chapter 9.

**M2301.3.3 Ground mounted systems.** Ground mounted solar thermal systems, solar thermal panel systems, and photovoltaic systems shall conform to Section R301.

**M2301.4 Corrosion prevention.** Solar equipment and systems shall be designed to inhibit galvanic and other corrosion between dissimilar metals of solar collectors, panels, modules, supports, fasteners and metal roofs. Paints shall not be used as galvanic corrosion protection.

**M2301.5 Interference.** Solar collectors, panels and modules shall not obstruct or interfere with the function or operation of access hatchways, roof access doorways, standpipe connections, expansion joints, skylights, operable windows, plumbing vents and mechanical equipment.

**M2301.6 Roof and wall penetrations.** Roof and wall penetrations shall be flashed in accordance with Chapter 9, Section R703.8 and, where required, shall be sealed in accordance with Chapter 11.

**M2301.7 Rooftop mounted system fire classification.** Rooftop mounted solar systems shall comply with Section 902.1.

**Commenter's Reason:** This public comment preserves the suggested definitions for the different types of solar energy systems. The definitions have been modified where necessary to conform with other IRC proposals that were approved. Similarly, the Committee Approval as Modified of RM98-13 established a new general section for Solar Energy Systems – R324. Therefore, Section M2301 as shown is deleted.

#### **RM80-13**

Final Action:                      AS                      AM                      AMPC \_\_\_\_\_                      D

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## RM87-13

### M2301.2.6 (New), M2301.2.7 (New)

#### Proposed Change as Submitted

**Proponents:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

#### **Add new text as follows:**

**M2301.2.6 Mixing valves.** Where heated water is discharged from a solar thermal system to a hot water distribution system, a thermostatic mixing valve complying with ASSE 1017 shall be installed to temper the water to a temperature of not greater than 140°F. Solar thermal systems supplying hot water for both space heating and domestic uses shall comply with Section P2802.2. A temperature indicating device shall be installed to indicate the temperature of the water discharged from the outlet of the mixing valve. The thermostatic mixing valve required by this section shall not be a substitute for water temperature limiting devices required by Chapter 27 for specific fixtures.

**M2301.2.7 Isolation valves.** Isolation valves shall be provided on the cold water feed to the water heater. Isolation valves and associated piping shall be provided to bypass solar storage tanks where the system contains multiple storage tanks.

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

These proposed new sections address mixing valves and isolation valves in solar thermal systems. They are based on Section P2803.3 of the 2012 IRC and criteria in the New York State Field Inspection Guidelines for Solar (thermal) Heating Systems.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where solar systems are provided, this proposal may increase the cost of construction.

M2301.2.6 (NEW) #2-RM-HALL-THOMPSON-SEHPCAC.DOC

#### Committee Action Hearing Results

**Committee Action:**

**Disapproved**

**Committee Reason:** The proposed text belongs in the plumbing chapters. Related subject text should be pulled together and placed in the proper location.

**Assembly Action:**

**None**

## **Individual Consideration Agenda**

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

### *Public Comment:*

**Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.**

Replace the proposal as follows:

Add new text as follows:

### **SECTION P2802** **SOLAR WATER HEATING SYSTEMS**

**P2802.1 Water temperature control.** Where heated water is discharged from a solar thermal system to a hot water distribution system, a thermostatic mixing valve complying with ASSE 1017 shall be installed to temper the water to a temperature of not greater than 140°F. Solar thermal systems supplying hot water for both space heating and domestic uses shall comply with Section P2802.2. A temperature indicating device shall be installed to indicate the temperature of the water discharged from the outlet of the mixing valve. The thermostatic mixing valve required by this section shall not be a substitute for water temperature limiting devices required by Chapter 27 for specific fixtures.

**P2802.2 Isolation valves.** Isolation valves in accordance with P2903.9.2 shall be provided on the cold water feed to the water heater. Isolation valves and associated piping shall be provided to bypass solar storage tanks where the system contains multiple storage tanks.

**Commenter's Reason:** The PMGCAC and SEHPCAC agree with the committee's recommendation to place the new information in the plumbing section of the code.

This public comment is submitted by the ICC Plumbing/Mechanical/Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 their inception, the PMGCAC and SEHPCAC have held numerous open meetings and workgroup calls which included members of the PMGCAC and SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

### **RM87-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_                      D

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**RM92-13**  
**M2301.6 (New)**

**Proposed Change as Submitted**

**Proponents:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

**Add new text as follows:**

**M2301.6 Filtering.** Air provided to occupied spaces through rock or other dust-producing materials shall be filtered for particulates at the outlet of the heat storage system.

**Exception:** Filters shall not be required where air movement is by means of natural convection.

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows: This proposed new section is similar to Section 1402.7 of the 2012 International Mechanical Code. It requires filtering in order to remove dust and particulates from mechanically forced air that has passed through a thermal storage area containing materials such as, but not limited to, pebbles or rock. A filter is not required for passive systems because the air velocity is typically not sufficient to carry particulates. Furthermore, a filter in a passive system could greatly impede natural convective airflow.

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where rock based or dust-producing heat storage systems are provided, this proposal may increase the cost of construction.

M2301.6 (NEW) #1-RM-HALL-THOMPSON-SEHPCAC.DOC

**Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The code should refer to the manufacturer's instructions for dust-producing materials. "Dust-producing" is not defined.

**Assembly Action:**

**None**

## Individual Consideration Agenda

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

### *Public Comment:*

**Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.**

#### **Modify the proposal as follows:**

**M2301.6 Filtering.** Air provided to occupied spaces that passes through thermal mass storage systems by mechanical means ~~through rock or other dust-producing materials~~ shall be filtered for particulates at the outlet of the heat thermal mass storage system.

**Exception:** ~~Filters shall not be required where air movement is by means of natural convection.~~

**Commenter's Reason:** The committee's reason for disapproval was that "dust-producing materials" was not defined. This public comment revises the proposal to remove that term from the proposal.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

#### **RM92-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_                      D

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## RM93-13

M2301.6 (New), M2301.6.1 (New), M2301.6.2 (New), P2902.5.5

### Proposed Change as Submitted

**Proponents:** David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee, (dave.hall@georgetown.org) and Brenda A. Thompson, Clark County Building Department, Las Vegas NV, Chair, Sustainability, Energy & High Performance Code Action Committee (bat@ClarkCountyNV.gov)

#### Add new text as follows:

**M2301.6 Solar systems for heating potable water.** Where a solar energy system heats potable water to supply a potable hot water distribution system, the solar energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

**M2301.6.1 Indirect systems.** Heat exchangers that are components of indirect heating systems shall comply with Section P2902.5.2.

**M2301.6.2 Direct systems.** Where potable water is directly heated, the pipe, fittings and valves between the solar collectors and the hot water storage tanks shall comply with NSF 61.

#### Revise as follows:

~~**P2902.5.5 Solar systems.** The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer. Where a potable water supply is connected to the solar collector circulation loop piping of an indirect solar water heating system and chemicals are not used in the circulation loop piping, a backflow preventer in accordance with ASSE 1012 shall be installed between the potable water system and the circulation loop piping. Where chemicals are used in the solar collector circulation loop piping, such backflow preventer shall be in accordance with ASSE 1013.~~

~~**Exception:** Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.~~

**Reason:** This proposal is submitted by the ICC Plumbing, Mechanical and Fuel Gas Code Action Committee (PMGCAC) and the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The PMGCAC and SEHPCAC were established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since their inception in July, 2011, the PMGCAC and SEHPCAC have held multiple open meetings and conference calls and workgroup calls which included members of the PMGCAC and SEHPCAC. Interested parties also participated in all of the meetings and conference calls to discuss and debate the proposed changes.

Reasons for this proposal are as follows:

Chapter 23 should include Sections M2301.6, M2301.6.1 and M2301.6.2 in order to address specific requirements for solar energy systems where they are used to heat potable water for supply to a potable hot water distribution system. Section M2301.6.1 is a pointer to a section that covers heat exchangers in the plumbing code section of the IRC:

**P2902.5.2 Heat exchangers.** Heat exchangers using an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

This section would apply where potable water was indirectly heated by the solar energy system. Section M2301.6.2 requires NSF 61 compliance for pipe, fittings and valves in a system that directly heats potable water as this is the same requirement for pipe, fittings and valves that the plumbing code requires for the hot water distribution system.

Section P2902.5.5 is modified as the section has been unclear for many cycles. Some have interpreted the existing section to require a backflow preventer on the cold water supply to any water heater that has a solar energy water heating system connected to the water heater. This makes no sense for a system that directly heats the water for distribution to the potable hot water

distribution system. The section is modified to make the language address where the backflow preventer is needed (only for connections to solar collector circulation loop piping of indirect heating systems).

Please note that the proponents have also submitted other proposals that are coordinated with this proposal. In the spirit of the IRC as a one stop code for one- and two-family dwellings and townhouses, these proposals enhance, update, clarify and improve the usability of the solar energy provisions of Chapter 23 of the IRC and make it truly comprehensive and much more direct and intuitive. This proposal, however, is intended to stand alone and is not contingent upon the success of other PMGCAC or SEHPCAC proposals.

**Cost Impact:** Where solar water heating systems are provided, this proposal may increase the cost of construction.

2301.6 (NEW) #2-RM-HALL-THOMPSON-SEPHCAC.DOC

### **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Committee Reason:** The subject of backflow protection does not belong in this part of the code.

**Assembly Action:**

**None**

### **Individual Consideration Agenda**

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

#### *Public Comment 1:*

**David Hall, Vice Chair, Plumbing/Mechanical/Gas Code Action Committee and Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair request Approval as Modified by this Public Comment.**

**Replace proposal as follows:**

Add new text as follows:

**M2301.6 Solar systems for heating potable water.** Where a solar energy system heats potable water to supply a potable hot water distribution system, the solar energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

**M2301.6.1 Indirect systems.** Heat exchangers that are components of indirect heating systems shall comply with Section P2902.5.2.

**M2301.6.2 Direct systems.** Where potable water is directly heated, pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of Chapter 29.

Revise as follows:

**~~P2902.5.5 Solar systems.~~** ~~The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer.~~

**Exception:** ~~Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.~~

**P2902.5.5 Solar thermal systems.** ~~Where a solar energy system heats potable water to supply a potable hot water distribution or a other type of heating system, the solar energy system shall be in accordance with Section P2902.5.5.1 or P2902.5.5.2 as applicable.~~

**P2902.5.5.1 Indirect systems.** Water supplies of any kind shall not be connected to the solar heating loop of an indirect solar water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

**P2902.5.5.2 Direct systems.** Where a solar water heating system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of Chapter 29.

Where a solar water heating system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a backflow preventer with intermediate atmospheric vent complying with ASSE 1012. Where a solar water heating system directly heats water for a system other than a potable water distribution system and that system will have chemicals added, a potable water supply connected to such system shall be protected by a reduced pressure principle backflow preventer complying with ASSE 1013.

**Commenter's Reason:** This public comment changes the new section in the mechanical code part of the IRC to simply point to appropriate sections of the plumbing code to ensure that the solar system designer and installer don't miss these important plumbing code requirements. The modification for Section P2902.5.5 stays the same as the original proposal as it is fixing a problem recognized long ago. The plumbing code committee is not nearly as familiar with solar systems as the people who are aiding and supporting the SEHPCAC on this topic of solar thermal systems. Thus, including this plumbing code section in this proposal and public comment is appropriate.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes 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 SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

## *Public Comment 2:*

### **Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.**

#### **Modify the proposal as follows:**

**M2301.6 Solar thermal systems for heating potable water.** Where a solar thermal energy system heats potable water to supply a potable hot water distribution system, the solar thermal energy system shall be in accordance with Sections M2301.6.1, M2301.6.2 and P2902.5.5.

**M2301.6.1 Indirect systems.** Heat exchangers that are components of indirect solar thermal heating systems shall comply with Section P2902.5.2.

**M2301.6.2 Direct systems.** Where potable water is directly heated by a solar thermal system. The pipe, fittings, valves and other components that are in contact with the potable water in the solar heating system shall comply with the requirements of Chapter 29.

~~**M2301.6.2 Direct systems.** Where potable water is directly heated, the pipe, fittings and valves between the solar collectors and the hot water storage tanks shall comply with NSF 61.~~

#### **Revise as follows:**

**P2902.5.5 Solar thermal systems.** Where a solar thermal system heats potable water to supply a potable hot water distribution or any other type of heating system, the solar thermal system shall be in accordance with Section P2902.5.5.1, P2902.5.5.2 or P2902.5.5.3 as applicable.

~~**P2902.5.5 Solar systems.** Where a potable water supply is connected to the solar collector circulation loop piping of an indirect solar water heating system and chemicals are not used in the circulation loop piping, a backflow preventer in accordance with ASSE 1012 shall be installed between the potable water system and the circulation loop piping. Where chemicals are used in the solar collector circulation loop piping, such backflow preventer shall be in accordance with ASSE 1013.~~

**P2902.5.5.1 Indirect systems.** Water supplies of any type shall not be connected to the solar heating loop of an indirect solar thermal hot water heating system. This requirement shall not prohibit the presence of inlets or outlets on the solar heating loop for the purposes of servicing the fluid in the solar heating loop.

**P2902.5.5.2 Direct systems for potable water distribution systems.** Where a solar thermal system directly heats potable water for a potable water distribution system, the pipe, fittings, valves and other components that are in contact with the potable water in the system shall comply with the requirements of Chapter 29.

**P2902.5.5.3 Direct systems for other than potable water distribution systems.** Where a solar thermal system directly heats water for a system other than a potable water distribution system, a potable water supply connected to such system shall be protected by a backflow

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

**Commenter's Reason:** This public comment clarifies that these sections pertain specifically to solar **thermal** energy systems. The new sections are added to the IRC Plumbing Chapter to clarify requirements for direct and indirect systems connected to potable or other than potable water distribution systems.

**RM93-13**

Final Action:           AS                   AM                   AMPC\_\_\_\_           D

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## RM95-13

M2302.2, M2302.2.1, M2302.2.2 thru M2302.2.2s.2.5 (New), M2302.2.2 thru M2302.4

### Proposed Change as Submitted

**Proponent:** Adria Smith, Fountain Valley Fire Department, Representing the California Fire Chiefs Association; Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office (adria.smith@fountainvalley.org)

**Revise as follows:**

**M2302.2 Requirements.** The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.21 through ~~M2302.2.3~~ M2302.2.7 and NFPA 70.

**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

**Exception:** Detached, nonhabitable structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.

**M2302.2.2 Access and pathways.** Roof access, pathways, and spacing requirements shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.2.5.

**M2302.2.2.1 Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

**M2302.2.2.2 Solar photovoltaic systems.** Solar photovoltaic systems for shall comply with Sections M2302.2.2.2.1 through M2302.2.2.2.5.

**M2302.2.2.2.1 Size of solar photovoltaic array.** Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

**M2302.2.2.2.2 Hip roof layouts.** Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.3 Single ridge roofs.** Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

**Exception:** This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.4 Roofs with hips and valleys.** Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.5 Allowance for smoke ventilation operations.** Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

**Exception:** Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

~~M2302.2.2~~**M2302.2.3 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

~~M2302.2.3~~**M2302.2.4 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be installed in accordance with Sections M2302.2.2 through M2302.2.3 and the manufacturer's instructions.

~~M2302.3~~**M2302.2.5 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~M2302.4~~**M2302.2.6 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**Reason:** We propose to reproduce the applicable provisions of International Fire Code 605.11 into the International Residential Code to provide for uniform design and enforcement. Many jurisdictions currently provide enforcement of the solar photovoltaic power systems guidelines in International Fire Code Section 605.11, or other locally adopted provisions through the building department/official which typically do not enforce the International Fire Code. Furthermore, the intent to have these provisions reproduced into the International Residential Code is to afford local communities the ability to provide adequate enforcement without the reference to a different code or standard. (IFC 605.11.3.3 through 605.11.3.3.3 are not reproduced, such provisions are not applicable to one- and two-family dwellings or townhouses).

**Cost Impact:** This proposal will not increase the cost of construction; these provisions are currently contained in the IFC.

M2302.2-RM-SMITH-REINERTSON.DOC

## **Committee Action Hearing Results**

**Committee Action:**

**Disapproved**

**Modify the proposal as follows:**

**M2302.2 Requirements.** The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.21 through M2302.2.7 and NFPA 70.

**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.

**Exception:** Detached, nonhabitable structures including, but not limited to, parking shade structures, carports, solar trellises and similar structures shall not be subject to the requirements of this section.

**M2302.2.2 Access and pathways.** Roof access, pathways, and spacing requirements shall be provided in accordance with Sections M2302.2.2.1 through M2302.2.2.5.

**Exceptions:**

1. Detached garages and accessory structures to one-and two-family dwellings and townhouses such as parking shade structures, carports, solar trellises, and similar structures.
2. Roof access, pathways and spacing requirements need not be provided where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed.

**M2302.2.2.1 Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

**M2302.2.2.2 Solar photovoltaic systems.** Solar photovoltaic systems shall comply with Sections M2302.2.2.2.1 through M2302.2.2.2.5.

**M2302.2.2.2.1 Size of solar photovoltaic array.** Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

**M2302.2.2.2.2 Hip roof layouts.** Panels and modules installed on dwellings with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.3 Single ridge roofs.** Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

**Exception:** This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.4 Roofs with hips and valleys.** Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**M2302.2.2.2.5 Allowance for smoke ventilation operations.** Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

**Exception:** Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

**M2302.2.3 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

**M2302.2.4 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be installed in accordance with Sections M2302.2.2 through M2302.2.3 and the manufacturer's instructions.

**M2302.2.5 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

**M2302.2.6 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**Committee Reason:** Same reason as for RM94-13

**Assembly Action:**

**Approved as Modified**

## **Individual Consideration Agenda**

This code change proposal is on the agenda for individual consideration because the proposal received a successful assembly action of Approved as Modified by the Floor and public comments were submitted.

### *Public Comment 1:*

**Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office; John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA); Adria Smith, Fountain Valley Fire Department, representing the California Fire Chiefs Association; And Adolf Zubia, Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, request Approval as Modified by this Public Comment.**

Modify the proposal as follows:

### **SECTION 324 SOLAR ENERGY SYSTEMS**

**~~M2302.2.2~~ R324.3.3 Access and pathways.** Roof access, pathways, and spacing requirements shall be provided in accordance with Sections ~~M2302.2.2.4~~ R324.3.3.1 through ~~M2302.2.2.5~~ R324.3.3.2.5.

#### **Exceptions:**

1. Detached garages and accessory structures, ~~to one and two family dwellings and townhouses~~ such as parking shade structures, carports, solar trellises, and similar structures.
2. Roof access, pathways and spacing requirements need not be provided ~~where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques~~ rooftop operations will not be employed.

**~~M2302.2.2.1~~ R324.3.3.1 Roof access points.** Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires, or signs.

**~~M2302.2.2.2~~ Solar photovoltaic systems ~~Size and layout.~~ Solar photovoltaic systems shall comply with Sections ~~M2302.2.2.2.1~~ through ~~M2302.2.2.2.5~~ R324.3.3.2.1 through R324.3.3.2.5.**

**~~M2302.2.2.2.1~~ R324.3.3.2.1 Size of solar photovoltaic array.** Each photovoltaic array shall be limited to 150 feet (45 720 mm) by 150 feet (45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet in width.

**~~M2302.2.2.2.2~~ R324.3.3.2.2 Hip roof layouts.** Panels and modules installed on ~~one and two family dwellings~~ with hip roof layouts shall be located in a manner that provides a 3-foot-wide (914 mm) clear access pathway from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located at a structurally strong location on the building capable of supporting the live load of fire fighters accessing the roof.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) or less.

**~~M2302.2.2.2.3~~ R324.3.3 Single ridge roofs.** Panels and modules installed on dwellings with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

**Exception:** This requirement shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**~~M2302.2.2.2.4~~ R324.3.3.2.4 Roofs with hips and valleys.** Panels and modules installed on dwellings with roof hips or valleys shall be located not closer than 18 inches (457 mm) to a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18 inch clearance does not apply.

**Exception:** These requirements shall not apply to roofs with slopes of two units vertical in 12 units horizontal (2:12) and less.

**~~M2302.2.2.2.5~~ R324.3.3.2.5 Allowance for smoke ventilation operations.** Panels and modules installed on dwellings shall be located not less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.

**Exception:** Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:** This public comment takes the photovoltaic access and pathways requirements approved by the assembly on RM95-13 and move them to the new Section R324 for Solar Energy Systems, specifically to a subsection of R324.3 Photovoltaic energy systems, which was proposed by RM98-13 Part II. This move is necessary since RM98-13, Part 1, if approved, deletes section M2302. Other than section renumbering, specific edits made in the public comment to the approved as amended language are as follows:

This public comment only includes those changes from the original proposal, M2302.2.2 to M2302.2.2.2.5, that specifically address access and pathways, as remaining provisions are not necessary due to previous committee action on RM98-13. Also, several unnecessary references to one- and two-family dwellings were removed since this is the IRC.

R324.3.3, Exception 2 - It is recognized that providing access and pathways for rooftop photovoltaic systems is a significant firefighter safety issue if they are likely to be deployed on a rooftop during firefighting operations. However many local fire departments have policies in place to not allow rooftop operations. This exception will waive all access, pathway and spacing requirements for rooftop photovoltaic systems if the code official has determined that rooftop operations will not be deployed in the jurisdiction, which should be determined in consultation with the local fire chief.

R324.3.3.1 – No changes from approved as modified proposal.

R324.3.3.2 – Title changes from “Solar photovoltaic systems” to “Size and layout” to better reflect the requirements.

R324.3.3.2.1 to R324.3.3.2.5 – No changes from approved as modified proposal.

This public comment received input from several interested parties, including the fire service and industry. As stated by the Fire Code Committee on the IBC/IFC companion proposal, “The proposal also represents a successful collaborative effort between the fire service and the solar energy stakeholders.”

## **Public Comment 2:**

### **Douglas Smith, Kaysville City, Utah, representing Utah Chapter ICC, requests Disapproval.**

**Commenter's Reason:** Proposal RM95 should be disapproved because its provisions are too restrictive for residential photovoltaic systems and has flaws in its provisions. The Committee originally disapproved RM95 which has excessive provisions for roof access, array size, and requiring access for smoke ventilation techniques. The Committee's reason for disapproval was as such: “The proposed text is overkill for residential buildings and is more commercial property related. The text would prohibit PV installations on homes.” However, the Committee's decision was overturned and the proposal was modified and approved by assembly action. The Committee had it right to disapprove such restrictive requirements and are justified in their reason for doing so, but the assembly modification from the floor has also shown some flaws in that Section M2302.2.4 in the modification requires that all ground-mounted panels and modules meet the same requirements as those located on the roof. These requirements that *ground-mounted* systems must follow, as noted in the text, include: *roof* access and pathways, *roof* access points, *hip roof* layouts, *single ridge roofs*, *roofs* with hips and valleys, allowance for smoke ventilation requirements (at the *roof*), and *roof* penetrations. To require ground-mounted systems to meet the same requirements for those on the roof does not make any sense. From this we can see that when writing code, modifications from the floor is not good practice and this is evident here, which further justifies disapproving RM95 altogether.

There are some portions of this proposal that already exist and are word for word in the 2012 IRC, such as: M2302.2 Requirements, M2302.2.1 Roof-mounted panels and modules, M2302.2.3 Roof and wall penetrations, M2302.2.4 Ground-mounted panels and modules (except that proposal RM95 states they also must meet the new roofing requirements), M2302.2.5 Photovoltaic panels and modules, and M2302.2.6 Inverters. All these noted sections would remain as worded in the 2012 IRC (other than M2302.2.4) if RM95 is disapproved and would not be effected other than by numbering of sections.

Disapproval of RM95 would mean that all its excessive requirements for roof access, array size, roof venting, and the requirements for ground-mounted systems meeting the roofing requirements would all be kept out of the IRC. The Committee had it right the first time, RM95 needs to be disapproved.

### **RM95-13**

Final Action:                      AS                      AM                      AMPC\_\_\_\_\_                      D

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## RM97-13, Part II

### M2302

**NOTE:** PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART I IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.

#### Proposed Change as Submitted

**Proponents:** John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

#### PART II – IRC- BUILDING

Revise as follows:

#### SECTION M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS

**M2302.1 General.** This section provides for the design, construction, installation, alteration, and repair of photovoltaic equipment and systems.

**M2302.2 General Requirements.** The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections ~~M2302.2.4~~ M2302.3 through ~~M2302.2.3~~ M2302.8 and NFPA 70.

~~**M2302.2.4**~~ ~~**M2302.3**~~ **Roof-mounted panels and modules photovoltaic panel systems.** Rooftop-mounted photovoltaic panel systems shall be designed in accordance with this section. ~~The roof shall be constructed to support the loads imposed by roof-mounted solar collectors. Roof-mounted solar collectors that serve as a roof covering shall conform to the requirements for roof coverings in Chapter 9 of this code. Where mounted on or above the roof coverings, the collectors and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction.~~

**M2302.3.1 Structural requirements.** Rooftop-mounted photovoltaic panel systems shall be designed in accordance with the *International Building Code* to support the system and withstand applicable loads. The roof shall be constructed to support the loads imposed by rooftop-mounted photovoltaic panel systems in accordance with Chapter 8 of this code or the *International Building Code*.

**M2302.3.1.1 Wind load.** Rooftop-mounted photovoltaic panel systems shall be designed for wind load in accordance with the *International Building Code* and ASCE 7, using an effective wind area in accordance with ASCE 7.

**M2302.3.1.2 Roof live load.** Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load  $L_R$  for the load case when the photovoltaic panel system is not present.

**M2302.4 Building integrated photovoltaic systems.** Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section R905.16.

~~**M2302.2.2 M2302.5 Roof and wall penetrations.**~~ Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9, ~~to prevent entry of water, rodents, and insects.~~

~~**M2302.2.3 M2302.6 Ground-mounted panels and modules, photovoltaic panel systems.**~~ Ground-mounted panels and modules photovoltaic panel systems shall be designed in accordance with the International Building Code and installed in accordance with the manufacturer's instructions.

~~**M2302.3 M2302.7 Photovoltaic panels and modules.**~~ Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

~~**M2302.4 M2302.8 Inverters.**~~ Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**Reason:** This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems. Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete. Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

**Cost Impact:** This proposal will reduce construction costs.

M2302.2-RM-CAIN-SMIRNOW.DOC

## **Committee Action Hearing Results**

**PART II – IRC – Building  
Committee Action:**

**Approved as Modified**

**Replace the proposal as follows:**

**R324.3.1.1 Roof live load.** Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the areas covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. Roof structures that provide support for photovoltaic panel systems shall be designed for live load  $L_R$  for the load case when the photovoltaic panel system is not present.

**Committee Reason:** Approval was based upon the proponent's published reason and the modification. The modification clarifies how to design the PV system for roof live load and correlates with previous action on RM98-13, Part II.

**Assembly Action:**

**None**

### **Individual Consideration Agenda**

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

*Public Comment:*

**John Smirnow and Joseph H. Cain, P.E, representing Solar Energy Industries Association (SEIA), request Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**R324.3.1.1 Roof live load.** Roof structures that provide support for photovoltaic panel systems shall be designed for applicable roof live load. The design of roof structures need not include roof live load in the area(s) covered by photovoltaic panel systems. Portions of roof structures not covered by photovoltaic panels shall be designed for roof live load. ~~The exclusion of the roof live load in the area(s) covered by the panels does not preclude the design of building roofs from being designed for roof live load requirements for the loading condition where the photovoltaic panel system may be removed or not installed.~~ Roof structures that provide support for photovoltaic panel systems shall be designed for live load  $L_R$  for the load case where the photovoltaic panel system is not present.

**Commenter's Reason:** The purpose of this proposal is to correct a mistake in the SEIA Floor Modification only.

Proposal RM97-13 Part II was Approved as Modified by unanimous vote of the IRC-Building Committee. The Floor Modification submitted by the Solar Energy Industries Association (SEIA) was to strike out all sections other than the section on Roof live load, with intent to keep the language in the Roof live load section unchanged. SEIA testimony to the IRC-Building Committee included statements that the language in this remaining section was unchanged from the Monograph.

The Floor Modification also revised the section number to correlate with the language approved by the IRC-Building Committee under RM98-13 Part II.

After the committee vote, ICC staff recognized that the SEIA Floor Modification inadvertently and erroneously reintroduced old language in the last sentence that was revised prior to publishing the Group B Monograph. This was never our intent. This proposal strikes out the erroneous last sentence inadvertently reintroduced in the Floor Modification, and replaces it with the correct last sentence as published in the Monograph. This will restore clarity for readers of the IRC.

Further to this correction, note the correct last sentence – as included in this Public Comment – was inadvertently published in the Report on Committee Hearings, even though the last sentence in the Floor Modification was incorrect. An Errata Update is expected that will correct the record by showing the Floor Modification last sentence, even though it was incorrect. This Public Comment will restore the correct last sentence, as shown in the Monograph.

#### **RM97-13, Part II**

Final Action:                      AS                      AM                      AMPC \_\_\_\_\_                      D

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**NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE**

**RM97 – 13, Part I  
M2302**

**Proponents:** John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA)  
(jsmirnow@seia.org)

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

**PART I – IRC- MECHANICAL**

**Add new definitions as follows:**

**BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT.** A building product that incorporates photovoltaic modules and functions as a component of the building envelope.

**PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, designed to generate DC power when exposed to sunlight.

**PHOTOVOLTAIC PANEL.** A collection of modules mechanically fastened together, wired, and designed to provide a field-installable unit.

**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that converts solar radiation into electricity, including rack support systems.

**Revise as follows:**

**PHOTOVOLTAIC MODULES/SHINGLES.** A roof covering composed of flat-plate photovoltaic modules fabricated into shingles that resembles shingles and that incorporates photovoltaic modules.

**Reason:** This code change proposal is the result of a consensus process established by the Solar Energy Industries Association's (SEIA) Codes and Standards Working Group. Established in 1974, SEIA is the national trade association of the U.S. solar energy industry. As the voice of the industry, SEIA works with its member companies to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy.

New definitions are added to provide clarity in requirements for photovoltaic systems.

Sections are re-numbered for better flow.

The sentence that references "roof mounted solar collectors that serve as a roof covering" is relocated into its own section and revised to clarify the requirements for Building Integrated Photovoltaic (BIPV) systems.

The sentence that references "noncombustible materials or fire-retardant treated wood" is deleted, as it is obsolete.

Photovoltaic panel systems are constructed entirely of noncombustible components, other than seals between the glass panels and frames.

The first sentence of M2302.3.1 clarifies the system of hardware that becomes the mounting system for rooftop-mounted photovoltaic panel systems must be qualified by methods found in the International Building Code. There are no applicable provisions found in the International Residential Code for these systems of mounting hardware. These mounting systems must be qualified by calculations or physical testing, as prescribed in the IBC. New definitions are needed to provide this clarity.

The second sentence of M2302.3.1 clarifies the roof system must be checked or designed to support the resultant loads imposed on it by the mounting system of the photovoltaic panel system. This check can be accomplished by using appropriate span tables in IRC Chapter 8, or by structural analysis according to IBC provisions.

A new section on wind load is added for guidance to appropriate codes and standards where wind design provisions are found. Effective Wind Area is defined in ASCE 7-10 Section 26.2. Effective Wind Area is also referenced in Footnote a of Table R301.2(2) of this code. Effective Wind Area used in design of photovoltaic systems must be consistent with the definition found in ASCE 7 in order to be compatible with the wind design calculation methods found in ASCE 7.

A new section on roof live load is added to clarify provisions already formalized in Final Action for the 2015 IBC, with some modifications as appropriate for one- and two-family dwellings. In one load case, roof live load need not be modeled in the area(s) of the roof covered by PV panels, as nobody will be walking on top of the panels or on the roof area covered by the panels. In another load case for new construction, the code-prescribed roof live load must be modeled as if the photovoltaic panels are not present.

The section on ground-mounted systems is revised to clarify that design provisions applicable to ground mount installations are found in the IBC and not found within the IRC.

**Cost Impact:** This proposal will reduce construction costs.

**PART I – IRC – Mechanical**

**Committee Action:**

**Disapproved**

**Committee Reason:** The proponent asked for disapproval because the definitions were addressed in other proposals.

**Assembly Action:**

**None**

## RM98-13, Part II

### R902, R905, R908 (New)

*NOTE: PART I DID NOT RECEIVE A PUBLIC COMMENT AND IS ON THE CONSENT AGENDA. PART II IS REPRODUCED FOR INFORMATIONAL PURPOSES ONLY FOLLOWING ALL OF PART II.*

#### **Proposed Change as Submitted**

**Proponent:** Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY THE IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

#### **PART II – IRC- BUILDING**

#### **SECTION R902 ROOF FIRE CLASSIFICATION**

**Revise as follows:**

**R902.1 Roofing covering materials.** Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in ~~areas~~ jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line. Classes A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E 108.

#### **Exceptions:**

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 oz/ft<sup>2</sup> copper sheets installed over combustible decks.

**R902.3 Building integrated photovoltaic product.** Building integrated photovoltaic products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section R902.1.

**R902.4 Rooftop mounted photovoltaic panels and modules.** Rooftop mounted photovoltaic panels and modules installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 1703. Class A, B or C photovoltaic panels and modules shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

#### **SECTION R905 REQUIREMENTS FOR ROOF COVERINGS**

**R905.16 Photovoltaic ~~modules/shingles~~.** The installation of photovoltaic ~~modules/shingles~~ shall comply with the provisions of this section.

**R905.16.1 Material standards.** Photovoltaic ~~modules/shingles~~ shall be listed and labeled in accordance with UL 1703.

**R905.16.2 Attachment.** Photovoltaic modules/shingles shall be attached in accordance with the manufacturer's installation instructions.

**R905.16.3 Wind resistance.** Photovoltaic modules/shingles shall be tested in accordance with procedures and acceptance criteria in ASTM D 3161. Photovoltaic modules/shingles shall comply with the classification requirements of Table R905.2.4.1(2) for the appropriate maximum basic wind speed. Photovoltaic module/shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D 3161 and the required classification from Table R905.2.4.1(2).

## **SECTION R908** **ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS**

**R908.1 General.** The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, the *International Fire Code* and *NFPA 70*.

**R908.1.1 Material standards.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

**R908.1.2 Structural requirements.** Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable loads in accordance with Chapter 3. The roof upon which these systems are installed shall be constructed to support the loads imposed by such systems in accordance with Chapter 8.

**R908.1.3 Installation.** Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter.

Add new text as follows:

## **SECTION 324** **SOLAR ENERGY SYSTEMS**

**R324.1 General.** Solar energy systems shall comply with the provisions of this section.

**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23 and the *International Fire Code*.

**R324.3 Photovoltaic solar energy systems.** Photovoltaic energy systems shall be designed and installed in accordance with this section, the *International Fire Code* and *NFPA 70*. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**R324.3.1 Rooftop mounted photovoltaic systems.** Rooftop mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section 908.

**R324.3.2 Building integrated photovoltaic systems.** Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section 905.

**R324.3.2.1 Photovoltaic shingles.** Photovoltaic shingles shall comply with Section R905.16.

**R324.4 Ground mounted photovoltaic systems.** Ground mounted photovoltaic systems shall be designed and installed in accordance with Section R301.

**R324.4.1 Fire Separation distances.** Ground mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

**Reason:** Currently, provisions for solar energy systems are sprinkled throughout the International Residential Code. Furthermore, there are also significant gaps, many of which were debated and approved in the 2015 *International Building Code* development process. This proposed change consolidates and organizes these provisions, with necessary section revisions, and section additions, in an easily used format that also sets the stage for easy integration of code requirements for new solar energy technology and applications as they emerge in the market. The following is an explanation of each new and revised section pertinent to the newly proposed Section R324 Solar Energy Systems:

**1. Chapter 2 New Definitions Section R202:**

Four definitions are added for BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT, PHOTOVOLTAIC MODULE, PHOTOVOLTAIC PANEL and PHOTOVOLTAIC PANEL SYSTEM. All of these definitions are necessary and were approved for inclusion in the 2015 *International Building Code*.

**2. Chapter 2 Revised Definition Section R202:**

A revised definition for PHOTOVOLTAIC SHINGLES is proposed, which was also approved for inclusion in the 2015 *International Building Code*.

**3. Add new SECTION R324 SOLAR ENERGY SYSTEMS:**

Chapter 3 is entitled Building Planning and therefore is an appropriate place to list the general provisions for installation of solar energy systems on buildings within the scope of the *International Residential Code*. Newly proposed Section 324 contains general provisions for solar energy systems and then, with subsections, serves as pointers to specific code requirements for solar energy systems based on type and location. This section is based upon requirements generally found in Chapter 23 which this proposal also revises. See below for details.

Setting up this section will also allow easy inclusion for new solar energy system types and locations. For example, if there are building integrated photovoltaic wall systems, a new subsection can be created, with an appropriate reference to Chapter 7.

**4. Revise Section R902 Roof Classification:**

This section has been renamed Fire Classification in order to clarify the subject of the section. Two new sections have been added to clearly identify the fire classification requirements for both building integrated photovoltaic products that serve as the roof covering and rooftop mounted photovoltaic panel systems. There is also a change to clarify Section 902.1, where the word "area" was changed to "jurisdiction" because there has been interpretation that the word "area" referred to is a place on the roof itself rather than a geographic area, such as the Urban Wildfire Interface Zone or other jurisdictional requirements for fire classified roofs. Section 902 is in place to prevent fire from spreading from rooftop to rooftop.

**5. Revise Section R902.16 Photovoltaic Shingles:**

This section, along with the revised definition for photovoltaic shingles, has been editorially revised to match comparable changes approved in the 2015 *International Building Code*.

**6. Add new section R908 ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS:**

This new section outlines specific requirements for rooftop photovoltaic panel systems installed on or above roof coverings. As shown, material standards, structural requirements and installation details for these systems is detailed.

**7. Revise CHAPTER 23 and delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:**

Chapter 23 is renamed as SOLAR THERMAL ENERGY SYSTEMS which limits the chapter to solar thermal energy systems only as identified in newly proposed R324.

**8. Delete Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS:**

As shown in Item 7, Chapter 23 is limited to solar thermal energy systems only. Therefore, Section M2302 PHOTOVOLTAIC SOLAR ENERGY SYSTEMS is deleted. Photovoltaic energy systems are electrical in nature. Placing requirements for these systems in the Mechanical part of the code is illogical and was only added in the 2012 International Residential Code because there was no other available place. This proposal sets up a new section R324 in Chapter 3 Building Planning for all solar energy systems with pointers to the type of system that will be used on the building. Provisions for photovoltaic energy systems currently in Section M2302 have been moved as appropriate to the newly proposed R324 SOLAR ENERGY SYSTEMS.

**Cost Impact:** This code change does not increase the cost of construction.

M2302-RM-ROSS.DOC

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## **Committee Action Hearing Results**

The code change is contained in the [Updates to the 2013 Proposed Changes](http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf) posted on the ICC website. Please go to <http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf> for more information.

### **PART II – IRC – Building Committee Action:**

**Approved as Modified**

**Modify the proposal as follows:**

**R908.1 General.** The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code, the *International Fire Code* and *NFPA 70*.

**R908.1.2 Structural requirements.** Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

*(Portions of proposal not shown remain unchanged)*

**Committee Reason:** Approval was based upon the proponent's published reason and the modification. The modification deleted reference to the IFC and added the requirement that the PV system must be design for the gravity loads and the roof support system must be designed to support the PV system loads.

**Assembly Action:**

**None**

### **Individual Consideration Agenda**

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

*Public Comment 1:*

**Lorraine A Ross, Intech Consulting Inc, representing The Dow Chemical Company, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

#### **SECTION R324 SOLAR ENERGY SYSTEMS**

**R324.1 General.** Solar energy systems shall comply with the provisions of this section.

**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23 ~~and the International Fire Code.~~

**R324.3 Photovoltaic solar energy systems.** Photovoltaic solar energy systems shall be designed and installed in accordance with this section, ~~the International Fire Code and NFPA 70.~~ Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

*(Portions of approved proposal not shown remain unchanged)*

**Commenter's Reason:** As stated in the Report of Hearing, RM 98 was approved based upon the proponent's published reason and the modification. The modification deleted reference to the IFC and added the requirement that the PV system must be designed for the gravity loads and the roof support system must be designed to support the PV system loads.

This public comment is a "clean-up" of Section R324 by deleting the reference to the IFC in conformance with the modification approved at the Dallas hearings. This Public Comment also editorially inserts the "R" designation to the section title and adds the word "solar" in the first sentence of R324.3 for clarity.

*Public Comment 2:*

**Kevin Reinertson, Division Chief, Representing the California State Fire Marshal's Office; John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA); Adria Smith, Fountain Valley Fire Department, representing the California Fire Chiefs Association; And Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, request Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

#### **SECTION R324 SOLAR ENERGY SYSTEMS**

**R324.1 General.** Solar energy systems shall comply with the provisions of this section.

**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23 ~~and the International Fire Code.~~

**R324.3 Photovoltaic solar energy systems.** Photovoltaic energy systems shall be designed and installed in accordance with this section, ~~the International Fire Code~~ and NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**R324.3.1 Equipment listings.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

**R324.4 R324.3.1 Rooftop mounted photovoltaic systems.** Rooftop mounted photovoltaic panel systems installed on or above the roof covering shall be designed and installed in accordance with Section ~~R908~~ 908.

**R324.5 R324.3.2 Building integrated photovoltaic systems.** Building integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section ~~R905~~ 905.

**R324.5.1 R324.3.2.1 Photovoltaic shingles.** Photovoltaic shingles shall comply with Section R905.16.

**R324.6 R324.4 Ground mounted photovoltaic systems.** Ground mounted photovoltaic systems shall be designed and installed in accordance with ~~Chapter 3 Section R304~~.

**R324.6.1 R324.4.1 Fire Separation distances.** Ground mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

## SECTION R908 ROOFTOP MOUNTED PHOTOVOLTAIC PANEL SYSTEMS

**R908.1 General.** The installation of photovoltaic panel systems that are mounted on or above the roof covering shall comply with the provisions of this code ~~this section, section R324,~~ and NFPA 70.

**R908.1.1 Material standards.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

**R908.2 R908.1.2 Structural requirements.** Rooftop mounted photovoltaic panel systems shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof upon which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

**R908.3 R908.1.3 Installation.** Rooftop mounted photovoltaic systems shall be installed in accordance with the manufacturer's instructions. Roof penetrations shall be flashed and sealed in accordance with this chapter.

**Commenter's Reason:** This public comment cleans up the proposal as follows.

General – For consistency the term “photovoltaic systems” replaces “photovoltaic energy systems” and “photovoltaic panel systems”.

R324.2 – Reference to the IFC was deleted since it does not include specific requirements for solar thermal systems.

R324.3 – Reference to the IFC was deleted to be consistent with R908.1.

R324.3.1 – A title was added to this section, which focuses on listing requirements. The listing requirements for photovoltaic panels and modules was moved from R908.1.1 to here because this is a more logical location, and since listing of these devices is also required for ground mounted systems.

R324.6 – The structural requirements were revised from Section R301.1 to Chapter 3 to be consistent with R908.2.

R908.1 – For the convenience of the code user a reference to Section R324 was added.

R908.1.1 – As previously mentioned, these requirements were moved to R324.3.1.

### *Public Comment 3:*

**Steve Orlowski, representing National Association Of Home Builders, requests Approval as Modified by this Public Comment.**

**Modify the proposal as follows:**

**R324.3 Photovoltaic solar energy systems.** Photovoltaic energy systems shall be designed and installed in accordance with this section, ~~the International Fire Code~~ and NFPA 70. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

*(Portions of proposal not shown remain unchanged)*

**Commenter's Reason:** This public comment correlates action taken by the committee when it approved the modification at the Dallas hearings. The proponent of the original code change submitted a modification deleting the reference to the International Fire Code, after the committee approved a code change that brought the requirements directly into the IRC. The committee failed to delete this additional reference to the IFC, in this section, because it was referenced in the errata which did not appear in the original monograph or in the modification that was approved.

**NOTE: PART I REPRODUCED FOR INFORMATIONAL PURPOSES ONLY – SEE ABOVE**

**RM98 – 13, Part I  
202, M2302**

**Proponents:** John Smirnow and Joseph H. Cain P.E. representing Solar Energy Industries Association (SEIA) (jsmirnow@seia.org)

**Proponent:** Lorraine Ross, Intech Consulting Inc., representing The Dow Chemical Company

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IRC-PLUMBING/MECHANICAL COMMITTEE; PART II WILL BE HEARD BY THE IRC-RESIDENTIAL/BUILDING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

**PART I - IRC- MECHANICAL**

**Add new definitions as follows:**

**SECTION 202  
DEFINITIONS**

**BUILDING INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates photovoltaic modules, and functions as a component of the building envelope.

**PHOTOVOLTAIC MODULE.** A complete environmentally protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power when exposed to sunlight.

**PHOTOVOLTAIC PANEL.** A collection of photovoltaic modules mechanically fastened together, wired, and designed to provide a field-installable unit.

**PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels, that convert solar radiation into electricity, including rack support systems.

**Revise as follows:**

**PHOTOVOLTAIC MODULES/SHINGLES.** A roof covering composed of flat-plate photovoltaic modules fabricated into resembles shingles and that incorporates photovoltaic modules.

**CHAPTER 23  
SOLAR THERMAL ENERGY SYSTEMS**

**Delete without substitution:**

**SECTION M2302  
PHOTOVOLTAIC SOLAR ENERGY SYSTEMS**

**SECTION M2302  
PHOTOVOLTAIC SOLAR ENERGY SYSTEMS**

**M2302.1 General.** This section provides for the design, construction, installation, alteration, and repair of photovoltaic equipment and systems.

**M2302.2 Requirements.** The installation, inspection, maintenance, repair and replacement of photovoltaic systems and all system components shall comply with the manufacturer's instructions, Sections M2302.2.1 through M2302.2.3 and NFPA 70.

**M2302.2.1 Roof-mounted panels and modules.** Where photovoltaic panels and modules are installed on roofs, the roof shall be constructed to support the loads imposed by such modules. Roof-mounted photovoltaic panels and modules that serve as roof covering shall conform to the requirements for roof coverings in Chapter 9. Where mounted on or above the roof coverings, the photovoltaic panels and modules and supporting structure shall be constructed of noncombustible materials or fire-retardant treated wood equivalent to that required for the roof construction

**M2302.2.2 Roof and wall penetrations.** Roof and wall penetrations shall be flashed and sealed in accordance with Chapter 9 to prevent entry of water, rodents, and insects.

**M2302.2.3 Ground-mounted panels and modules.** Ground-mounted panels and modules shall be installed in accordance with the manufacturer's instructions.

**M2302.3 Photovoltaic panels and modules.** Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703.

**M2302.4 Inverters.** Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

The code change is contained in the [Updates to the 2013 Proposed Changes](http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf) posted on the ICC website. Please go to <http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf> for more information.

**PART I – IRC – Mechanical**  
**Committee Action:**

**Approved as Submitted**

**Committee Reason:** Approval was based upon the proponent's published reason. PV is not mechanical and does not belong in Chapter 23.

**Assembly Action:**

**None**