

6 

vapor barrier/air barrier

6.1 INTRODUCTION

In northern climates, such as the northern USA and Canada, it has been necessary to prevent the passage of warm, moist air into the wall cavity in conventional wood frame construction. When this moist air infiltrates the insulation, it may condense, and with time the effectiveness of the insulation material may deteriorate.

At the same time, it has also been necessary to prevent the infiltration of outside air into the building. Windows, doors, and electrical installations have traditionally been the worst offenders of air leakage in new construction.

❖ **Infiltration** is the passage of non-conditioned air through a wall assembly from the building’s exterior to the interior.

❖ **Exfiltration** is the passage of conditioned air through a wall assembly from the building’s interior to the exterior.

FIGURE 6.1 – CAVITY WALL SYNDROME

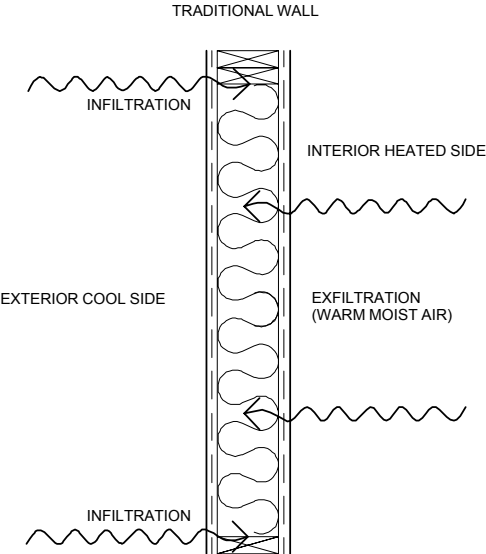
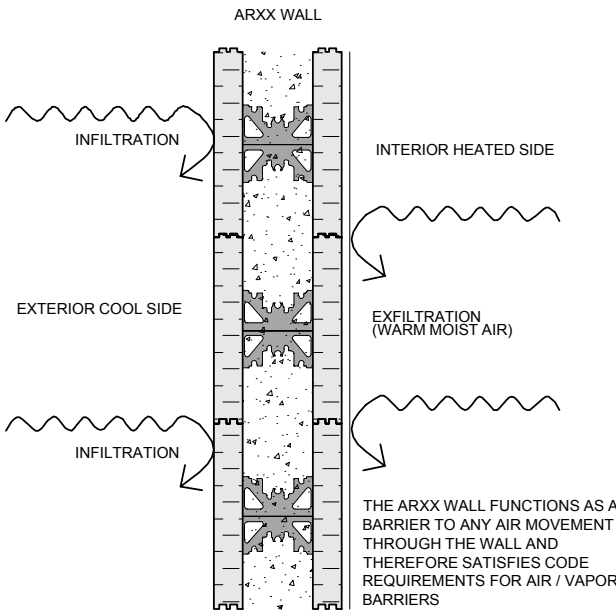


FIGURE 6.2 – ARXX™ CONCRETE WALL EFFECT ON AIR PASSAGE



6.2 VAPOR BARRIER

According to building codes, a vapor barrier or vapor retarder is defined as “the element of the building that is installed to control or resist the transmission of water vapor through the building envelope.”

The specific intent of vapor barriers is to prevent infiltration of moisture through a wall and condensing within the assembly. Materials having the characteristics of a vapor barrier must have a low permeability to water vapor.

Arxx™ EPS insulation is a closed cell foam bead product which by nature of its composition is unaffected by air borne or liquid moisture. By virtue of its properties and density it can absorb no more than 4% of its own volume in moisture. The foam is classified as a Type II EPS low vapor permeance insulation with a water permeance less than 3.50 perms per inch (200 NG/Pa.s.m² per 25mm).

Condensation occurs when warm, moist air comes in contact with a surface that is at a lower temperature than its dew point. (Dew point is the temperature at which water vapor will condense, based on the air temperature and relative humidity). By design, the interior surface temperature of an Arxx wall is relatively close to the room temperature. This is due to the high insulation value of the overall wall assembly. Windows, on the other hand, have a considerably lower insulation value, and therefore have an interior surface temperature closer to that of the outside air. Condensation will therefore occur on the window surface.

For example, at an indoor air temperature of 75°F (24°C) in winter and a relative humidity of 40%, the wall surface temperature (dew point) would have to be 48°F (9°C) in order for condensation to occur. In other words, the wall surface would have to be 27°F (15°C) colder than the indoor air temperature.

Where low permeance foamed plastic is the sole thermal insulation in the wall assembly, similar to the Arxx Wallsystem, the inner surface of this element will be close to the interior temperature. **In this case, building codes have provided exceptions stating that no additional vapor barrier is required to control condensation within the assembly.**

❖ Therefore, Arxx Building Products does not recommend the installation of a supplemental vapor barrier.

6.3 AIR BARRIER

By design, walls constructed with the Arxx™ Wallsystem have a monolithic concrete core – 4", 6", 8", or 10" (100, 160, 200, 250 mm). This solid mass of concrete does not provide an opportunity for infiltration or exfiltration of air through the wall. Thus, the concrete wall acts as an air barrier and meets the requirements of most building codes.

Table 6.0 below lists code accepted air barriers. It can be seen that they all have a measurable air permeability.

Arxx Building Products does not recommend the installation of a supplemental air barrier.

TABLE 6.0 – AIR BARRIERS PERMEABILITY RATINGS

MATERIAL	AIR PERMEABILITY	
	CFM/FT ²	L/S•M ²
3/8" (9 mm) plywood	0.001	0.007
1/2" (10 mm) gypsum board	0.004	0.020
High density bead board	0.023	0.119
ASTM proposed air barrier standard	0.030	0.152
Tyvek™	0.035	0.176
Typar™	0.634	3.220
Low density bead board (type 1)	2.411	12.237

