

ICYNENE ENERGY CODE COMPLIANCE GUIDE



ICYNENE

The Icynene Energy Code Compliance Guide is intended for use by the installing contractor and plan review and field inspection staff. The Guide is designed to provide instructions on how to comply with the provisions of the International Residential Code and International Energy Conservation Code and to take full advantage of the Icynene insulation and air sealing qualities. The Guide provides instructions on:

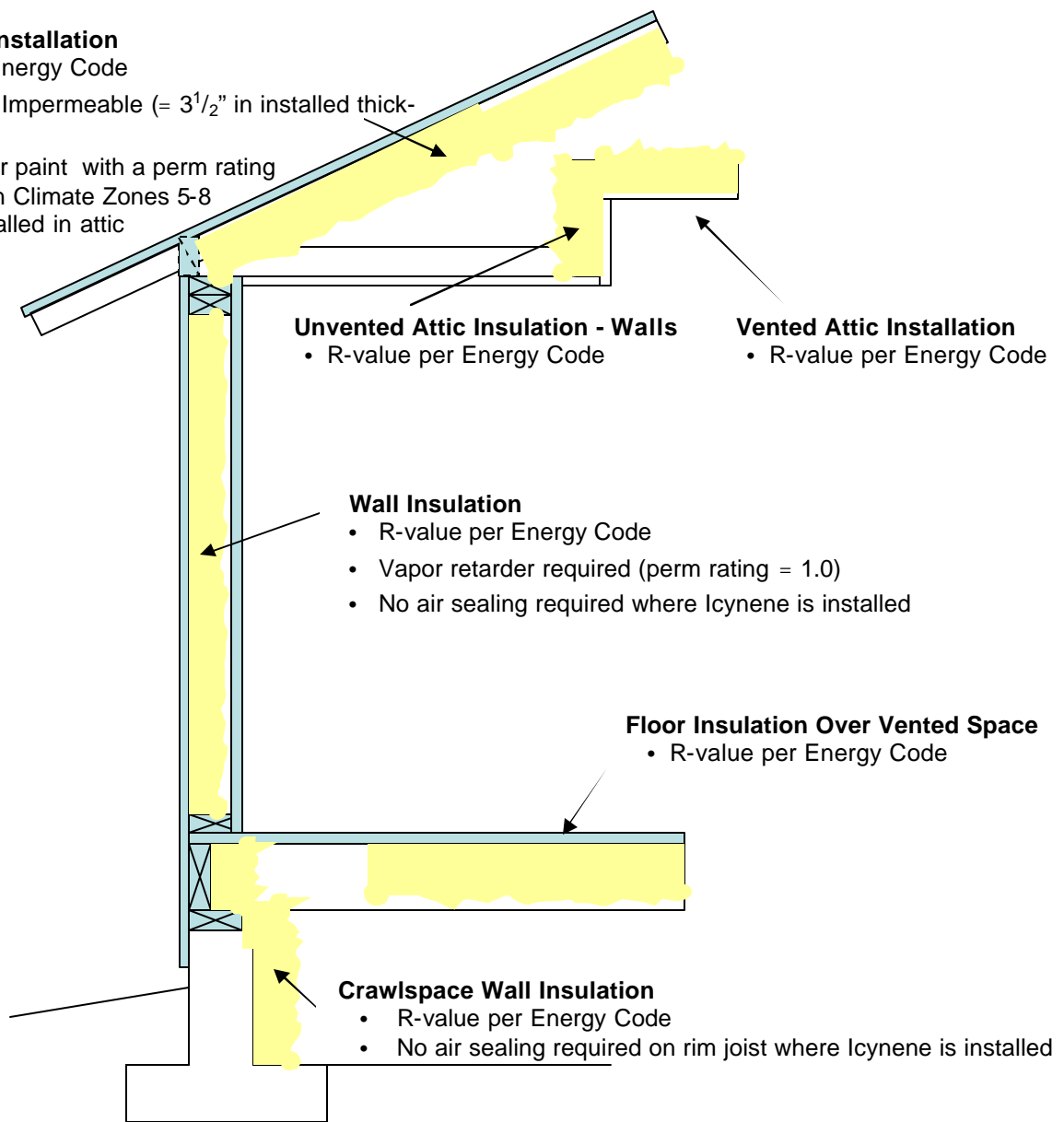
- What documentation is required to submit for the building permit application;
- What product documentation to have available on the building site for verification and approval;
- What to plan review based on the energy code compliance documentation submitted and the credit taken; and
- What to field inspect based on the application of the insulation

This Compliance Guide is based on the requirements listed in:

- *2006 ICC International Energy Conservation Code*

Unvented Attic Installation

- R-value per Energy Code
- Insulation Air Impermeable (= 3 1/2" in installed thickness)
- Vapor retarder paint with a perm rating of 1 or less. in Climate Zones 5-8
- No vents installed in attic



General Icynene Installation Code Guidelines

Unvented Attic Assembly – Verify that no attic vents are specified for the unvented attic. Vents for combustion appliances are permitted in the attic assembly. The use of sealed combustion appliances are recommended.

- Icynene must be installed to a thickness greater than or equal to 3 1/2" between the rafters directly under the roof sheathing to meet the requirements for an air impermeable insulation under IRC Section R806.4.
- A vapor retarder rated at 1 perm or less is required for air impermeable insulation installed under the structural roof sheathing in Climate Zones 5-8. Vapor retarder paint applied over Icynene will meet the vapor retarder requirement.

Moisture Control for Exterior Walls (IECC Section 402.5) – Verify that an approved vapor retarder is installed in all unvented framed cavities in Climate Zones 5 - 8. The vapor retarder shall have a perm rating ≤ 1.0.

Air Leakage (IECC Section 402.4) – No air sealing is required in wall, roof, or floor systems where Icynene is installed as it is rated as an approved air barrier per ASTM E 283.

Unvented crawl space (IRC Section R408.3) – Verify that a continuous vapor retarder is installed on the crawlspace floor and the Icynene foam does not come in contact with exposed earth. Verify that the insulation extends from the underside of the subfloor down and covers the rim joist.

2006 IECC ANNUAL ENERGY COST COMPLIANCE

Building Name:	Icynene	Date:	May 06, 2008
Owner's Name:	John Doe	Builder's Name:	Icynene Inc.
Property Address:	Address information is required for approval.	Weather Site:	New York, NY
		File Name:	8000sqft,NewYork,NY,Brochure,Icynene.big

Annual Energy Cost

	2006 IECC	As Designed
Heating:	2549	1671
Cooling:	417	390
Water Heating:	365	382
Lights & Appliances:	2358	2358
Photovoltaics:	-0	-0
Service Charge:	60	60
Total:	5749	4862
Window U-Value Check (per Section 402.6)		
Window U-Value (Design must be lower):	0.480	0.330

This home MEETS the annual energy cost requirements in accordance with Section 404 of the 2006 International Energy Conservation Code based on a climate zone of 5A. In fact, this home surpasses the requirements by 15.4%.

* Design energy cost is based on the following systems:
 Heating: Fuel-fired air distribution, 64.0 kBtu/h, 92.0 AFUE.
 Cooling: Air conditioner, 54.0 kBtu/h, 13.0 SEER.
 Water Heating: Conventional, Gas, 0.54 EF.
 Window U-Value: 0.480
 Blower door test: Htg: 0.10 ACHnat; 0.10 ACHnat

In accordance with IECC, building inputs, such as setpoints, infiltration rates, and window shading may have been changed prior to calculating annual energy cost. Furthermore, the standard reference design HVAC system efficiencies are set to the "prevailing federal minimum standards" as of January, 2006. These standards are subject to change, and software updates should be obtained periodically to ensure the compliance calculations reflect current federal minimum standards.

Performance Method using REM/Design

REM/Design is an energy modeling software that's developed by the Architectural Energy Corporation and it is the most widely used energy modeling tool among the US energy raters. We use REM/Design software to show the application of Icynene satisfies the energy code requirement in terms of the Performance approach. This energy evaluation method takes both conductive (R-values) & convective (air infiltration) heat transfer mechanisms into energy efficiency calculation process for a house so that, if the total annual energy consumption for the proposed design is less than the standard design built to the prescriptive requirements (Section 404, 2006 IECC), the proposed design will be deemed to have passed the energy code evaluation.

Required Energy Code Compliance Documentation (What to Submit)

- IECC Annual Energy Cost Compliance report from REM/Design
- Building File Report from REM/Design
- Energy Code Inspection Checklist (IECC section 404.4.2 or REM/Design: Energy Code Inspection Check List)
- The Icynene Insulation System Installers Manual, Copyright 2008 (must be available on the job site during the installation – see ES Report ESR 1826)
- Icynene Evaluation Service Report ESR 1826 (must be available on the job site during the installation)
- Insulation Certificate (IECC Section 102.1)
- Blower Door Test Results (if applicable - IECC Table 404.5.2(1))

What to Plan Review

Building Envelope Insulation - Verify that the insulation R-values proposed on the building plans meet or exceed the values shown in the Building File Report and also the Energy Code Inspection Checklist. Note that the maximum R-value shall not exceed R-22 for walls (six inches) and R-36 for roof/ceiling assemblies (10 inches).

Building Envelope Areas – Verify that the surface areas for each of the insulated assemblies matches the areas reported in the energy code documentation. For unvented attics the roof area reported in the energy code compliance documentation is measured at the underside of the structural roof deck.

Blower Door Test – Verify that a blower door test is required by reviewing the IECC Annual Energy Cost Compliance Form.

- For Blower Door Test > 0.35 ACHnat: Require test results prior to issuance of the certificate of Occupancy.
- For Blower Door Test < 0.35 ACHnat: Require test results prior to issuance of the Certificate of Occupancy. Also mechanical ventilation is required and calculated using the following equation (IECC Table 404.5.2(1))

$$0.01 \times CFA + 7.5 \times (Nbr+1)$$

Where:

CFA = conditioned floor area Nbr = number of bedrooms
 Test results shall be in accordance with ASHRAE 119, Section 5.1 for measured air exchange rates >0.35 ACH with no mechanical ventilation installed in the building.

- For Blower Door Test < 0.35 ACHnat—Require documentation that mechanical ventilation will be installed and sized per Table 404.5.2(1) as required. Air leakage tests shall be conducted by an independent party approved by the building official.

What to Field Inspect

Insulation R-values – Verify that the insulation R-values installed in the building assemblies meet or exceed the values called out on the Energy Code Inspection Checklist and the approved building plans.

Insulation Certificates (IECC Section 102.1.1 and 102.1.1.1) – Verify that the installed thickness of the Icynene insulation for the applicable assemblies, and the rated R-values, be documented on the Insulation Certificate provided by the insulation installer.

Air leakage (IECC Section 402.4) – Verify that all building assemblies that have not been insulated with Icynene are caulked, gasketed or otherwise sealed with an air barrier material, suitable film or solid material. Icynene is rated an air barrier per ASTM E-283 (See ICC ES Report ESR 1826)

Blower Door Test > 0.35 ACHnat (see 2006 IECC Annual Energy Cost Compliance Form) - Require documentation showing the tested ACHnat meets or exceeds the energy code compliance documentation. (See Plan Review).

Blower Door Test < 0.35 ACHnat (see 2006 IECC Annual Energy Cost Compliance Form) - Require documentation showing that the tested ACHnat meets or exceeds the energy code compliance documentation. Mechanical ventilation must be installed. (See Plan Review).



REScheck Software Version 4.1.3
Compliance Certificate

Project Title: based on CBH homes sundance

Report Date: 02/13/08

Data filename: C:\Documents and Settings\MsajMy Documents\BMG\Compliance Runs\Icynene sample.rck

Energy Code: 2006 IECC
 Location: Topeka, Kansas
 Construction Type: Single Family
 Building Orientation: Bldg. faces 180 deg. from North
 Conditioned Floor Area: 2710 ft2
 Glazing Area Percentage: 9%
 Heating Degree Days: 5265
 Climate Zone: 4

Construction Site: ID Owner/Agent: Designer/Contractor:

Compliance: Passes on UA

Compliance: 12.4% Better Than Code Maximum UA: 408 Your UA: 358

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Flat Ceiling or Scissor Truss	1611	38.0	0.0		48
North/Back: Wood Frame, 16" o.c. Orientation: Front	590	19.0	0.0		33
Window 1: Vinyl Frame:Double Pane with Low-E SHGC: 0.30 Orientation: Front	46			0.340	16
East: Wood Frame, 16" o.c. Orientation: Right Side	680	19.0	0.0		35
Window 2: Vinyl Frame:Double Pane with Low-E SHGC: 0.30 Orientation: Right Side	81			0.340	28
Door 1: Solid Orientation: Right Side	20			0.600	12
South: Wood Frame, 16" o.c. Orientation: Back	900	19.0	0.0		52
Window 3: Vinyl Frame:Double Pane with Low-E SHGC: 0.30 Orientation: Back	15			0.340	5
Door 2: Solid Orientation: Back	20			0.600	12
West: Wood Frame, 16" o.c. Orientation: Left Side	700	19.0	0.0		35
Window 4: Vinyl Frame:Double Pane with Low-E SHGC: 0.30 Orientation: Left Side	104			0.340	35
Door 3: Glass SHGC: 0.44 Orientation: Left Side	20			0.900	18
Crawl 1: Solid Concrete or Masonry Wall height: 2.0' Depth below grade: 1.5' Insulation depth: 2.0' Inside below-grade depth: 0.5'	212	0.0	10.0		29
Furnace 1: Forced Hot Air/78 AFUE					
Air Conditioner 1: Electric Central Air/13 SEER					

What to Plan Review

Building Envelope Insulation - Verify that the insulation R-values proposed on the building plans meet or exceed the values shown in the REScheck Compliance Certificate. Note that the maximum R-value shall not exceed R-20 for walls (six inches) in attic assemblies and R36 for roof/ceiling assemblies (10 inches) when installed on the floor of the attic.

Building Envelope Areas – Verify that the surface areas for each of the insulated assemblies matches the areas reported in the energy code documentation. For unvented attics the roof area reported in the energy code compliance documentation is measured at the underside of the structural roof deck

Crawl spaces (IRC Section R408.3) – Verify that the insulation is applied to the walls and underextends from the underside of the subfloor down and covers the rim joist. Verify that a continuous vapor retarder is installed on the crawlspace floor and the Icynene foam does not come in contact with exposed earth. . Verify that the installed R-value reported on the insulation certificate meets or exceeds what is shown on the approved plans and documentation. In vented crawlspaces verify the product is also applied to the underside of floor. In this case, no vapor retarder is required on crawlspace floor.

REScheck Based Compliance

Required Energy Code Compliance Documentation (What to Submit)

- REScheck Compliance Certificate
- REScheck Inspection Checklist
- Icynene Insulation System Installers Manual, Copyright 200 (must be available on the job site during the installation - see ES Report ESR 1826)
- Icynene Evaluation Service Report ESR 1826 (must be available on the job site during the installation)
- When applicable—Product cut sheet from vapor barrier paint showing perm rating of 1 or less. Climate Zones 5-8.
- Insulation Certificate (IECC Section 102.1)

What to Field Inspect

Insulation R-values – verify that the insulation R-values installed in the building assemblies meet or exceed the values called out on the REScheck Compliance Certificate and the approved building plans.

Insulation Certificates (IECC Section 102.1.1 and 102.1.1.1) – Verify that the installed thickness of the Icynene insulation for the applicable assemblies, and the rated R-values, are documented on the Insulation Certificate provided by the insulation installer.

Air leakage (IECC Section 402.4) – Verify that all building assemblies that have not been insulated with Icynene are caulked, gasketed or otherwise sealed with an air barrier material, suitable film or solid material. Icynene is rated an air barrier per ASTM E-283 (See ICC ES Report ESR 1826).

2006 IECC ANNUAL ENERGY COST COMPLIANCE			
Building Name:	Icynene Sample House	Date:	February 21, 2008
Owner's Name:		Builder's Name:	
Property Address:		Weather Site:	Topeka, KS
		File Name:	Icynene Sample conditioned attic.blg
Annual Energy Cost			
	2006 IECC	As Designed	
Heating:	428	358	
Cooling:	175	143	
Water Heating:	125	133	
Lights & Appliances:	524	524	
Photovoltaics:	-0	-0	
Service Charge:	120	120	
Total:	1372	1278	*
Window U-Value Check (per Section 402.6)			
Window U-Value (Design must be lower):	0.480	0.350	
This home MEETS the annual energy cost requirements in accordance with Section 404 of the 2006 International Energy Conservation Code based on a climate zone of 4A. In fact, this home surpasses the requirements by 6.9%.			
* Design energy cost is based on the following systems: Heating: Fuel-fired air distribution, 70.0 kBtu/h, 78.0 AFUE. Cooling: Air conditioner, 36.0 kBtu/h, 13.0 SEER. Water Heating: Conventional Gas, 0.56 EF. Window-to-Wall Area Ratio: 0.10 Blower door test: Htg: 0.10 Cfg: 0.10 ACHnat			
In accordance with IECC, building inputs, such as setpoints, infiltration rates, and window shading may have been changed prior to calculating annual energy cost. Furthermore, the standard reference design HVAC system efficiencies are set to the "prevailing federal minimum standards" as of January, 2006. These standards are subject to change, and software updates should be obtained periodically to ensure the compliance calculations reflect current federal minimum standards.			

Building Envelope Areas – Verify that the surface areas for each of the insulated assemblies matches the areas reported in the energy code documentation. For unvented attics the roof area reported in the energy code compliance documentation is measured at the underside of the structural roof deck.

Blower Door Test – Verify that a blower door test is required by reviewing the 2006 IECC Annual Energy Cost Compliance Form

For Blower Door Test ≥ 0.35 ACHnat: Require test results prior to issuance of the Certificate of Occupancy.

For Blower Door Test < 0.35 ACHnat—Require test results prior to issuance of the Certificate of Occupancy. Also mechanical ventilation is required and calculated using the following equation (IECC Table 404.5.2(1))

$$0.01 \times \text{CFA} + 7.5 \times (\text{Nbr} + 1)$$

where:

CFA = conditioned floor area
 Nbr = number of bedrooms

Test results shall be in accordance with ASHRAE 119, Section 5.1 for measured air exchange rates ≥ 0.35 ACH with no mechanical ventilation installed in the building.

For Blower Door Test < 0.35 ACHnat—Require documentation that mechanical ventilation will be installed and sized per Table 404.5.2(1) as required. Air leakage tests shall be conducted by an independent party approved by the building official

Performance Based Compliance

Required Energy Code Compliance Documentation (What to Submit)

- 2006 IECC Annual Energy Cost Compliance (from performance software)
- Building File Report (from performance software)
- Energy Code Inspection Checklist (IECC Section 404.4.2)
- Icynene Insulation System Installers Manual, Copyright 200 (must be available on the job site during the installation – see ES Report ESR 1826)
- Icynene Evaluation Service Report ESR 1826 (must be available on the job site during the installation)
- Insulation Certificate (IECC Section 102.1)
- Blower Door Test Results (if applicable - IECC Table 404.5.2(1))
- When applicable—Product cut sheet from vapor barrier paint showing perm rating of 1 or less. Climate Zones 5-8.

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Blower Door Test ≥ 0.35 ACHnat (see 2006 IECC Annual Energy Cost Compliance Form) - Require documentation showing the tested ACHnat meets or exceeds the energy code compliance documentation. (See What to Plan Review). **Blower Door Test < 0.35 ACHnat** (see 2006 IECC Annual Energy Cost Compliance Form) - Require documentation showing that the tested ACHnat meets or exceeds the energy code compliance documentation. Mechanical ventilation must be installed. (See What to Plan Review).