ICC EVALUATION SERVICE

www.icc-es.org/ep
1-800-423-6587
(562) 699-0543

A Subsidiary of the International Code Council®

ENVIRONMENTAL CRITERIA FOR DETERMINATION OF EQUIVALENT WOOD FRAME WALL ASSEMBLIES TO THE PRESCRIPTIVE BUILDING THERMAL ENVELOPE REQUIREMENTS OF THE *INTERNATIONAL ENERGY CONSERVATION CODE®* AND *INTERNATIONAL RESIDENTIAL CODE®*

EC115

Effective date: October 1, 2012

PREFACE

ICC-ES issues Environmental Criteria (ECs) to provide interested parties with information on the requirements for obtaining an ICC-ES Verification of Attributes Report (VAR). An ICC-ES VAR provides independent verification of a manufacturer's environmental claims and product attributes. ECs address the production stage of the report subject, beginning with raw material acquisition through final manufacturing and packaging, and may also include information on projections for installation, use, reuse, and end-of-life, where specifically stated therein. This EC is effective as of the date referenced above and may be amended from time to time.

All VARs must comply with the EC in effect on the date of issuance or reissuance of the report. Any technical changes to the EC will be marked within the EC. A solid vertical line (│) shall be placed in the margin within the EC to indicate a change, addition, or deletion from the previous edition. A deletion indicator (➔) shall be placed in the margin where wording has been deleted.

ICC-ES may consider alternate approaches to those contained in this EC, provided the applicant submits valid data demonstrating that the alternate approach is at least equivalent to the requirements set forth in this EC, subject to approval by ICC-ES staff. Notwithstanding that a product, material, or type or method of construction meets the requirements set forth in this EC, or that it can be demonstrated that valid alternate ECs are equivalent to the requirements in this document, ICC-ES retains the right to refuse to issue or renew a VAR, if the product, material, or type or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

The EC is limited to the scope statement in Section 1.2 and is not intended to construe a comprehensive environmental claim where considerations are given to other environmental trade-offs, impacts or full life cycle assessment.

Note: The Preface of ICC-ES environmental criteria was revised in February 2012 to reflect changes in policy .

Environmental Criteria are developed for use solely by ICC-ES for purpose of issuing ICC-ES VARs.

ENVIRONMENTAL CRITERIA FOR DETERMINATION OF EQUIVALENT WOOD FRAME WALL ASSEMBLIES TO THE PRESCRIPTIVE BUILDING THERMAL ENVELOPE REQUIREMENTS OF THE *INTERNATIONAL ENERGY CONSERVATION CODE*® AND *INTERNATIONAL RESIDENTIAL CODE*® (EC115)

1.0 INTRODUCTION

1.1 Purpose: This document provides a procedure for determining the equivalent thermal transmission performance of wood frame wall assemblies to that of a benchmark wall assembly that complies with the provisions of the 2012 and 2009 *International Energy Conservation Code*® (IECC) and the 2012 and 2009 *International Residential Code*®, for recognition of that equivalence in an ICC-ES Environmental Programs, Verification of Attributes Report (VAR).

The reason for the development of this criteria is to establish methods that will permit the listing of various prescriptive wood frame wall assemblies that have equivalent thermal transmittance of a wood frame wall assembly within a given climate zone.

1.2 Scope: This criteria is limited to the thermal transmittance of the opaque portion of wood frame wall assemblies. This criteria does not consider total U_A (sum of *U*-factor times assembly area) and does not consider trade-offs for other energy efficiency measures, including, but not limited to, air infiltration, fenestration efficiencies, and heating and cooling efficiencies. The issue of determination of compliance with other requirements of the International Codes, such as structural capacity, fire resistance, weather resistance, moisture transfer, or material compliance, is outside the scope of this criteria

1.3 Applicability: Minimum prescriptive building thermal envelope requirements are found in 2012 IECC Sections C402.1 and R402.1, 2012 IRC Section N1102.1, 2009 IECC Sections 402.1 and 502.1 and 2009 IRC Section N1102.1.

1.4 Referenced Documents:

1.4.1 2012 and 2009 *International Energy Conservation Code*® (IECC), International Code Council.

1.4.2 2012 and 2009 *International Building Code*® (IBC), International Code Council.

1.4.3 2012 and 2009 *International Residential Code*® (IRC), International Code Council.

1.4.4 ANSI/ASHRAE/IESNA Standard 90.1-2010, *Energy Standard for Buildings Except Low-Rise Residential Buildings*, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

1.4.5 2009 ASHRAE *Handbook of Fundamentals*, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

1.4.6 ASTM C177-99, Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus, ASTM International.

1.4.7 ASTM C518-91 or -04, Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus, ASTM International.

1.4.8 ASTM C1363-05, Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus, ASTM International.

1.4.9 ICC-ES Acceptance Criteria for Reflective Insulation (AC02), ICC Evaluation Service, LLC.

1.4.10 ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), ICC Evaluation Service, LLC.

1.4.11 ICC-ES Acceptance Criteria for Polyester Loose-fill and Blanket Insulations (AC187), ICC Evaluation Service, LLC.

1.4.12 ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), ICC Evaluation Service, LLC.

1.4.13 ICC-ES Evaluation Guideline for Cotton Fiber Insulation (EG81), ICC Evaluation Service, LLC.

1.4.14 Documents related to the Seal and Insulate with ENERGY STAR® Program, United States Environmental Protection Agency.

2.0 REQUIRED DATA

2.1 Product Description: Information shall be submitted on all components of the wood frame wall assembly to be evaluated. The information shall include the product names, styles, and part or model numbers, and/or a physical description of each component, as applicable. Each discrete component of each wall assembly for which recognition is sought shall be identified by manufacturer and product model number or name, as required. ICC-ES staff should be contacted for additional information on specific submission requirements for the individual assembly components. Specific data establishing the thermal transmittance of each assembly for which recognition is sought shall be submitted in accordance with the requirements set forth in Section 3.0 of this criteria.

2.2 Installation Requirements: Documentation shall be submitted which contains detailed information about each component (its characteristics, dimensions, and construction requirements) making up each variety of wood frame wall assembly for which recognition is sought.

3.0 PERFORMANCE REQUIREMENTS

3.1 Evaluation and Determination of Thermal Values: The thermal values of the components that determine the overall thermal transmittance of the wall assemblies shall be established based on one or more of the following methods, as appropriate:

3.1.1 Section 3.2, Individual Component *R*-values.

3.1.2 Section 3.3, Assembly *U*-factor.

3.1.3 Section 3.4, Tested Wall or Components.

3.2 Individual Component R-values: Calculations and/or test data must be submitted establishing the *R*-value or *U*-factor for each discrete component of each assembly to be evaluated. As noted in Section 2.1, ICC-ES staff should be contacted for additional information on specific submission requirements for the individual components. Calculation methods used to establish *R*-values shall be in accordance with those set forth in Table1.

3.3 Assembly Thermal Transmittance: Calculations establishing the assembly thermal transmittance shall be submitted. Calculations determining the thermal transmittance of the benchmark assembly and the

equivalent assembly shall be conducted using the same method in accordance with one of the following:

3.3.1 Chapters 25, 26 and 27 of the ASHRAE Handbook of Fundamentals.

3.3.2 ANSI/ASHRAE/IESNA Standard 90.1, Section A.

3.3.3 Calculations based upon data from finite-element software for two-dimensional (2D) or three dimensional (3D) heat-transfer analysis based on prior approval by ICC-ES. **Note:** ICC-ES staff should be contacted for more information on requirements before calculations are submitted. At a minimum, calculations shall clearly show:

3.3.3.1 Component *R*-values for interior and exterior air film, insulation, structural components, finishes, air spaces, effective emittance, and other moisture or air infiltration barriers, where applicable.

3.3.3.2 Actual component dimensions and spacing within the assembly. **Note:** Where the assembly consists of materials that are not in substantial contact with the wood frame wall construction, these materials shall be excluded from the thermal transmission calculations.

3.3.3.3 Compliance with the IECC requirements noted in Section 1.3. For compliance with Tables 402.1.3 and 502.1.2 of the 2009 IECC, Table N1102.1.2 of the 2009 IRC, Tables R402.1.3 and C402.1.2 of the 2012 IECC, and Table N1102.1.3 of the 2012 IRC, the benchmark assembly calculated *U*-factor shall be less than or equal to the maximum *U*-factors listed in the IECC tables. ICC-ES staff should be contacted for more information on benchmark assembly requirements for compliance with Tables 402.1.1 and 502.1.2 of the 2009 IECC, Table N1102.1 of the 2009 IRC, Tables R402.1.1 and C402.2 of the 2012 IECC, and Table N1102.1.1 of the 2012 IRC, before calculations are submitted.

3.4 Tested Wall Assemblies or Components: Component *R*-values that are determined by testing shall be based on one or more of the following tests, as appropriate:

3.4.1 ASTM C177.

3.4.2 ASTM C518.

3.4.3 ASTM C1363.

4.0 VAR RECOGNITION

4.1 The VAR shall identify the specific wood frame wall assembly and all individual components of the wall assembly which are recognized in the report.

4.2 The VAR shall set forth the installation requirements for each assembly.

4.3 Where the components of the wood frame wall assembly listed in the report are the subject of a current ICC-ES evaluation report, the following statement shall be included:

"See ICC-ES evaluation report ESR-XXXX for compliance with requirements of the *International Building Code* and/or *International Residential Code*."

4.4 Where the components of the wood frame wall assembly listed in the report are not the subject of a current ICC-ES evaluation report, the following statement shall be included:

"Documentation that establishes that the following wood frame wall assembly components (list components) comply with the applicable requirements of the *International Building Code* and/or *International Residential Code* must be submitted to the Authority Having Jurisdiction (AHJ) as part of the permit application."

4.5 The following limitation-of-use statement shall be included:

"The evaluation of the entire wood frame wall assembly is limited to thermal transmission properties only. The evaluation for compliance of the wall assembly with any other applicable requirements of the *International Building Code* and/or *International Residential Code* is outside the scope of this report."■

TABLE 1—INDIVIDUAL COMPONENT ACCEPTABLE SOURCES

ACCEPTABLE SOURCES	COMPONENTS							
	Framing Members	Insulation	Sheathing	Exterior Claddings	Interior Finishes	Air Barriers	Vapor Retarders	Air Spaces
ASHRAE Handbook of Fundamentals, Chapters 25, 26 & 27	✓	✓	✓					✓
ANSI/ASHRAE/IESNA Standard 90.1, Section A	✓	✓	✓	✓	✓	✓	✓	✓
ICC-ES reports based on AC02		✓						✓
ICC-ES reports based on AC12		✓						
ICC-ES reports based onAC181		✓						
ICC-ES reports based on AC377		✓						
ICC-ES reports based on EG81		✓						
U.S. EPA Seal and Insulate with ENERGY STAR® Program certification report		✓						