

VAPOR PERMEANCE (Vapor Barriers or Vapor Retarder)

OVERVIEW

ASHRAE defines Vapor retarder as the element that is designed and installed in a wall assembly to retard the movement of water by vapor diffusion.

The function of a vapor barrier or vapor retarder is to retard water vapor migration through the wall assembly. With conventional wood or steel stud wall framing and assemblies, water vapor intrusion can result in the degradation of the structure, through mold growth, and the reduction of the thermal performance of the insulation system in the wall with moisture present in the wall assembly.

To meet the code requirements, in a typical framed wall cavity construction, a vapor barrier layer, with a minimum specified permeance rating, is typically installed on the warm side of the wall assembly. This common type of wall assembly prevents moisture from passing into the wall assembly cavity and collecting in the insulation material and stud framing.

Stronghold ICF Wall assemblies are composed of a monolithic concrete wall core encapsulated on both sides by EPS (expanded polystyrene) insulation panels, and is considered by code agencies as a mass wall versus a conventional wood or steel stud framed cavity wall.

NATIONAL BUILDING CODE REQUIREMENTS

The International Residential Code (IRC) and the National Building Code of Canada specify requirements for a vapor retarder for framed wall cavity construction, to control any diffusion or condensation of water vapor that may occur on a cold surface with a wall assembly cavity.

Stronghold ICF walls are recognized by the building codes as a mass wall. There is no cavity, and the materials of concrete and EPS foam are not affected by or influenced by moisture or water vapor.

Vapor retarders must be evaluated by standard testing methods (ASTM E96) to establish the Permeability Rating that meets the requirements of the building code. The ASTM E96 test measures the rate of vapor diffusion through materials

Any materials or wall system with a permeance of less than 1 perm (57.2 ng/Pa.s.m2) is considered ‘vapor semi-impermeable’ and recognized as a vapor retarder.

The ASTM E96 testing standard defines different classes of vapor retarders dependent of the perm rating. This class rating also applies to vapor barriers.

Class I - very impermeable 0.1 perm or less

Class II - semi-permeable 1.0 perm or less and greater than 0.1 perm

Analysis has shown that the ‘dew point’ for an ICF wall assembly occurs within the concrete near the exterior face of the wall, and has zero influence on the wall assembly.



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The addition of any material, acting as a vapor barrier, over the Stronghold wall assembly may be detrimental to the functionality of the wall assembly.

Class III - semi-permeable 10 perm or less and greater than 1.0 perm

The International Residential Code and the National Building Code of Canada specify a vapor retarder with a permeance rating of not greater than the following:

- IRC specifies - 1.0 perm
- NBCC specifies - 60ng/(Pa.s.m2)

Conversion : 1.0 perm = 57.2 ng/(Pa.s.m2)

STRONGHOLD INSULATED CONCRETE FORM PERMEANCE RATING

The permeance rating for Stronghold ICF Forms is measured through the interior EPS panel, which is manufactured from a Type II polystyrene foam plastic insulation, 2.75” (70mm) thick.

Stronghold ICF wall assemblies meet the requirements as a Class II vapor retarder/barrier as per ASTM E96 testing.

Intertek, the independent testing laboratory, performed testing as per ASTM E96 on Stronghold EPS blocks, and concluded the following results:

- Permeance rating of - 0.83 perms or 47.76ng/(Pa.s.m2)

The inherent capabilities of continuous EPS foam and Monolithic poured concrete, as tested, meet code requirements and standards for vapor permeance as a Class II vapor retarder/barrier.

The conclusion of, No separate vapor barrier (retarder) is required on Stronghold ICF form walls in any climate zone.

Basic science shows that water vapor moves from the warm side to the cold side of a wall assembly. In hot climates, with interior air conditioning, the exterior 2.75” (70mm) layer of EPS foam on the Stronghold Form wall assembly acts as the vapor retarder, in cold climates the interior 2.75” (70mm) layer of EPS foam on the Stronghold form wall assembly acts as the vapor retarder.

The EPS insulation panels and the concrete core of Stronghold are inert materials that do not promote mold or mildew growth within or on the Stronghold wall assembly.

Stronghold ICF blocks will not rot or deteriorate, as part of the building envelope.

To allow the concrete within the ICF wall to migrate moisture, interior finishes with very low permeance (i.e. vinyl wall paper) should be avoided.



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