Provided By:

CMHA

WHAT OPTIONS ARE AVAILABLE FOR COMPLYING WITH THE INTERNATIONAL ENERGY CONSERVATION CODE?

The International Energy Conservation Code (IECC) [1] provides several different, independent methods of complying with the minimum energy efficiency requirements for commercial construction: prescriptive, trade-off (called component performance alternative), and total building performance (previously called whole building energy analysis.) These alternatives are permitted for each of the various editions of the IECC. The prescriptive method is often the easiest to apply, but offers the least flexibility. It is the most conservative of the three options, and is the source of the misconception that masonry walls require continuous insulation – which they do not [2]. The trade–off (components performance alternative) is an option if a building envelope does not comply using either the prescriptive R-Value or U-Factor requirements. The simplest way to utilize this compliance path is to use a software tool such as COMcheck [3]. The trade-off method strikes a balance between designer flexibility and compliance path complexity.

COMcheck determines compliance for the building envelope based on the specifics of the building under consideration and on the project location. Using this option, the designer "builds" a description of the building, entering basic data (size, type of construction, R-value of insulation, etc.) for the building envelope elements (roof, exterior walls, windows, doors, floor, basement and skylights). After the building envelope description and project location are defined, the program displays how close the envelope as entered comes to meeting the specified code requirements. If the envelope fails to comply, it is typically a simple matter to adjust individual elements to bring the envelope into compliance.

Note that using COMcheck is an alternative to complying via the prescriptive R-Value or U-Factor requirements. The envelope components do not need to meet the prescriptive requirements if the envelope is shown to comply using COMcheck. COMcheck includes compliance options for various editions of the IECC as well as many state modifications to the IECC.

While COMcheck provides enhanced design flexibility, with a little bit of added complexity over the prescriptive tables, there are some inherent limits to the approach that can result in extra conservatism. For example, the U-Factors for integrally-insulated (masonry cell insulation) single wythe walls embedded in the program assume conventional CMU with both vertical and horizontal partial grouting. Hence, the U- Factor built into the wall assembly list of COMcheck can be conservative in many cases. For a concrete masonry wall with better thermal proprieties than traditional CMU, such as integrally insulated CMU, users should define their mass wall assembly separately rather than using the software defaults. For this, the user needs to know the U-factor of their desired assembly, as well as that assembly's heat capacity. Heat capacity is a material property used to assess a wall's thermal mass, and it is often used as a criterion in energy codes and standards to define a mass wall. In addition, it is important to capture the accurate heat capacity to get an accurate thermal mass. CMHA TEK 06-16A [4] contains values for heat capacity of various concrete masonry walls. More information on using Comcheck with concrete masonry assemblies can be found in CMHA TEK 06-04B [5].

The final option for energy code compliance is to use the total building performance option. For this method, a whole-building analysis, such as that performed using the EnergyPlus [6] software package, analyzes the energy impacts of the entire building, including factors such as interior components, lighting, HVAC, and occupancy patterns. The result is an estimate of annual energy use and/or cost for the building as a whole. A whole-building analysis is performed in accordance with ASHRAE/IESNA Standard 90.1 Appendix G, Performance Rating Method [6]. Use of Appendix G complies with IECC

Last Revised April 1, 2024

Section C401.2, which states that the building may demonstrate compliance with ASHRAE/IESNA Standard 90.1 as an alternate to the requirements listed in the IECC. (Note that ASHRAE 90.1 also includes a trade-off method for compliance that COMcheck utilizes as well.) As mentioned above it is very important to pay attention that any program/software used is accurately capturing the heat capacity so that the thermal mas and energy compliance is accurately determined.

REFERENCES

1. International Energy Conservation Code (IECC), 2021, International Code Council, www.iccsafe.org.
2. CMHA CMU-FAQ-008-23, 2023, “Do Concrete Masonry Walls Require Continuous Insulation?”, Concrete Masonry & Hardscapes Association, www.masonryandhardscapes.org.
3. COMcheck, U.S. Department of Energy, https://www.energycodes.gov/comcheck.
4. CMHA TEK 06–16A, 2016, “Heat Capacity (HC) Values for Concrete Masonry Walls”, Concrete Masonry & Hardscapes Association, www.masonryandhardscapes.org.
5. NCMA TEK 06-04B, 2012, “Energy Code Compliance Using COMcheck”, Concrete Masonry & Hardscapes Association, www.masonryandhardscapes.org.
6. EnergyPlus, U.S. Department of Energy, http://apps1 eere.energy.gov/buildings/energyplus/.
7. ASHRAE/IESNA Standard 90.1, 2022, “Energy Standard for Buildings Except Low-Rise Residential Buildings”, ASHRAE, www.ashrae.org.

ABOUT CMHA

The Concrete Masonry & Hardscapes Association (CMHA) represents a unification of the Interlocking Concrete Pavement Institute (ICPI) and National Concrete Masonry Association (NCMA). CMHA is a trade association representing US and Canadian producers and suppliers in the concrete masonry and hardscape industry, as well as contractors of interlocking concrete pavement and segmental retaining walls. CMHA is the authority for segmental concrete products and systems, which are the best value and preferred choice for resilient pavement, structures, and living spaces. CMHA is dedicated to the advancement of these building systems through research, promotion, education, and the development of manufacturing guides, design codes and resources, testing standards, and construction practices.

Disclaimer:
The content of this CMHA FAQ is intended for use only as a guideline and is made available “as is.” It is not intended for use or reliance upon as an industry standard, certification or as a specification. CMHA and those companies disseminating the technical information contained in the FAQ make no promises, representations or warranties of any kind, expressed or implied, as to the accuracy or completeness of content contained in the FAQ and disclaim any liability for damages or injuries resulting from the use or reliance upon the content of FAQ. Professional assistance should be sought with respect to the design, specifications, and construction of each project.