

August 11, 2023

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Reference: IECC (International Energy Conservation Code)

The following is my understanding and opinions of the code requirements as they apply to insulation values and roof systems.

The introduction of the IECC requirements has somehow been ignored by the roofing industry over the years. We, the Arizona Roofing Contractors Association needs to educate our members, non-members and the industry that designs, oversees and constructs roofing projects.

Each individual municipality can adopt any code or portions thereof. Most of the municipalities regularly adopt the most current code requirements.

The IECC current code is 2021. I am not sure how many if any of the municipalities have currently adopted IECC 2021. Contractors have a responsibility to confirm which codes have been adopted in the jurisdiction in which they are working.

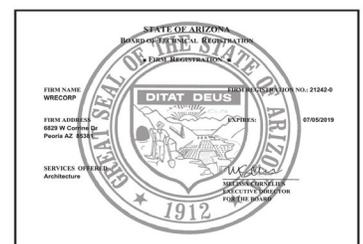
For the purpose of this discussion, we are going to use the 2018 IECC as it applies to low sloped roofs. We know that it has been adopted by most of the municipalities in Arizona.

First, IBC section 1511.1 indicates that methods and materials for the application of replacing or recovering existing roofs shall comply with the requirements of Chapter 15. This section generally states that roofing operations must comply with adopted codes which include IECC.

IEBC International Existing Building Code 2018 now has specific code requirements applicable to reroofing. These codes are in addition to the IBC, IRC and the IECC and may be even more strict.

2018 IECC energy code requirements for roof system replacement on commercial buildings (nonresidential buildings as dictated by jurisdiction) is dictated under Section C401 and C501. This applies to additions, alterations and repairs to existing buildings. Basically, it states that if the existing roof system is removed and a new roof system is installed then the code requirements apply. If the roof system is not removed then it does not apply. Some contractors are attempting to tear off just the top layers of the roofing system and then applying the new roof system over the remaining layers of the roofing system. This is not allowed by code and does not allow you to skirt the energy codes application.

IBC states in Chapter 15, Section 1510.3 New roof coverings ***shall not*** be installed ***without removing all existing layers of roof coverings down to***



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the roof deck where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

There are exceptions to this section. These exceptions should be reviewed prior to making any decisions as to this code and roof removal.

As to the IECC insulation code as it applies to roofing, I will try to keep it simple. If you tear off a low sloped roof and are installing a new roof system to that roof you shall comply with the IECC code. Each zone in Arizona has a specific requirement. Arizona has 4 zones. (Zones 2, 3, 4 & 5). Your responsibility is to determine which zone you are working in and apply the code requirements. Once that is determined then you have to apply the requirements for the insulation. There are 2 categories that apply to low slope roofing.

- Insulation entirely above the deck. *Insulation entirely above the deck is easy. That is commonly board stock insulation.*
- Attic and other. *Attic and other is a little more complicated. If you can determine the R-value of the insulation under the roof deck, you then have to determine if that value is truly a value. Example, if there is a R-30 batted insulation installed under the deck but it is all loose and not secured to the underside of the deck and there is an air space between the deck and the insulation then it is not a true R-30 value. This is not a true value because of the air convection that takes place. If there is an air space above, below and/or around the insulation then the insulation becomes nothing more than a dust filter and not a valued insulation. You would then need to consult an insulation consultant to provide you what the true value is if there is any value at all. Under this section of Attic and Other, you can use that value and then add only the insulation above the roof deck to meet the requirements for that zone.*

Insulation code requirements for insulation is as follows.

Above Deck:

Zone 2: R25

Zone 3: R-25

Zone 4: R-30

Zone 5 & Marine Zone 4: R-30

Attic and Other:

Zone 2: R-38

Zone 3: R-38

Zone 4: R-38

Zone 5: R-38 & Zone 4 Marine R-49

There is a 3rd category regarding Metal Buildings. If you take on a metal building you will be required to do some additional research.

In conclusion, you cannot contract around code, code is law.

I have attached the IECC Chapter 5 Prescriptive Approach Compliance page for your review.

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Chapter 5 Prescriptive Approach Compliance

TABLE C402.1.3
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD^{a,1}

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		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	
Roofs																	
Insulation entirely above roof deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci	
Metal buildings ^b	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-25 + R-11 LS	R-25 + R-11 LS	R-30 + R-11 LS				
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-49							
Mass ^f	R-5.7ci ^e	R-5.7ci ^e	R-5.7ci ^e	R-7.6ci	R-7.6ci	R-9.5ci	ROOFS					R-13.3ci	R-15.2ci	R-15.2ci	R-15.2ci	R-25ci	R-25ci

Climate Zone	1	2	3	4	5	6	7	8								
				Except Marine	And Marine 4											
Insulation entirely above deck	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
Metal buildings ^{a, b}	R-19+ R-11 LS	R-25+ R-11 LS	R-25+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS	R-30+ R-11 LS									
Attic and other	R-38	R-49														

Opaque doors																
Nonswinging	R-4.75															

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m², 1 pound per cubic foot = 16 kg/m³.
 ci = Continuous insulation, NR = No Requirement, LS = Liner System.
 a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
 b. Where using R-value compliance method, a thermal spacer block shall be provided, otherwise use the U-factor compliance method in Table C402.1.4.
 c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft²-°F.
 d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
 e. "Mass floors" shall be in accordance with Section C402.2.3.
 f. Steel floor joist systems shall be insulated to R-38.
 g. "Mass walls" shall be in accordance with Section C402.2.2.
 h. The first value is for perimeter insulation and the second value is for slab insulation. Perimeter insulation is not required to extend below the bottom of the slab.
 i. Not applicable to garage doors. See Table C402.1.4.