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RESIDENTIAL ENERGY SERVICES NETWORK

Setting the **Standards** for
Home Energy Efficiency

Interpretation: Mass Wall Insulation Inspection & Grading

Designation: IR 301-2019-049 and 301-2022-004

Approved: November 19, 2024 by RESNET SDC 300

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Reference:

Standard	ANSI/RESNET/ICC 301-2019 ANSI/RESNET/ICC 301-2022
Page Number(s):	Numerous
Sections(s):	Appendix A, Appendix B and Section 4.2.2.3
Table(s):	Wall Insulation Installation
Relating to:	Inspection, Grading & Modeling of Insulated Mass Walls

Request from:

Name:	Richard Porter
Affiliation:	CfiFOAM, Inc.
Address:	5909 Echo Drive
City:	Knoxville
State:	Tennessee Zip: 37919
Email:	richard@cfifoam.com

Background Statement:

For ANSI/RESNET/ICC Standard 301-2022 (Standard 301)…

Appendix A addresses the grading of insulation installation.

Appendix B addresses the inspection procedures for minimum rated features.

Section 4.2.2.3 addresses how the insulation grade should be modeled in software.

Standard 301 appears to address many specific insulation products/applications, including batt, loose fill, open cell spray foam, closed cell spray foam, insulated sheathing, structural insulated panels and reflective/radiant products.

However, the standard does not appear to address injectable foam insulation for integrally insulated mass walls such as Concrete Block Stucco (CMU/CBS) Walls (used widely in central/south Florida), nor 3D Concrete Printed Walls (growing nationwide). By far, the most popular method for insulating these mass walls is by integrally-insulating the interior/core of the mass wall cavity with pre-expanded injection foam.

Clarification is needed as to how this type of product should be handled by Standard 301-2022.

Part I

Section 4.2.2.3.1 of Standard 301 states: "The insulation of the Rated Home shall be either inspected according to procedures of Normative Appendix A or if confirmed to be present but not fully inspected, shall be modeled as Grade III and shall be recorded as "not inspected" in the rating."

The following is an excerpt from Section 4.2.2.3 of Standard 301.

> **4.2.2.3. Insulation Inspections**: All enclosure elements for the Rated Home shall have their insulation assessed in accordance with this Standard. Insulation shall be rated as Grade I, II, III or uninsulated in accordance with the on-site inspection procedures Normative Appendix A.
>
> > **4.2.2.3.1.** The insulation of the Energy Rating Reference Home enclosure elements shall be modeled as Grade I. The insulation of the Rated Home shall either be inspected according to procedures Normative Appendix A or if confirmed to be present but not fully inspected, shall be modeled as Grade III and shall be recorded as "not inspected" in the rating.
> >
> > **Exceptions:**
> >
> > (a) Modular and manufactured housing using IPIA inspections shall be considered as an acceptable alternative for the Energy Rating inspection where the manufacturer of the home includes the on-site inspection procedures for insulation details and requirements in Appendix A in their DAPIA packages, which are used by IPIAs for their factory inspections.

(b) The R-Values for nonstructural materials or for Structural Insulated Panels (SIPs), Insulated Concrete Forms (ICFs) and other pre-manufactured assemblies when accompanied by supporting test data consistent with ASTM C177, ASTM C518, ASTM C1114, ASTM C1363 or ASTM C976.

Thermographic inspection is permitted to be used to determine that an assembly is insulated and achieves a Grade II rating if the person doing the inspection is an ASNT NDT Level III or a licensed engineer or if the person doing the inspection is working under the direction of an ASNT NDT Level III or a licensed engineer. Thermographic inspection shall not be used to determine an assembly achieves a Grade I rating.

Furthermore, Appendix B of Standard 301-2022 specifically states under the "Wall insulation installation" section: "Use the inspection procedures in Normative Appendix A to verify the insulation type and grade of the insulation installed in the framed wall stud cavity".

This provision makes it clear that Normative Appendix A applies to conventional framed stud walls.

Excerpt from Standard 301-Appendix B:

Wall insulation installation	Determine and record type, grade and thickness of framed wall insulation and resultant R-Value.	Use the inspection procedures in Normative Appendix A insulation type and grade of the insulation installed in the cavity. Visually confirm and record R-Value and measure insulation is observed, but the R-Value cannot be determi observation, the manufacturer's data sheet shall be used.

Part II

Concrete masonry unit mass walls can be insulated with pre-expanded, injectable spray foam insulation where the foam is pressure-injected into the wall cavity via either injection holes drilled in every open core of concrete block or, alternatively, is top-filled in open-top mass wall cavities. These types of installations are visually inspected from small "pigtails" of foam exiting test holes drilled at the top and bottom of the wall cavity or, alternatively, visible via holes in the top plate, if applicable. This allows for each core of the wall to be fully inspected in accordance with Section 4.2.2.3.1.

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Proposed Interpretation:

Part I
Normative Appendix A of Standard 301-2022 does not address the grading of insulation installation in integrally insulated mass walls.

Part II
Where the injection foam complies with one or more of the ASTM standards in the Exceptions under Section 4.2.2.3.1 and each core is fully inspected via test holes to verify foam has filled the cavity shall receive a Grade I installation.

SDC Response:

Is the proposed interpretation correct? _____ Yes __X___ No

SDC Comments:

In a previous interpretation request, IR-301-2019-035, the Committee agreed with the interpretation that "core-filled CMU block wall assemblies are not explicitly addressed in ANSI / RESNET / ICC 301" and that "the insulation installation of such an assembly cannot achieve Grade I".

Consistent with that interpretation request, the Committee finds Part I of this current interpretation to be correct and Part II to be incorrect.

While Appendix A (excerpt copied below) does not currently contain specific installation requirements for CMU walls that are injected on-site with pre-expanded spray foam to achieve Grade I or Grade II, they are eligible for Grade III.

> **A-1. Insulation.** In order to meet the requirements of a Grade I or Grade II insulation rating, the insulation material shall be installed in accordance with the minimum installation requirements of this Appendix and the requirements specified by ASTM standards C727, C1015, C1743, C1320, C1321 and C1848 as described below in the insulation grading section.
>
> Installations not complying with the minimum installation requirements of this Appendix, the relevant ASTM standard for the type insulation, or the Grade I or Grade II coverage requirements shall be considered Grade III installations. Grade III installations shall be recorded and shall be modeled as specified by Section 4.2.2.3.2 of this Standard.

In addition (in accordance with 4.2.2.3.1 below), these assemblies can achieve Grade II, where meeting the requirements for thermographic inspection. As the insulation within these assemblies cannot be "fully inspected", they cannot currently achieve Grade I until a procedure is added via proposed amendment to the standard to Appendix A that is specific to this assembly type. While the ASTM Standards cited in the interpretation are listed in the Exception, this is with respect to assessing R-values and not grading, and also do not apply to foam-filled CMU's.

4.2.2.3. Insulation Inspections: All enclosure elements for the Rated Home shall have their insulation assessed in accordance with this Standard. Insulation shall be rated as Grade I, II, III or uninsulated in accordance with the on-site inspection procedures Normative Appendix A.

4.2.2.3.1. The insulation of the Energy Rating Reference Home enclosure elements shall be modeled as Grade I. The insulation of the Rated Home shall either be inspected according to procedures Normative Appendix A or if confirmed to be present but not fully inspected, shall be modeled as Grade III and shall be recorded as "not inspected" in the rating.

Exceptions:

(c) Modular and manufactured housing using IPIA inspections shall be considered as an acceptable alternative for the Energy Rating inspection where the manufacturer of the home includes the on-site inspection procedures for insulation details and requirements in Appendix A in their DAPIA packages, which are used by IPIAs for their factory inspections.

(d) The R-Values for nonstructural materials or for Structural Insulated Panels (SIPs), Insulated Concrete Forms (ICFs) and other pre-manufactured assemblies when accompanied by supporting test data consistent with ASTM C177, ASTM C518, ASTM C1114, ASTM C1363 or ASTM C976.

Thermographic inspection is permitted to be used to determine that an assembly is insulated and achieves a Grade II rating if the person doing the inspection is an ASNT NDT Level III or a licensed engineer or if the person doing the inspection is working under the direction of an ASNT NDT Level III or a licensed engineer. Thermographic inspection shall not be used to determine an assembly achieves a Grade I rating.

The Committee encourages the submitter to propose an amendment to sections 4.2.2.3, Appendix A, and B that would provide an avenue for this assembly to demonstrate and achieve Grade I insulation installation.