

PM7-16 (Heard by IFC Committee)

IPMC: 705 (New), [F] 705.1 (New), [F] 705.2 (New).

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2015 International Property Maintenance Code

Add new text as follows:

SECTION 705 CARBON MONOXIDE ALARMS

[F] 705.1 General. Carbon monoxide alarms shall be installed in dwellings in accordance with Section 1103.9 of the International Fire Code, except that alarms in dwellings covered by the International Residential Code shall be installed in accordance with Section R315 of that code.

~~[F] 705.2 Deadline for compliance. Where a carbon monoxide alarm is not already installed or required elsewhere, section 705.1 does not apply until January 1, 2019.*~~

Reason: International Fire Code Section 1103.9
International Residential Code Section R315

In 2011, 49 million homes had carbon monoxide alarms.¹ Almost 4.5 million more homes had an alarm in 2011, compared to 2009.² These alarms protect residents and their guests from carbon monoxide poisoning, which kills more than 300 people annually and hurts thousands more.³ The carbon monoxide typically results from incomplete combustion of a fuel, usually when a vehicle, furnace, water heater, or fireplace is either functioning poorly or is warming up and has not yet reached optimum performance.⁴ The risk is greatest where there are older appliances or where the garage is not properly isolated from the occupied area.

When carbon monoxide exposes residents to dangerous levels of this odorless, tasteless, invisible gas, the alarm warns them to get to safety before their brains are so starved of oxygen that they become sleepy or disoriented and unable to escape.³ The alarm complements the many educational and code-related efforts to reduce carbon monoxide generation and exposure and serves to prevent death and serious harm much as a smoke alarm does.

According to health and safety experts at the Centers for Disease Control and Prevention (CDC),³ the U.S. Consumer Product Safety Commission (CPSC)⁵ and the National Fire Protection Association (NFPA),⁶ all dwellings with either an attached garage or a fuel-burning appliance should have a functioning carbon monoxide alarm. Recognizing the gaps in the existing codes, elected officials in the many states have adopted laws requiring the alarms, often in response to a tragedy.⁷ The National Electric Manufacturers Association (NEMA)⁸ also agrees. A decade ago, a five-year Underwriters Laboratory study confirmed the reliability of the alarms and concluded the alarms are not susceptible to nuisance activations.⁹

The ICC's International Fire Code (IFC) section 1103.9 and International Residential Code (IRC) section R315.3 now require carbon monoxide alarms in almost all dwellings with an attached garage or fuel-burning appliance. The IRC requirement is triggered by new construction or work requiring any permit without regard to whether the work affected a fuel-burning appliance. The IFC requirement applies to Group I and R occupancies (with a limited exception) and, therefore, not to homes covered by the IRC. Because the IFC alarm requirement is in a maintenance provision in Chapter 11, it applies to existing conditions and operations pursuant to section 102.2 and not only construction. While the maintenance provisions of section 1103 may result in the need for a permit pursuant to section 1103.1 to correct deficiencies, they are not triggered solely by a permit.

This proposal adds new section 705.1 to the IPMC to require homes to have a carbon monoxide alarm consistent with the applicable IFC section 1103.9 or IRC section R315.3. The proposal also adds a new section 705.2 to delay the application of the carbon monoxide alarm requirement under section 705.1 until January 1, 2019 so that property owners have three years to comply. Where states have required carbon monoxide alarms in homes, they commonly only provide 18 not 36 months to comply so three years from the date that the revised IPMC is final should be more than adequate.

In Group I and R occupancies where the IFC applies, the proposal will improve compliance by providing property owners with another reminder to install an alarm. If a jurisdiction has elected to limit the IFC requirement so it is triggered only by a construction permit, then it would most likely elect to do the same here. There are very few communities that have adopted the IFC but not the IPMC.¹⁰

For homes covered by the IRC, this proposal will address a serious problem with the IRC approach. By making the alarm requirement contingent on the need for a permit, it does not protect the residents of homes at greatest risk of carbon monoxide poisoning because they are not making improvements and likely have the oldest fuel-burning appliances. As a result, the residents who would benefit most from an alarm are the least likely to be required to have one. This proposal corrects that problem.

Bibliography:

¹ American Housing Survey for the United States: 2011, U.S. Census Bureau, 2013, p. 37, <http://www.census.gov/content/dam/Census/programs-surveys/ahs/data/2011/h150-11.pdf>.

² American Housing Survey for the United States: 2009, U.S. Census Bureau, 2011, p. 18, <http://www.census.gov/programs-surveys/ahs/data/2009/h150-09.html>.

³ Carbon Monoxide Poisoning Frequently Asked Questions webpage, Centers for Disease Control and Prevention, accessed January 8, 2015 at <http://www.cdc.gov/co/faqs.htm>.

⁴ Carbon Monoxide: Background, American Gas Association, accessed January 8, 2015 at <https://www.aga.org/carbon-monoxide>.

⁵ CPSC Recommends Carbon Monoxide Alarm for Every Home, Consumer Products Safety Commission, Release#01-069, 2001, <http://www.cpsc.gov/en/Recalls/2001/CPSC-Recommends-Carbon-Monoxide-Alarm-for-Every-Home/>.

⁶ Carbon Monoxide Safety Tips, National Fire Protection Association, accessed January 8, 2015 at <http://www.nfpa.org/safety->

information/for-consumers/fire-and-safety-equipment/carbon-monoxide/carbon-monoxide-safety-tips.

⁷ CO Detection Requirements webpage, Life Safety Solutions Online, accessed January 8, 2015 at <http://www.lifesafetysolutionsonline.org/co-detection-requirements/>.

⁸ Recommend Policies, State and Local Legislation for Carbon Monoxide Life Safety Device Legislation and Local Ordinance Drafting, National Electric Manufacturers Association, 2013, <http://www.lifesafetysolutionsonline.org/wp-content/uploads/2014/03/NEMA-Recommendations-on-State-CO-Legislation-2013.pdf>.

⁹ Carbon Monoxide Alarm Field Study, Underwriters Laboratories, 2002, <http://ulstandardsinfonet.ul.com/stp/addinfo/old/CARBON%20MONOXIDE%20ALARM%20FIELD%20STUDY.pdf>

¹⁰ International Codes-Adoption by Jurisdiction (December 2014), International Code Council, 2014, www.iccsafe.org/gr/Documents/stateadoptions.pdf.

¹¹ 2007 Performance and Accountability Report, U.S. Consumer Products Safety Commission, 2007, p. 41, <http://www.cpsc.gov/en/Media/Documents/About/Budget-and-Performance/Annual-Performance-Reports/Archive/2007-Performance-and-Accountability-Report/>.

¹² Hospital burden of unintentional carbon monoxide poisoning in the United States, 2007, *Am J Emerg Med* 2012 Jun;30(5):657-64. doi: 10.1016/j.ajem.2011.03.003, Iqbal S, Law HZ, Clower JH, Yip FY, Elixhauser A, <http://www.ajemjournal.com/article/S0735-6757%2811%2900105-7/abstract>.

¹³ Carbon Monoxide-Related Hospitalizations in the U.S.: Evaluation of a Web-Based Query System for Public Health Surveillance, *Public Health Rep.* 2010 May-Jun; 125(3): 423-432, Iqbal S, Clower JH, Boehmer TK, Yip FY, Garbe P, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2848267/>.

¹⁴ Non-Fire Carbon Monoxide Incidents, National Fire Protection Association, 2012, <http://www.nfpa.org/~/media/Files/Research/NFPA%20reports/Non%20fire%20Incidents/osnonfirecarbonmonoxide.pdf>.

Cost Impact: Will increase the cost of construction

COSTS:

Carbon monoxide (CO) alarms listed as complying with ANSI/UL standards typically costs approximately \$25 and are usually relatively simple to install. We estimate the total installed cost to be \$42 per dwelling.

According to the 2011 American Housing Survey (AHS),¹ an estimated 49 of 115 million occupied homes (42% of all homes) had working carbon monoxide alarms/detectors. About half of these detectors were powered only by batteries. Overall, 46% of owner-occupied homes and 33% of renters had detectors. The rates varied by region of the country with the Northeast at 65%, the Midwest at 54%, the West at 30%, and the South at 27%. The AHS does not track garages that are attached separately from those that are not attached.

Since IFC's requirements already apply to Group I and R occupancies, we analyzed the AHS data for 2011 for one- and two-family homes with fuel-burning appliances. For these homes, we found 43% had working carbon monoxide alarms, a rate similar to that for all homes. Because the IFC, IRC, and many state laws already require CO alarms in many existing dwellings, it appears that many homes already required to have an alarm under the code still do not have one. For those dwellings, the proposal will primarily improve compliance rates rather than increase the cost of construction.

Our cost analysis focused on those dwellings not already required to have an alarm. To conduct that analysis, we evaluated each state as follows:

- **Statewide IFC:** The IFC has been adopted statewide in 29 states and locally in 11 more.¹⁰ Unless the state or locality opted not to adopt Section 1103.9 of the IFC, or if a limited exception applies, a CO alarm is required in all dwelling units in Group I or R occupancies containing a fuel-burning appliance or that have an attached garage (other than an open parking garage or ventilated enclosed parking garage). The units must be equipped with a single station CO alarm listed as complying with UL 2034 installed and maintained in accordance with NFPA 720 and the manufacturer's instructions. In these jurisdictions, the proposal will improve compliance with IFC in Group I and R occupancies.
 - Twenty-five of these 29 states also have a statewide IRC.¹⁰ Therefore, the proposal will only increase construction cost in homes covered by the IRC that have not had a permit since the 2012 edition of the IRC goes into effect in the jurisdiction. These are also the homes most in need of a CO alarm.
 - Four of the 29 states only have a local IRC.¹⁰ Alaska already requires alarms in all homes; Arizona and Tennessee have adopted the 2009 edition of the IRC statewide.⁷ In South Dakota, all local jurisdictions listed by ICC have adopted the IRC. In these three states, the proposal will only increase construction cost in homes covered by the IRC that will not have had a permit when the 2012 edition of the IRC is effective in the jurisdiction.
- **Statewide IRC:** Sixteen states have a statewide IRC but not a statewide IFC.¹⁰
 - Eight of the 16 states lack a local IFC. Two states, Massachusetts and Rhode Island, already require alarms in all homes.⁷ West Virginia requires alarms in most occupancies covered by the IFC and in rentals covered by the IRC. Maryland requires alarms in Group R occupancies. Michigan gave the state commission authority to require alarms and all localities adopting the ICC have already adopted the IFC. Florida, Hawaii, and Maine do not have localities that have adopted the IPMC so they won't be affected. Therefore, in two of the eight states, the proposal will only increase construction cost in homes covered by the IRC that will have not had a permit when the 2012 edition of the IRC is effective in the jurisdiction.
 - Eight of the 16 states have a local IFC. In Missouri, Montana, Nebraska, Nevada, North Dakota, and Texas, all or most localities adopting ICC codes have adopted the IFC. Montana requires alarms in rentals.⁷ New Hampshire requires alarms at substantial rehabilitations. In Louisiana, four localities have adopted the IPMC and not the IFC. Therefore, these states and the few localities that have adopted the IPMC but not the IFC will be impacted in Group I and R occupancies. In all eight, the proposal will increase construction cost in homes covered by the IRC that will not have had a permit when the 2012 edition of the IRC is effective in the jurisdiction.
- **No Statewide IRC and IFC:** Only five states have adopted neither the IRC nor IFC statewide:
 - Colorado: State law already requires CO alarms in all homes.⁷ Therefore, the proposal will only improve compliance and not increase construction costs.
 - Delaware: Of the ten localities that have adopted any of the ICC codes, four have adopted the IFC, all have adopted the IRC, and six have adopted the IPMC.¹⁰ In the six localities adopting the IPMC, four have adopted the IFC. Therefore, the proposal will primarily improve compliance and increase construction costs in two counties in Group I and R occupancies, and in all

ten, in homes that will not have had a permit when the 2012 edition of the IRC is effective in the jurisdiction.

- o Illinois: The state already requires CO alarms in all homes.⁷ Therefore, the proposal will only improve compliance and not increase construction costs.
- o Vermont: No localities have adopted any of the ICC codes, so it would be unaffected by the proposal.¹⁰ In addition, the state already requires a CO alarm for all but one-family dwellings; in those homes, the alarm must be installed when the home is sold.⁷ Therefore, the proposal will not increase construction costs.
- o Wisconsin: Of the two localities that have adopted any of the ICC codes, both have adopted the IFC.¹⁰ In addition, Wisconsin state law requires a CO alarm for all but one- and two-family homes.⁷ Therefore, the proposal will only improve compliance and not affect construction cost.

In summary, in Group I and R occupancies in the minority of states and localities without the IFC or an existing state law mandating compliance, the proposal will increase costs by \$42 per unit. For homes covered by the IRC, the proposal will accelerate the requirement to install CO alarms. In the few localities that have the IPMC but not the IRC, the proposal will increase costs by \$42 per home.

BENEFITS:

The benefits of a CO alarm in fewer deaths, emergency room visits, hospitalizations, treatment, and rehabilitation far outweigh the \$42 per dwelling cost. The U.S. Consumer Product Safety Commission (CPSC) estimated the societal costs of unintentional non-fire CO poisoning deaths associated with consumer products at \$705 million annually from 1999 to 2002.¹¹

A 2012 study¹² estimated that the hospitalization cost for confirmed carbon monoxide poisonings was more than \$26 million in 2007, based on 21,304 emergency room visits and 2,302 hospitalizations. This estimate only includes the cost of confirmed hospitalizations and not (1) the rehabilitation and long-term treatment costs, and (2) the thousands of cases where the poisoning occurred but was not confirmed, usually because the person was unaware of the exposure. In 2007, for every confirmed case there were an estimated five probable or suspected cases.¹³ More recent numbers are not available, though they should have decreased due to the actions by state and local legislatures, as well as implementation of the IRC and IFC after 2012.

Beyond victim hospitalization and treatment costs, carbon monoxide costs communities whose emergency responders respond to non-fire-related incidents. In 2012, the National Fire Protection Association estimated that municipal fire departments responded to an annual average of 72,000 of these incidents between 2006 and 2010, with 94% of the incidents occurring in residential properties and 73% in one- or two-family homes.¹⁴ The alarms are likely to increase the number of responses, but, based on the UL-study, few will be the result of nuisance alarms.⁹

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