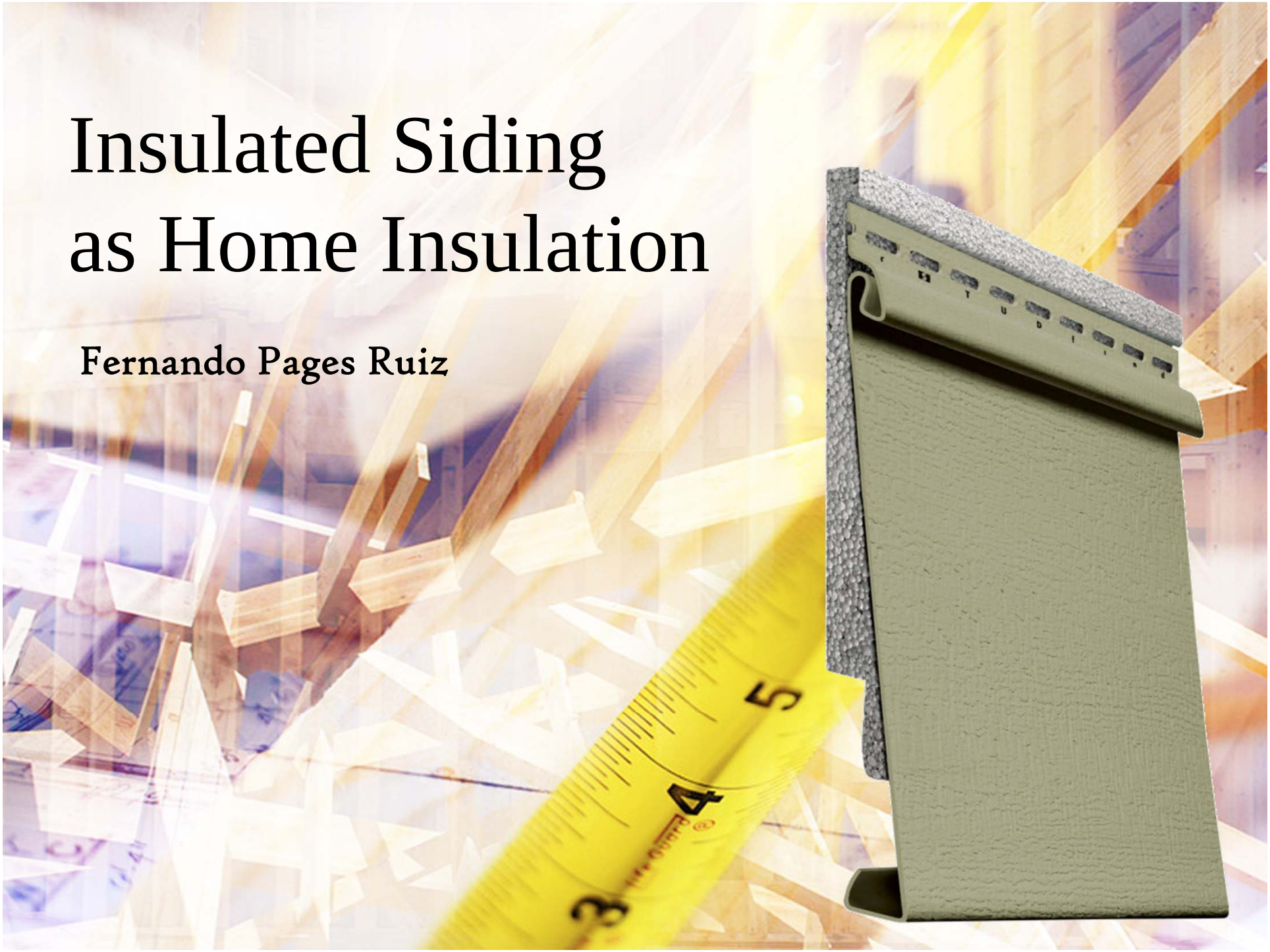
Insulated Siding as Home Insulation

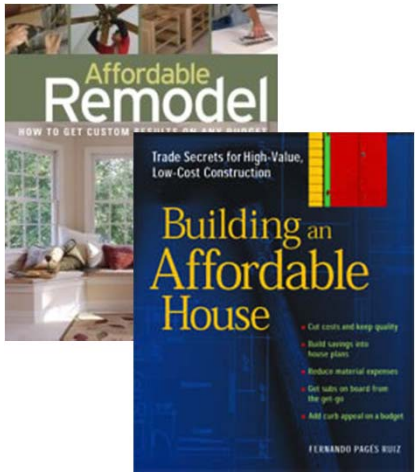
Fernando Pages Ruiz



Fernando Pagés Ruiz

Builder thirty years

- 2008 Green Building Single Family House of the Year
- 2007 *Workforce Housing Award* from the National Association of Home Builders.
- 2006 Chosen by Department of Housing and Urban Development's PATH project to build America's first *PATH Concept Home*



- Author
  - *Building an Affordable House*
  - *Affordable Remodel*
- www.buildingaffordable.com

Insulated Siding

Insulated Siding: An Introduction

- Insulated siding is vinyl siding that is engineered to incorporate a substantial thickness of insulation
  - Most commonly used insulation is expanded polystyrene (EPS), a material manufactured to the specifications of *ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
  - Adhesives used in insulated siding are permanently flexible, allowing for the normal expansion and contraction that occurs in vinyl siding
- Not to be confused with vinyl siding that has drop-in backers, insulated siding has insulation that is integral to the specific panel

Insulated Siding: An Introduction

- Early 1990s: First field tests conducted in the southern United States
- Mid 1990s: Improvements in design and manufacturing
- 1997: First commercial insulated siding introduced
- Over the past decade, product developments have allowed insulated siding to experience consistent growth and recognition as a premium residential cladding

Insulated Siding: An Introduction

- Government agencies acknowledge the ability of rigid or board insulation to improve the energy efficiency of homes
  - U.S. EPA/ENERGY STAR®
    - Insulated siding is an option for compliance with thermal bridging reduction requirements to earn the label for new homes under ENERGY STAR Qualified Homes Version 3
  - Federal Trade Commission
    - For products such as insulated siding, the appropriate standard for testing R-value is *ASTM C1363 Standard Test Method for the Thermal Performance of Building Materials and Envelope Assemblies*

R-value Testing of Insulated Siding

Slide 7

jyh8 fixed text box
jhuntley, 1/5/2011

R-value Testing

- *ASTM C1363* (aka, the “Hot Box”)
  - *ASTM C1363* testing is conducted to determine an insulated siding product’s specific R-value
  - Insulated siding is tested in a realistic setting
    - Close to field application
    - Includes air circulation around siding
  - Initial results indicate insulated siding products on the market have R-values between 2.0 and 3.0
    - Each profile has its own R-value

Energy Code and Program Recognition

2009 International Energy Conservation Code

- As energy efficiency has become more important, energy codes have become increasingly stringent
- As a result, builders and designers are looking for cost-effective ways to specify and build walls with higher thermal performance
- Understanding the thermal performance of insulated siding is especially important for compliance with the *2009 IECC,* which is expected to be adopted widely by states and jurisdictions across the country

Insulated Siding and *IECC*

- When properly installed, insulated siding can meet the definition of "continuous insulation" in *ASHRAE 90.1,* which is referenced in the *IECC*
- When used as a component of a high performance wall, insulated siding can help builders and designers meet or exceed *IECC* requirements for continuous insulation and/or whole wall U-factors

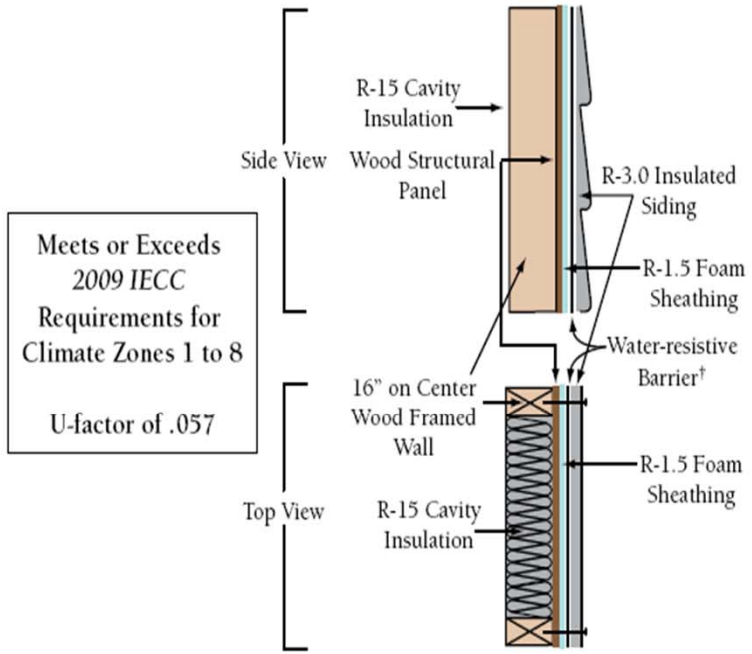
IECC Compliance Approach	*2009 IECC* Section	Documentation Required	Notes
Prescriptive R-value	402.1.1	R-value of insulated siding (see Chapter 3 of this guide for more information on determining the R-value)	Table 402.1.1 of the *2009 IECC* recognizes "insulated sheathing." To determine if "insulated siding" is approved for compliance with Table 402.1.1 and Section 402.1.2, check with the local building official. In footnote h of Table 402.1.1 of the *2012 IECC*, insulated siding is cited as a form of continuous insulation.
Prescriptive U-factor	402.1.3	U-factor of wall assembly, including insulated siding	In computing wall U-factors, the designer can use the thermal benefit of insulated siding.
Prescriptive UA (U-factor times the area of the wall)	402.1.4	U-factor of wall assembly, including insulated siding	
Performance	405	U-factor of wall assembly, including insulated siding	

Insulated Siding Can Be Used for Energy Code Compliance in Various Climate Zones

Table 6.3 Wood Framed Wall, 16" on Center, Whole Wall U-factors

Continuous Insulation R-value	Cavity Insulation R-value							
	2" x 4" Construction				2" x 6" Construction			
	R-0	R-11	R-13	R-15	R-19	R-20	R-21	R-25
R-2.0	0.176	0.078	0.073	0.068	0.055	0.054	0.052	0.048
R-2.5	0.161	0.075	0.070	0.066	0.053	0.052	0.051	0.047
R-3.0	0.149	0.072	0.067	0.063	0.052	0.050	0.049	0.046
R-3.5	0.138	0.070	0.065	0.061	0.050	0.049	0.048	0.044
R-4.0	0.129	0.067	0.063	0.059	0.049	0.048	0.047	0.043
R-4.5	0.121	0.065	0.061	0.057	0.048	0.046	0.045	0.042
R-5.0	0.114	0.063	0.059	0.055	0.046	0.045	0.044	0.041
R-5.5	0.108	0.061	0.057	0.054	0.045	0.044	0.043	0.040
R-6.0	0.102	0.059	0.055	0.052	0.044	0.043	0.042	0.039
R-6.5	0.097	0.057	0.054	0.051	0.043	0.042	0.041	0.038
R-7.0	0.093	0.056	0.052	0.049	0.042	0.041	0.040	0.037
R-7.5	0.088	0.054	0.051	0.048	0.041	0.040	0.039	0.037
R-8.0	0.085	0.052	0.049	0.047	0.040	0.039	0.039	0.036
R-8.5	0.081	0.051	0.048	0.046	0.039	0.039	0.038	0.035
R-9.0	0.078	0.050	0.047	0.045	0.039	0.038	0.037	0.035
R-9.5	0.075	0.049	0.046	0.044	0.038	0.037	0.036	0.034
R-10.0	0.072	0.047	0.045	0.043	0.037	0.036	0.036	0.033

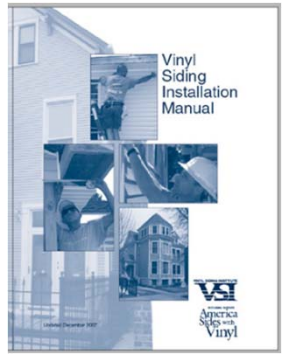
Figure 6.9 Cross Section of Wood Framed Wall with R-3.0 Insulated Siding, R-1.5 Foam Sheathing and R-15 Cavity Insulation

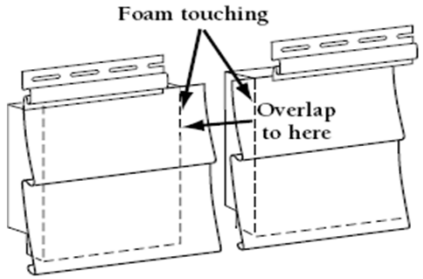


Installation

Installation

- Many of insulated siding's attributes and installation techniques are the same as those of vinyl siding
- Always follow the manufacturer's instructions, using accessories specified by the manufacturer, to ensure proper installation
- Insulated siding can be installed over furring strips, but in order for insulated siding to qualify as home insulation, it must be installed directly over a water-resistive barrier and sheathing
  - Insulated siding installed over furring strips would not be considered home insulation
- When cutting insulated siding, use a circular saw with a fine-tooth (plywood) blade inserted backwards and cut slowly
- No gap is needed between the foam at the ends of insulated siding





Insulated Siding and Energy Performance Programs

Insulated Siding and Energy Performance Programs

- Two of the most popular energy efficiency programs for residential builders—EPA's ENERGY STAR Qualified Homes and DOE's Builders Challenge—use a home energy rating system (HERS) to develop a score, referred to as a HERS Index
  - Insulated siding can be used to help with compliance to these programs by reducing a home's HERS Index

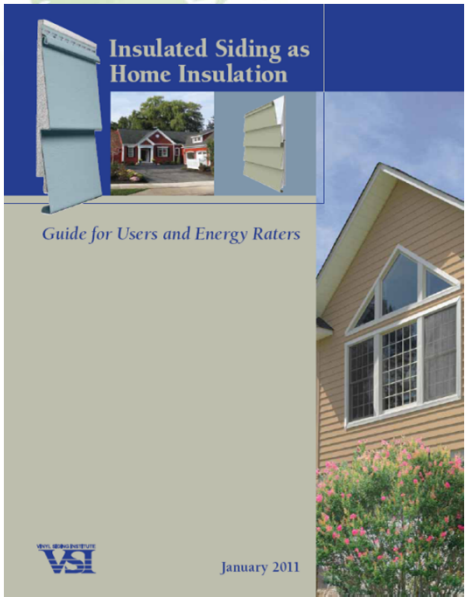
HERS Index Improvements Using Insulated Siding

- Improvements to the HERS Index and projected energy use for homes using R-values for insulated siding of 2.0, 2.5 and 3.0 show insulated siding can provide a 1 to 3 point improvement
- This improvement accounts for up to 23 percent of the total improvement necessary to achieve compliance with ENERGY STAR Qualified Homes Version 3

Table 7.1 Expected HERS Index Improvements on *2009 IECC* Compliant Homes That Can Be Achieved with Insulated Siding

Climate Zone	City	*2009 IECC* Minimum Home		*2009 IECC* Minimum Home + R-2.0 Insulated Siding		*2009 IECC* Minimum Home + R-2.5 Insulated Siding		*2009 IECC* Minimum Home + R-3.0 Insulated Siding		ENERGY STAR 2011 HERS Index Target
		Wall U-factor	HERS Index	Wall U-factor	HERS Index Improvement v. *2009 IECC*	Wall U-factor	HERS Index Improvement v. *2009 IECC*	Wall U-factor	HERS Index Improvement v. *2009 IECC*	
1	Miami	0.082	86	0.073	2	0.070	2	0.067	2	70
2	Phoenix	0.082	87	0.073	2	0.070	3	0.067	3	71
3	Dallas	0.082	85	0.073	1	0.070	2	0.067	2	70
4	Baltimore	0.082	84	0.073	2	0.070	2	0.067	3	71
5	Denver	0.059	85	0.054	1	0.052	1	0.050	2	70
6	Burlington	0.059	86	0.054	1	0.052	1	0.050	2	68
7	Duluth	0.057	87	0.052	2	0.051	2	0.049	2	66
8	Fairbanks	0.057	85	0.052	2	0.051	2	0.049	2	61

Questions and Resources



For more information on insulated siding and to download a free copy of *Insulated Siding as Home Insulation: Guide for Users and Energy Raters,* visit www.insulatedsiding.info

VINYL SIDING INSTITUTE
America Sides with Vinyl℠