Optimize performance: select the right air barrier

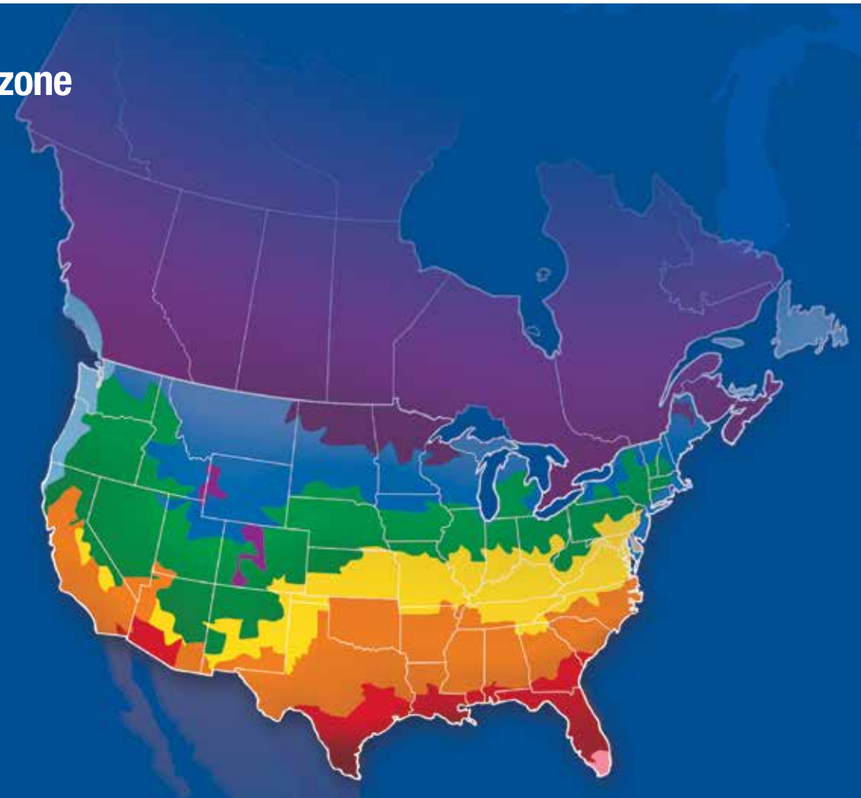
The first step to optimizing air barrier performance is choosing the right system to meet your project needs. In order for your air barrier system – and your building – to meet performance expectations, you will need to factor climate zone and wall assembly design into your decision.

> "The architect or building designer is responsible for making judgements about what materials to use and how to use them. However, close collaboration with the WRB manufacturer is extremely important to help the architect select the optimum product and installation details given the specific factors at play in their project."
>
> ***John Straube, Ph.D.***
> *Principal for RDH Building Science Inc.*

Know your climate zone

You must first determine the climate zone in which the air barrier system will need to function, as each zone poses unique challenges. Climate zones are categorized as:

- Climate zone 1 *Very hot/humid*
- Climate zone 2 *Hot-humid/dry*
- Climate zone 3 *Warm - humid/dry/marine*
- Climate zone 4 *Mixed - humid/dry*
- Climate zone 4 marine *Mixed - marine*
- Climate zone 5 *Cool - humid/dry*
- Climate zone 6 *Cold - humid/dry*
- Climate zone 7 & 8 *Very cold*



This map is meant to serve as a representation of the climate zones outlined by ASHRAE. This map was not created or provided by ASHRAE.

Consider wall assembly design

With a variety of air barrier products designed to enhance indoor comfort in all climates, you will also have to factor wall assembly design into your decision. Important aspects of wall assembly design to consider include:

- Building performance requirements
- Substrate to which the air barrier will be applied
- Location of insulation
- Complex geometries and rough surfaces
- Compliant in various NFPA 285 assemblies
- Avoiding condensation in the wall assembly

Additional considerations

Both climate and wall design will play a role in deciding between a vapor impermeable or vapor permeable air barrier.

Vapor impermeable air barriers act as air, vapor and water barriers. When positioned on the warm side of the insulating layer, they serve as an efficient vapor barrier, preventing moisture condensation through the wall cavity.

Vapor permeable air barriers act as air and water barriers as well, but allow moisture vapor to escape. They typically can be positioned anywhere in the wall assembly for greater design flexibility.

Once you have selected between vapor impermeable and vapor permeable, you will need to determine if a self-adhered sheet or fluid applied system is right for your project.

The experts at Henry® can help you navigate the many decisions involved in selecting the optimal air barrier solution.

The challenge is clear.

The primary function of a building has long been to protect its occupants and contents from outside elements. Increasingly, this goal is expanding to include protecting the building and its systems from damage as well as minimizing the building's energy use and environmental impact.

As a result, architects and contractors now have to meet the challenges of changing building codes, increasingly strict environmental regulations and the growing expectations of building owners and managers. What was done in the past is no longer adequate.

The solution is here.

By providing a seamless building envelope, Henry commercial air barrier systems can eliminate uncontrolled air leakage, reducing energy use and providing better control of temperature, moisture, air quality and humidity in commercial structures.

Henry Building Envelope Systems® are designed to help the building perform at a higher level over a longer period of time, not only reducing energy costs but protecting the building's structure and systems by preventing penetration of the elements at cracks, crevices, terminations, penetrations and transitions.

The result is an effective building envelope and a healthier, stronger and more energy efficient structure.

The importance of air barriers

An airtight building
An air barrier system of seamless continuity, structural integrity, and time-tested durability helps designers eliminate uncontrolled air leakage while offering many other benefits — for a typical initial investment of less than 1-2% of the cost of the building.

Energy efficiency
Air movement through the wall assembly is far greater than many designers imagine. A study on air barriers by the National Institute of Science and Technology revealed that the right air barrier can help improve building performance by reducing heating and cooling costs by as much as 36%.†

LEED certification
Air barriers help designers meet changing building code requirements and achieve U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards for Optimizing Energy Performance, while minimizing condensation that can cause corrosion, decay and loss of insulation value.

Environmental separation
Air barrier systems separate the outside environment from the desired interior environment, allowing control over temperature, humidity, moisture and air quality throughout the building and in all types of weather.

Mold control
Without an air barrier membrane, moisture accumulation in the wall assembly through condensation can be difficult to control. Air carries moisture and moisture feeds mold.

† NIST Report 7238

Understanding air, vapor and water-resistive barriers

Air barriers are not to be confused with vapor barriers or water resistive barriers, each of which has a different role to play. It's important to understand the functions of each in order to determine the best materials for specific building assemblies.

Air Barriers, which can also serve as vapor barriers, can be placed anywhere within the assembly to stop the movement of air. Vapor barriers cannot be air barriers; water resistive barriers are not necessarily air barriers.

Vapor Barriers control water vapor from passing through the material. They are typically installed on the warm side within the assembly.

Water-Resistive Barriers are installed on the exterior side of the assembly to block bulk water that enters past the cladding.

The forces that drive air movement

Air barrier systems can solve many common building environment problems – cost effectively and efficiently

As buildings have grown taller, so have expectations for the effectiveness of building systems to protect these valuable assets and the people within them. Goals include healthier interior air and increased energy efficiency, even in the most extreme climates, in order to reduce massive electricity use in buildings – estimated to account for 70% of the total electricity generated in the U.S.* Common problems caused by the forces that drive air movement in buildings include:

- **Wind cycling** from sustained winds that have the potential to damage air barriers that are improperly selected and installed
- **Fan pressurization** from HVAC units that may lead to unnecessary exfiltration or infiltration of air and moisture through the building envelope
- **Stack effect** phenomenon in which outside and inside temperatures, coupled with decreasing air pressures with increases in height, result in pressure differences affecting air flow across the building envelope
- **Barometric cycling** in which barometric pressure rises, sucking humid interior air into the wall cavity, resulting in condensation
- **Thermal cycling** caused by temperature differences from one side of the building to another or from daytime highs to nighttime lows

Too often, these problems are improperly addressed by oversizing the HVAC system to compensate for energy loss — a costly solution that does not address the resulting moisture build-up.

Moisture transport is up to 200 times more likely to occur with air flow than vapor diffusion.

*The American Institute of Architects

Choosing the right air barrier system

Climate is key

Air barrier systems are designed to weather even the most extreme environments.

Cold climate
Controlling the flow of warm, moist interior air onto cold surfaces within the building envelope is a concern in design and construction.

Marine
Heavy precipitation and high relative humidity requires designs that prevent the flow and trapping of moisture into the wall assembly.

Hot-dry/mixed-dry climate
Intense solar radiation and thermal cycling is a concern. Preventing uncontrolled air leakage of conditioned interior air helps to manage cooling loads in the building and save energy.

Mixed-humid climate
Design and construction needs to control the infiltration of moisture-laden air into the building envelope and keep moisture away from cold surfaces while promoting drying to both the interior and exterior of the assembly.

Hot-humid climate
High moisture coupled with intense solar radiation is typical in this climate. Controlling the infiltration of this moisture-laden air into the building envelope and decreasing cooling loads are major design and construction goals.