

Changes in the 2012 *International Energy Conservation Code*

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In mid-August of this year, the International Code Council (ICC) released the latest round of code documents—the 2012 *I-Codes*. Among those issued is the 2012 *International Energy Conservation Code*, or IECC. Code users familiar with previous editions of the IECC will find numerous changes within the covers that affect both commercial and residential construction.

The change that will immediately present itself to past IECC users will be the overall format of the code book itself. Although a single bound volume, the 2012 IECC is now, in essence, two separate codes—each with its own table of contents and scoping, administration, definitions, and general requirements sections.

The primary reason for the organizational format change was to align the residential energy efficiency requirements in the *International Residential Code* (IRC) with those in the IECC. Unlike the *International Building Code* (IBC), the IRC is intended to be a standalone code; thus the need to have energy efficiency requirements within the IRC document. However, in past editions of the *I-Codes*, the IRC and IECC had separate requirements, which in some cases conflicted with each other. In the 2012 *I-Codes*, the energy efficiency requirements for residential construction in the IECC are identical to those in the IRC.

Changes to the Commercial Provisions

The commercial provisions in the IECC saw some significant changes, including entirely new sections on efficiency package options and system commissioning. A detailed list of notable changes is provided below:

- Added requirements for visible transmittance (VT) for fenestration products.
- Added requirements for skylight curb insulation. Provisions require an R-value equal to roof or R-5, whichever is less. This does not apply to curbs that are integral to skylights rated by National Fenestration Rating Council's standard NFRC 100.
- Added requirements for roof solar reflectance and thermal emittance for roofs with a slope less than 2 units vertical in 12 horizontal that cover cooled conditioned spaces in Climate Zones 1, 2, and 3 (Maricopa County is in Climate Zone 2).
- Reduced maximum *U*-factors for roofs and walls above grade, reduced maximum *C*-factors for walls below grade, and reduced maximum *F*-factors for heated slabs-on-grade and slabs-on-grade in cooler climate zones.
- Increased minimum R-values for metal building roofs, mass floors, and opaque swinging doors; increased minimum R-values and/or addition of continuous insulation for walls above grade; and, changed from *U*-factors to R-values for roll-up and sliding doors.
- Increased allowable fenestration (30% to 40% of gross above-grade wall area) in Climate Zones 1 through 6 (Arizona includes Climate Zones 2 through 5) when prescribed daylighting controls are provided.

- Added requirements for minimum (yes, *minimum*) skylighting area for spaces greater than 10,000 square feet directly under a roof. This applies only to the types of spaces indicated, which include, but are not limited to, open offices, lobbies, atriums, warehouses, gymnasiums, and retail stores.
- Added air barrier requirements (including material requirements) to the mandatory air leakage provisions. The air barrier requirements are not applicable in Climate Zones 1, 2, and 3.
- Reduced maximum allowable air leakage through some fenestration assemblies, such as windows, sliding doors, skylights, curtain walls, and storefront systems. Added air leakage requirements for garage (sectional) and rolling doors.
- Added requirements for air leakage through openings between conditioned spaces and shafts, chutes, stairways, and elevator lobbies.
- Changed water-cooled centrifugal chilling packages from an exception to the HVAC equipment performance requirements to actual provisions, and the formulas for calculating full load and NPLV (Non-standard Part Load Value) ratings changed from maximums to minimums.
- Increased SEER (seasonal energy efficiency ratio) ratings for electrical unitary air conditioners, condensing units, and heat pumps. Also includes additional equipment types.
- Increased EER (energy efficiency ratio) ratings for packaged air conditioners, heat pumps, and room air conditioners.
- Increased minimum efficiencies for boilers.
- Added requirements for minimum efficiency of heat rejection equipment.
- Expanded requirements for energy recovery ventilation systems.
- Expanded requirements for minimum pipe insulation. Insulation selection is based on minimum conductivity of the insulation, temperature of fluid in pipe, and nominal pipe size.
- Changed requirement to add economizers to all cooling systems greater than or equal to 33,000 Btu/h (Previously was 54,000 Btu/h), added new exceptions when economizers are not required, and added specific requirements for air economizers.
- Expanded requirements for pools and spas and made them mandatory.
- Expanded interior lighting requirements to add new provisions for automatic lighting controls, such as occupancy sensors, manual and automatic daylighting controls, and multi-level lighting controls. Also included controls for specific applications, such as separation of display and accent lighting from other lighting, master control device located at main room entry that controls all lighting in a hotel and motel sleeping unit, and individual controls for supplemental task lighting.
- Expanded interior lighting power requirements by creating two methods: the Building Area Method (used in previous editions) and the Space-by-Space Method (new for the 2012 edition), which establishes interior lighting allowance on the specific use of each space.
- Added requirements for efficiency packages that offer overall performance for a building based on 3 options: 1) Efficient HVAC Performance, 2) Efficient Lighting System, or 3) On-Site Supply of Renewable Energy. All buildings shall utilize one of the options.
- Added requirements for system commissioning for mechanical and electrical systems.

Changes to Residential Provisions

The residential provisions did not change as much as the commercial provisions did, but since the changes are also reflected in the IRC, the energy efficiency requirements in the IRC saw significant change, and the option of complying either with the IRC or the IECC for energy efficiency is no longer available. A detailed list of notable changes is provided below:

- Added requirements for visible transmittance (VT) for fenestration products.
- Reduced maximum U -factors for fenestration and skylights.
- Reduced maximum solar heat gain coefficients (SHGC) for glazing.
- Increased R-values and/or added continuous insulation for wood-frame walls in Climate Zones 3, 4, and 5.
- Increased R-values for steel-frame walls.
- Deleted visual inspection option for verifying air leakage rate and insulation installation. Testing remains as the only method for verification.
- Added compliance with the *International Mechanical Code* (IMC) in addition to the IRC for sealing of ducts, air handlers, and filter boxes.
- Reduced allowable leakage in ducts as determined by testing at the postconstruction stage or at the rough-in stage.
- Expanded requirements for hot water pipe insulation.
- Added requirement to provide an accessible manual switch for turning off hot-water circulating pumps.
- Increased the minimum number of permanently installed light fixtures required to have high-efficacy lamps from 50% to 75%.

Energy Codes in Arizona

Adoption of an energy code is not consistent throughout Arizona. Currently, based on research conducted by the Phoenix Chapter's Technical Committee earlier this year, only half of Arizona's counties have adopted an energy code and more than 40% of the cities researched by the committee (a total of 49) indicated they did not adopt an energy code. It is understandable—why increase construction cost for energy efficiency when Arizona has one of the lowest energy expenditures per person of all fifty states at \$2,662.45?—only Utah has a lower expenditure rate.¹

Fortunately, the more populated areas of Arizona have adopted some form of energy code based on earlier editions of the IECC. The future adoption of energy codes in smaller jurisdictions of Arizona will likely increase when building life cycle energy costs start to overtake initial construction costs for code-required energy improvements. It is unknown as to when or if the 2012 edition will be adopted by jurisdictions in Arizona, but it is clear that either the 2012 or a later edition will eventually be adopted by larger Arizona metropolitan areas, thus the requirements will likely get more restrictive.

¹ Based on 2009 data made available by the Department of Energy (<http://energy.gov/maps/2009-energy-expenditure-person>)