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CMHA

HOW CAN CONCRETE MASONRY ASSEMBLIES COMPLY WITH CODE-MANDATED AIR BARRIER REQUIREMENTS?

The International Energy Conservation Code [1] includes performance requirements for air barrier materials and systems. In the 2021 IECC, except for Climate Zone 2B, commercial buildings have requirements for these air barriers and systems. Compliance can be determined by whole building testing, or through use of certain materials and systems.

The requirements for materials and systems are as follows (per C402.5.1.3.1 and C402.5.1.4 of the 2021 IECC):

- Materials shall have an air permeability not greater than 0.004 cfm/ft^2 (0.02 L/s-m^2) under a pressure differential of 0.3-inch water gauge (75 Pa) when tested in accordance with ASTM E2178.
- Assemblies of materials and components shall have an average air leakage not greater than 0.04 cfm/ft^2 (0.2 L/s-m^2) under a pressure differential of 0.3 inch of water gauge (75 Pa) when tested in accordance with ASTM E2357, E1677, D8052 or E283.

In addition to the performance requirements listed above, there are several 'deem-to-comply' options for both materials and assemblies listed in the IECC. These would not require any additional testing, but rather would automatically comply with air barrier requirements. This list includes:

- Options specific to masonry construction:
  - Fully grouted concrete masonry (although listed as a material, this compliance option is more accurately deemed an assembly),
  - As a material, Portland cement/sand parge or gypsum plaster with a minimum thickness of 5/8 in. (16 mm),
  - As an assembly, Portland cement/sand parge, stucco or plaster with a minimum thickness of 1/2 in. (13 mm), and
  - Concrete masonry walls with either one application of block filler or two coats of paint or sealer coating.
- Other relevant options:
  - Extruded polystyrene insulation board with a minimum thickness of 1/2 in. (13 mm) with joints sealed,
  - Foil-backed polyisocyanurate insulation board with a minimum thickness of 1/2 in. (13 mm) with joints sealed,
  - Closed-cell spray foam insulation with a minimum density of 1.5 pcf (2.4 kg/m^3) with a minimum thickness of 1-1/2 in. (36 mm),
  - Open-cell spray foam insulation with a density between 0.4 and 1.5 pcf (0.6 - 2.4 kg/m^3) with a minimum thickness of 4-1/2 in. (114 mm), and
  - Gypsum wallboard with a minimum thickness of 1/2 in. (13 mm) with joints sealed.
  - Cement board having a thickness of not less than ½ inch (12.7 mm).
  - As a material, solid or hollow masonry constructed of clay or shale masonry units.
  - As an assembly, masonry walls constructed of clay or shale masonry units with a nominal width of 4 inches (102 mm) or more.

Any of the 'deem-to-comply' options can be used in order to comply with the air barrier requirements. Other methods could be used, so long as the materials or assembly are tested and comply with the performance requirements in the IECC. For materials (such as sheet or rigid board products), testing is conducted in accordance with ASTM E2178, *Standard Test Method for Air Permeance of Building Materials* [2]. For assemblies, there are several methods available, but one commonly used is ASTM E283, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen* [3]. This method could be used for

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concrete masonry walls with specific coatings or finishes.

For multi-wythe assemblies, there are many options for air barrier compliance. Many of the 'deem-to-comply' materials can be used in the cavity of the assembly; such as spray foam insulation. There are also many proprietary systems available from a variety of manufacturers that are intended for use in the cavity of multi-wythe assemblies.

Single-wythe assemblies do not have as many options, but there are still several ways to comply. Solid grouting is a deem-to-comply option. There are also proprietary and non-proprietary surface coatings that can be utilized. In addition to the deem-to-comply options, NCMA performed research that shows that single coats of paint or block filler can reduce the air leakage of a concrete masonry assembly below the required limits. More information can be found in NCMA Report MR36 [4].

For more information, please see CMHA TEK 06-14A [6].

REFERENCES

1. *International Energy Conservation Code* 2021. International Code Council, 2021.
2. *Standard Test Method for Air Leakage Rate and Calculation of Air Permeance of Building Materials,* ASTM E2178-21a. ASTM International, 2021.
3. *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen,* ASTM E283-19. ASTM International, 2019.
4. *Assessment of the Effectiveness of Water Repellents and Other Surface Coatings on Reducing the Air Permeance of Single Wythe Concrete Masonry Assemblies,* MR36. National Concrete Masonry Association, 2010.
5. *International Energy Conservation Code* 2021. International Code Council, 2021.
6. *Control of Air Leakage in Concrete Masonry Walls,* CHMA TEK 06-14A, Concrete Masonry & Hardscapes Assocation, 2011.

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.