

## **EC45-09/10 Part I & Part II**

### **EECC Requested Final Action: Approved as Submitted**

#### **EECC Public Comment:**

*EC45, Parts I & II should be approved as submitted.*

The IECC Committee recommended approval of the same improvements in ceiling insulation as proposed in EC45 for climate zones 3, Marine 4, and 5 in EC13 and EC27. If EC45 is approved as submitted, additional energy savings would be gained in climate zone 2 (by moving it to R-38 like climate zone 3) and climate zone 4 except Marine (by moving it to R-49 like climate zone Marine 4).

As documented in the original reason statement, these insulation levels were shown to be cost-effective by the U.S. Department of Energy. Analysis shows that the homeowner will see positive cashflow from the energy savings in each of the climates compared to the increased cost of insulation. In climate zone 2, there is a modest increase of insulation from R-30 to R-38, which is important for homes in locations where documented attic temperatures range from 110 to 140 degrees -- a 40 to 70 degree temperature differential from the top floor of a home. The extra insulation is important to reduce occupant discomfort in the top floor of a home and to reduce energy usage.

The improvement from R-38 to R-49 in climate zone 4 will also reduce the extreme temperature swings in both winter and summer, reducing the need for both heating and cooling. In the case of zone 4, if R-49 is appropriate for climate zone Marine 4, then it is also appropriate for the rest of climate zone 4. These improvements are permanent, efficient measures that will benefit homeowners for the lifetime of the home.

#### **Proposal History:**

##### **Committee Recommended Action on Original Proposal at Public Hearing:**

**Part I IECC** – Disapproved

**Part II IRC** – Disapproved

##### **Committee Reason(s) for Recommended Action:**

**Part I IECC** – This is not a cost effective change to insulation values. Opponents provided specific data that the return on investment would be 40 to 50 years.

**Part II IRC** – The proposal does not provide a cost effective change to insulation values. In addition, this would be inconsistent with EC16.

**Initial Recommendation of EECC:** Approve

#### **Initial Proposal for Reference:**

## **EC45–09/10**

**Tables 402.1.1 and 402.1.3; IRC Tables N1102.1 and N1102.1.2**

**Proponent:** Bill Prindle, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Garrett Stone, Brickfield, Burchette, Ritts & Stone; Steve Rosenstock, Edison Electric Institute; Brian Dean, ICF International

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC COMMITTEE. PART II WILL BE HEARD BY THE IRC BUILDING/ENERGY COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

**PART I – IECC**

Revise tables as follows:

**TABLE 402.1.1  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>i</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>c</sup> WALL R-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65 <sup>j</sup>	0.75	0.30	<del>30</del> 38	13	4/6	13	0	0	0
3	0.50 <sup>j</sup>	0.65	0.30	<del>30</del> 38	13	5/8	19	5/13 <sup>f</sup>	0	5/13
4 except Marine	0.35	0.60	NR	<del>38</del> 49	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	<del>38</del> 49	20 or 13+5 <sup>h</sup>	13/17	30 <sup>g</sup>	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5 <sup>h</sup>	15/19	30 <sup>g</sup>	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38 <sup>g</sup>	15/19	10, 4 ft	10/13

(Footnotes remain unchanged)

**TABLE 402.1.3  
EQUIVALENT U-FACTORS<sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR <sup>b</sup>	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR <sup>d</sup>	CRAWL SPACE WALL U-FACTOR <sup>c</sup>
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	<del>0.035</del> 0.030	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	<del>0.035</del> 0.030	0.082	0.141	0.047	0.091 <sup>c</sup>	0.136
4 except Marine	0.35	0.60	<del>0.030</del> 0.026	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	<del>0.030</del> 0.026	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

(Footnotes remain unchanged)

**PART II – IRC BUILDING/ENERGY**

Revise tables as follows:

**TABLE N1102.1  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>t</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE AND DEPTH	CRAWL SPACE <sup>c</sup> WALL R-VALUE
1	1.2	0.75	0.35 <sup>j</sup>	30	13	3/4	13	0	0	0
2	0.65 <sup>i</sup>	0.75	0.35 <sup>j</sup>	<del>30</del> 38	13	4/6	13	0	0	0
3	0.50 <sup>i</sup>	0.65	0.35 <sup>e, j</sup>	<del>30</del> 38	13	5/8	19	5/13 <sup>f</sup>	0	5/13
4 except Marine	0.35	0.60	NR	<del>38</del> 49	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	<del>38</del> 49	20 or 13 + 5 <sup>h</sup>	13/17	30 <sup>f</sup>	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13 + 5 <sup>h</sup>	15/19	30 <sup>g</sup>	10/13	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	30 <sup>g</sup>	10/13	10, 4 ft	10/13

(Footnotes remain unchanged)

**TABLE N1102.1.2  
EQUIVALENT U-FACTORS<sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR <sup>b</sup>	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	<del>0.035</del> 0.030	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	<del>0.035</del> 0.030	0.082	0.141	0.047	0.091c	0.136
4 except Marine	0.35	0.60	<del>0.030</del> 0.026	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	<del>0.030</del> 0.026	0.060	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.060	0.060	0.033	0.059	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.059	0.065

(Footnotes remain unchanged)

**Reason:** This code proposal is intended to improve thermal envelope efficiency through improved insulation in ceilings in climate zones 2-5. These proposed improvements are reasonable, producing savings in total heating, cooling and hot water energy ranging from 0.8% to 1.4% in these climate zones. These savings are significant and when coupled with other proposed code modifications can lead to significant overall energy savings for homes. Moreover, unlike many building components, ceiling insulation can last for the life of the building, delivering consistent energy savings far longer than most energy savings measures. The following table portrays estimated savings from these measures:

	Climate Zone 2	Climate Zone 3	Climate Zone 4	Climate Zone 4M	Climate Zone 5
Heating, Cooling, Hot Water Purchased Energy Cost Percent Savings	0.8%	1.0%	1.2%	1.4%	1.4%
Total Purchased Energy Cost Percent Savings (also including major appliances and lighting)	0.6%	0.8%	0.9%	1.1%	1.0%

The U.S. Department of Energy issued new recommendations for cost-effective insulation levels in new homes in early 2008. The R-values in this proposal are consistent with the recommendations for new construction as shown in the table below from the DOE.

Zone	Heat Pump					Attic	Cathedral Ceiling	Wall		Floor
	Gas	Fuel Oil	Electric Furnace	Cavity	Insulation Sheathing					
1	✓	✓	✓	✓	R30 to R49	R22 to R38	R13 to R15	None	R13	
2	✓	✓	✓		R30 to R60	R22 to R38	R13 to R15	None	R13	
2			✓		R30 to R60	R22 to R38	R13 to R15	None	R19 - R25	
3	✓	✓	✓		R30 to R60	R22 to R38	R13 to R15	None	R25	
3			✓		R30 to R60	R22 to R38	R13 to R15	R2.5 to R5	R25	
4	✓	✓	✓		R38 to R60	R30 to R38	R13 to R15	R2.5 to R6	R25 - R30	
4			✓		R38 to R60	R30 to R38	R13 to R15	R5 to R6	R25 - R30	
5	✓	✓	✓		R38 to R60	R30 to R38	R13 to R15	R2.5 to R6	R25 - R30	
5			✓		R38 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30	
6	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30	
7	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30	
8	✓	✓	✓	✓	R49 to R60	R30 to R60	R13 to R21	R5 to R6	R25 - R30	

Source: <http://www1.eere.energy.gov/consumer/tips/insulation.html>

These modest, cost-effective savings are part of a larger package of proposals that together will get the IECC to the 30% improvement that national policymakers are seeking. Achieving this goal requires several modest improvements, in multiple components of the building. Recent energy price increases, despite softening effects of the current economic downturn, signal a new era of sharply higher energy costs. In addition, climate change policy is likely to be enacted before the 2012 IECC is published, and its effects will likely include further energy price increases. This

proposal represents one of a set of reasonable and cost effective improvements that give states new options to increase the efficiency of their energy codes.

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

**PART I – IECC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

**PART II – IRC BUILDING/ENERGY**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

ICCFILENAME: PRINDLE-EC-6-T. 402.1.1-T. N1102.1

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