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BUILDING CODES TOOLKIT



2012 International Energy Conservation Code Adoption Toolkit

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ADOPTION TOOLKIT

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Building energy codes and standards have an important impact on the multifamily industry. Today, apartment properties face new challenges as federal, state and local governments implement energy-efficiency initiatives that increasingly seek to control building energy performance through aggressive building codes. The apartment industry supports cost-effective and technologically feasible improvements to building energy performance. However, changes to existing energy codes and standards must address the specific needs of residential occupancies, including the continued affordability and availability of new apartment homes.

The International Energy Conservation Code (IECC) is the most widely adopted building energy code in the nation. Published by the International Code Council (ICC), the IECC provides design and construction criteria for the building envelope, mechanical and electrical systems, lighting and other energy uses associated with buildings. The code includes requirements for energy use in all building types but specifies substantially different requirements for commercial and residential properties. Multifamily buildings are unique because they fall within both sections. Multifamily buildings three stories or less in height (“low-rise buildings”) must comply with the IECC’s residential provisions, while multifamily buildings four stories or more (“high-rise buildings”) follow the code’s commercial requirements.

The IECC serves as the basis for most state and local building energy codes. However, it is not in effect or enforceable until adopted by a state or local jurisdiction. Accordingly, state and local governments may adopt the IECC in whole, in part or amend the model provisions to accommodate specific regional conditions.

This document is designed to assist code officials and apartment industry representatives as jurisdictions consider adoption of the latest IECC version – the 2012 IECC. It includes specific recommendations and model language for amending the 2012 IECC to accommodate the unique characteristics of multifamily properties.

The 2012 IECC

Efforts to significantly increase the energy savings requirements of the IECC began with the 2009 edition, which includes new and significantly altered provisions over previous code versions. In July 2011, the ICC published the 2012 edition of the IECC, which includes even more aggressive changes and considerable administrative differences compared to the 2009 code. It is estimated that the 2012 IECC will require a 30 percent increase in energy efficiency over 2006 levels.

To gain an understanding of the effects of these changes in the multifamily sector, the National Multi Housing Council (NMHC) and the National Apartment Association (NAA) commissioned a study examining the costs, benefits and practical limitations of the 2009 and 2012 IECC editions. The report, *Impact of the 2009 and 2012 International Energy Conservation Code in Multifamily Buildings* (www.nmhc.org/goto/55323), finds that the 2009 and 2012 codes will substantially impact apartment building design and construction costs and that compliance costs differ widely, based on the type and location of the building. These changes include the following:

- **New Air Leakage Limits and Air Sealing Testing Requirements** – beginning with visual inspections, leading to mandatory blower-door testing for low-rise buildings;

- **Increased Insulation Requirements** – will force changes to building framing and facade systems;
- **First-Ever Lighting Efficiency Requirements for Apartment Units** – mandates that 50 percent of lamps be high efficiency in 2009, increasing to 75 percent in 2012;
- **Increased Fenestration Requirements** – necessitating high-efficiency windows and insulated doors;
- **Enhanced Mechanical Systems** – including new duct tightness and testing requirements, new pipe insulation requirements and programmable thermostats;
- **New Requirements for High-Rise Properties** – including building commissioning and additional energy performance measures such as on-site energy production; and
- **New Performance Requirements for Building Amenities and Common Areas** – including enhanced pool features, new lighting controls and fireplace design requirements.

The full report is available at www.nmhc.org/goto/55323.

Recommended Amendments to the 2012 IECC¹

1) Revise Provision R402.4 (Air Leakage). The 2012 IECC establishes allowable air leakage levels for buildings and requires air leakage compliance testing. However, the IECC stipulates different test methods for low- and high-rise apartment buildings. Low-rise multifamily buildings (three stories or less in height) must conduct blower-door testing to determine air leakage levels, thereby eliminating the visual inspection option available in the 2009 IECC. High-rise buildings (four stories or more in height) have a choice of compliance methods – one option being blower-door testing.

NMHC/NAA recommend adding an exception to R402.4 that would allow low-rise multifamily buildings to use the same air leakage compliance methods provided for high-rise buildings. This amendment ensures that all multifamily properties are afforded the same flexibility in determining air leakage compliance methods without impacting building energy performance.

This is an important revision, as mandatory blower-door testing is problematic in the multifamily sector. The IECC blower-door test protocol is based on single-family residential construction. Of note, blower-door testing in apartments typically uses a sampling rate to test a certain proportion of building units without testing every apartment unit. However, the IECC does not provide specific multifamily test requirements, such as whole-building versus unit testing and appropriate sampling rates.

2) Revise C403.1 (Mechanical Systems). The 2012 IECC provides different HVAC criteria for low-rise and high-rise multifamily buildings. NMHC/NAA recommend aligning the commercial and residential chapters by adding a provision to the commercial section allowing mechanical systems installed in individual apartment units to comply with the IECC's residential requirements.

3) Revise C403.2.7 (Ducts and Plenums). The 2012 IECC currently provides two exceptions to duct and plenum insulation and sealing requirements. NMHC/NAA recommend adding an additional exception for ducts and plenums that are installed completely inside a building's thermal envelope. When enclosed in the building envelope, heat loss and

¹ All analysis, costs and conclusions are based on "Impact of the 2009 and 2012 International Energy Conservation Code in Multifamily Buildings," Niles Bolton Associates, Inc., March 2012.

gain from ducts and plenums is released into the conditioned space; therefore, it does not impact energy performance.

4) Revise C403.2.4.1 (Thermostatic Controls). The 2012 IECC currently provides one exception to the thermostatic control requirement in high-rise buildings. NMHC/NAA recommend adding an additional exception for the installation of thermostats that meet the requirements of residential provision R403.1.1.

5) Revise Tables R402.1.1 and R402.1.3 (Insulation and Fenestration). The 2012 IECC provides different building thermal envelope requirements for residential and commercial buildings. Recognizing the similarities in low- and high-rise wood-framed construction, NMHC/NAA recommend aligning these criteria to provide apartment buildings with one set of requirements, regardless of building height. This change addresses the necessary changes to the IECC's residential chapter.

6) Revise Tables C402.1.2 and C402.2 (Opaque Thermal Envelope). The 2012 IECC provides different building thermal envelope requirements for residential and commercial buildings. Recognizing the similarities in low- and high-rise wood-framed construction, NMHC/NAA recommend aligning these criteria to provide apartment buildings with one set of requirements regardless of building height. This change addresses the necessary changes to the IECC's commercial chapter.

2012 IECC Model Amendments

Amend R402.4 as follows:

R402.4 Air leakage (Mandatory). The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

Exception: R-2 occupancies that comply with Section C402.4.

Reason: The change will allow R-2 occupancies that are three stories or less in height, and included in the residential occupancy section of the IECC, to comply with the air leakage requirements of the commercial section, which cover R-2 occupancies four stories or more in height. There is really no difference in energy performance between R-2 occupancies three stories or less in height versus R-2 occupancies four stories or more in height. The exception will allow more flexibility in determining compliance with air leakage without any impact on building air leakage performance, allowing compliance by one of the three methods specified in Section 402.4.1.2 Air barrier compliance options, which establish requirements based on specific materials, specific assemblies or building testing.

This proposed change, which allows for compliance with the commercial provisions of the code for compliance with air leakage, is similar to the requirements in Section R403.7 for mechanical systems that require R-2 occupancies covered by the residential portions of the code to comply with the commercial requirements for mechanical installation.

Cost Impact: The change will have a cost savings in the design and construction phases of R-2 occupancy development. Design costs will be reduced, as it will allow the same procedures for compliance to apply to all R-2 occupancies. Costs will be reduced during construction because of the allowance for compliance by installation of specific materials and/or assemblies that are deemed to comply with the code and verified by inspection.

Amend C403.1 as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilation needs shall comply with Section C403.2 (referred to as the mandatory provisions) and either:

1. Section C403.3 (Simple systems); or
2. Section C403.4 (Complex systems). ; or
3. Section R403 if installed in individual dwelling or sleeping units.

Reason: To provide provisions for installation of individual HVAC equipment in individual dwelling units included in the residential portion of the code for R-2 occupancies three stories or less in height.

Cost Impact: The change will have a cost savings in the installation of mechanical equipment in dwelling units and sleeping units with individual HVAC equipment.

Amend C403.2.7 as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and a minimum of R-8 insulation where located outside the building. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

Exceptions:

1. When located within equipment.
2. When the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).
3. Ducts and plenums located completely inside the *building thermal envelope*.

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Reason: To provide for non-insulated ducts and plenums, as permitted in the residential portions of the IECC, when the ducts and plenums are completely inside the building thermal envelope. Heat loss or gain from the ducts and plenums is only released to the conditioned space and, thus, does not have an impact on energy use.

Cost Impact: The change will have a cost savings by not requiring insulation on ducts and plenums when there is no impact on energy usage.

Amend C403.2.4.1 as follows:

C403.2.4.1. Thermostatic controls. The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Where humidification or dehumidification or both is provided, at least one humidification control device shall be provided for each humidity control system.

Exceptions:

1. Independent perimeter systems that are designed to offset only building envelope heat losses or gains or both serving one or more perimeter *zones* also served by an interior system provided:
 - a. The perimeter system includes at least one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within +/- 45 degrees) (0.8 rad) for more than 50 contiguous feet (15.2 m); and
 - b. The perimeter system heating and cooling supply is controlled by a thermostat(s) located within the *zone(s)* served by the system.
2. Thermostats for HVAC systems for individual dwelling units or sleeping units complying with R403.1.1.

Reason: To allow for programmable thermostats for individual systems providing HVAC to individual dwelling units and sleeping units.

Cost Impact: The change will have a cost savings.

Amend Table R402.1.1 as follows (items not shown are unchanged):

TABLE R402.1.1

INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	CEILING R-VALUE	WOOD-FRAME WALL R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH
1	-	-	-	-
2	-	-	-	-
3		20 or 13+5 <u>13+3.8 or R20</u>	5/13 <u>0</u>	-
4, except Marine	49 <u>38</u>	20 or 13+5 <u>13+3.8 or R20</u>	-	-
5, and 4 Marine	-	20 or 13+5 <u>13+3.8 or R20</u>	-	-
6	-	20+5 or 13+10 <u>13+7.5 or 20+3.8</u>	-	10.4 ft <u>15.2 ft</u>
7 & 8	-	20+5 or 13+10 <u>13+7.5 or 20+3.8</u>	-	10.4 ft <u>15.2 ft</u>

Amend Table R402.1.3 as follows (items not shown are unchanged):

TABLE R402.1.3

EQUIVALENT U-FACTORS

CLIMATE ZONE	CEILING U-FACTOR	FRAME WALL U-FACTOR	BASEMENT WALL U-FACTOR	SLAB R-VALUE & DEPTH
1	-	-	-	-
2	-	-	-	-
3	-	-	0.091 <u>0.360</u>	-
4, except Marine	0.026 <u>0.030</u>	0.057 <u>0.064</u>	-	-
5, and 4 Marine	-	0.057 <u>0.064</u>	-	-
6	-	0.048 <u>0.064</u>	-	F - 0.55 <u>F - 0.52</u>
7 & 8	-	0.048 <u>0.051</u>	-	F - 0.55 <u>F - 0.52</u>

Reason: To align the residential and commercial building thermal envelope values to provide apartment buildings with one set of requirements, regardless of building height. The amendments also reflect cost-effective changes incorporated into ASHRAE 90.1 Public Review Draft 4.

Cost Impact: The change will have a cost savings.

Amend Table C402.2 as follows (items not shown are unchanged):

TABLE C402.2

OPAQUE THERMAL ENVELOPE REQUIREMENTS

Climate Zone	1		2		3		4, except Marine		5, and 4 Marine		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Wood framed and other		R13 + R3.8ci or R20		R13 + R3.8ci or R20						R13+R7.5ci or R20+r3.8ci <u>R13+3.8ci or R20</u>		R13+R7.5ci or R20+r3.8ci <u>R13+7.5ci or R20</u>		R13+R7.5ci or R20+r3.8ci <u>R13+37.5ci or R20</u>		R13+R15.6ci or R20+R10ci <u>R13+R7.5ci or R20</u>
Slab-on-Grade Floors																
Unheated slabs																R20 for 24" below <u>R15 for 24" below</u>

Amend Table C402.1.2 as follows (Items not shown are unchanged):

TABLE C402.1.2

OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4 ,except Marine		5, and 4 Marine		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Walls, Above Grade																
Wood framed and other		U-0.064 U-0.082		U-0.064 U-0.082										U-0.051 U-0.064		U-0.036 U-0.064

Reason: To align the residential and commercial building thermal envelope values to provide apartment buildings with one set of requirements regardless of building height. The amendments also reflect cost-effective changes incorporated into ASHRAE 90.1 Public Review Draft 4.

Cost Impact: The change will have a cost savings.