



How can concrete masonry assemblies comply with code-mandated air barrier requirements?

Beginning with the 2012 International Energy Conservation Code [1], performance requirements were introduced for air barrier materials and systems. All commercial buildings in climate zones 4-8 are required to comply with these requirements (IECC Section C402.4). There are three levels of compliance with these air barrier requirements:

- a building material intended to serve as an air barrier must have an air permeance of less than 0.004 cfm/ft^2 at a pressure differential of 1.57 lb/ft^2 (0.02 L/s-m^2 at 75 Pa) (IECC Section 402.4.1.2.1),
- an assembly of materials intended to serve as an air barrier, such as a concrete masonry wall assembly, must have an air leakage rate of less than 0.04 cfm/ft^2 at a pressure differential of 1.57 lb/ft^2 (0.2 L/s-m^2 at 75 Pa) (IECC Section 402.4.1.2.2), or
- a building must have an air leakage rate of less than 0.4 cfm/ft^2 at a pressure differential of 1.57 lb/ft^2 (2.0 L/s-m^2 at 75 Pa) (IECC Section 402.4.1.2.3).

In addition to the performance requirements listed above, there are several 'deem-to-comply' options. 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 coated with one application of block filler and two applications of a 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 ($0.6 - 2.4 \text{ kg/m}^3$) 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.

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 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].

These provisions were included in the 2012 IECC, and are maintained in the 2015 IECC [5]. One key change was the addition of clay brick masonry to the list of deem-to-comply materials. This change enables an assembly with a solid clay brick veneer to use the veneer to comply with the air barrier requirements in the 2015 IECC.

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

References

1. *International Energy Conservation Code 2012*. International Code Council, 2012.
2. *Standard Test Method for Air Permeance of Building Materials*, ASTM E2178-13. ASTM International, 2013.
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 E283-04 (Reapproved 2012). ASTM International, 2012.
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 2015*. International Code Council, 2015.
6. *Control of Air Leakage in Concrete Masonry Walls*, TEK 6-14A. National Concrete Masonry Association, 2011.