Continuous Insulation – What is it and why do we care?

Everyone instinctively knows that when you go outside on a cold day, you must zip your coat to stay warm. It doesn't matter how thick the coat is, if it's left open, your body heat will leak out.

The same is true with building insulation – no matter its R-value (thermal performance), if insulation isn't continuous throughout the building envelope like a zipped coat, heat will escape – wasting energy and money. Hence the term ***continuous insulation***.

What is Continuous Insulation?

Continuous insulation, also known as outsulation, is defined in American Society of Heating, Refrigerating and Air-conditioning Engineers 90.1 (ASHRAE 90.1), as:

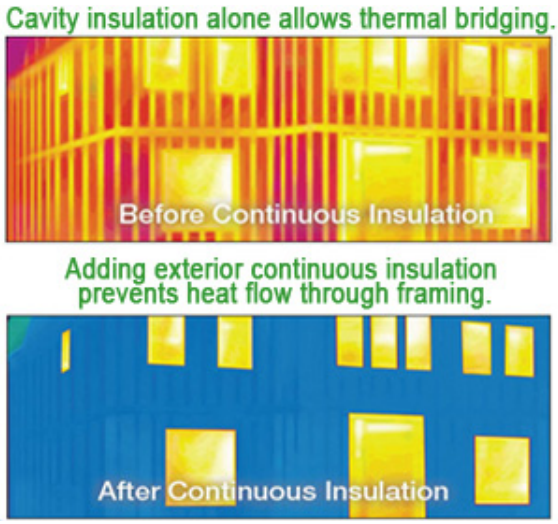
> *"Insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior, exterior, or is integral to any opaque surface of the building envelope."*

To help ensure well-insulated buildings, since 2012, the International Energy Conservation Code (IECC) has required continuous insulation (CI) in the building envelope. The 2012 IECC prescribes how much insulation is required for each of the 8 U.S. climate zones, for various types of above-grade walls, below-grade walls, roofs, and floors.

Notably, this requirement eliminates the use of fiberglass batts installed between wall studs as the sole means of insulation, which had been common practice in construction for decades. Such insulation can still be used, but continuous insulation installed over the studs, such as rigid foam, must also be applied.

In addition to enhancing a building's energy efficiency, CI helps reduce moisture damage in the building envelope by lowering condensation within the envelope assembly resulting from vapor diffusion.

Why Continuous Insulation Really Matters



When more than 39% of energy use in North America is consumed by buildings, finding the most effective way to reduce energy loss in imperative. Is Continuous insulation (ci) the answer? | Image via Dryvit

As a highly industrialized nation, the United States consumes energy in many areas including manufacturing, transportation, and construction.

According to the U.S. Green Building Council, “buildings account for approximately 40 percent of the total energy used today… and 38 percent of total carbon dioxide emissions in the United States,” which amounts to higher energy use than in the entire transportation industry.

Obviously, the U.S. Department of Energy (DOE) realized that if they were truly going to make a difference in the environment, they had to tackle the biggest culprit – buildings. Specifically, thermal bridging.

If you've been around the construction and insulation industry you probably know the term. T*hermal bridging*, also known as cold bridges or heat bridges, are penetrations in a building's insulation layer that allow heat (a.k.a. energy) to escape and cold to intrude during winter. Vice versa in the summer. In an airtight and insulated home, thermal bridges can account for heat loss of **up to 30 percent**.

As more stringent legislation and energy awareness lead to increased insulation levels in walls, roofs, and floors, heat losses due to thermal bridging become increasingly important. We discuss the topic of thermal bridges in depth here.

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Continuous Insulation In the Field

Perhaps the best way to understand how CI impacts high-performance home builders is via the following example by GreenBuildingAdvisor.com:

> *It's been calculated that a 2×4 wall with R-13 insulation in the cavity actually has a whole-wall R-value of only R-11, and a 2×6 wall with R-20 insulation is actually performing at*

> *R-15.67. So… What happens when we add rigid insulation to the exterior?*
>
> *Let's take a 2×4 wood framed wall with R-13 fluffy stuff in the cavity and R-5 on the exterior to minimize thermal bridging and air infiltration. The combined R-value is R-17.26, while a 2×6 wall without external insulation measures R-15.67. So the 2×4 wall with continuous insulation actually performs better than the 2×6 wall without continuous insulation (CI).*

This can save you money in construction as well as giving you more space inside. The exterior wall insulation can make it perform up to 50 percent better than the same wall without the rigid foam insulation.

Furthermore, studies done by the Oak Ridge National Laboratory (ORNL) found that thermal bridging through framing components reduces insulation performance by as much as **15-20 percent** in wood frame construction and by **40-60 percent** in metal framed buildings.

The installation of proper amounts of continuous insulation maximizes the full R-value of the insulation products. Continuous insulation on outbound exterior walls, alone are in tandem with interior insulation efforts, is the most efficient way of achieving improved R-values.

Rigid foam plastic sheathing materials are commonly used for continuous insulation because of their relatively high R-value

per inch and low cost to meet or exceed energy code requirements. [We discuss the pros and cons of Rigid Foam Sheathing here and here.]

Other common continuous insulation solutions include:

- Spray foam
- Fiberglass boards
- Fiberboard
- Rock wool

How Tape Is Being Used with Continuous Insulation

Improving the energy efficiency of all buildings will reduce the consumption of non-renewable fossil fuels, lessen dependence on foreign sources of that energy, and curtail greenhouse gas emissions. That's all good, but what does this have to do with **tape**?

Related: *compare our top insulation tapes*

It is obvious to us that as customers demand more energy-efficient homes and building codes become more strict, adhesive technologies will play a major role in the application and effectiveness of ci.

Here are just a few ways builders and contractors can use tape more effectively in sealing the building envelope:

- Tape all insulation seams to create an air/water-resistive barrier
- Seal all penetrations with tape to create airtight seals
- Create a continuous air/water barrier at the roof and foundation wall interface by taping all transition seams

In the long run, continuous insulation not only dramatically reduces building management costs, but the improvements in efficiency, help the building industry move closer to carbon neutrality and a more sustainable environment.

Why Thermal Bridging and Thermal Breaks Matter in Construction

Thermal bridging reduces the overall performance of a home. ***Thermal breaks*** are the answer to this problem. Simple in theory, but thermal bridges have been challenging high-

performance home builders for decades. It affects HERS ratings. It impacts continuous insulation. It affects sale-ability. It affects home comfort. So it's a topic worth revisiting.

What is Thermal Bridging?

Thermal bridging occurs when a more conductive (or poorly insulating) material allows an easy pathway for heat flow across a thermal barrier. A classic example of this is the use of steel studs to bridge an insulated wall. The steel creates a pathway for heat to travel out of the home at a much higher rate than the rest of the wall. It's often hidden—the most common is wall studs—but, you must keep it in mind when thinking about heat loss (and the heating bills) at your home.

Areas in the wall assembly can transfer heat quicker than the insulation around it, like studs, plates, headers, and wall posts. In a wood stud wall with R-20 batts, thermal bridging can bring the effective R-value down as low as R-15. If you put an R-20 batt into a steel stud wall, you may only get an *effective* R-value of approximately R-4. The keyword here is "effective". Because building codes are beginning to require effective R-values rather than the number on the package, thermal bridging becomes more important.

But this isn't about just meeting code; it's also about energy

bills. Energy prices tend to go up, so an investment in using less energy is an investment that pays bigger dividends every year.

Another issue with thermal bridges in insulated walls is moisture accumulation. You can see it inside the house as dark stains that telegraph framing members. It happens on ceilings and in closets where a lot of framing gets mashed together. This is often called '*ghosting*' because the moist cool air attracts dust and forms dark lines on the ceiling which 'ghost' the joists.

How to Prevent A Thermal Bridge

So, if thermal bridging acts as a pathway for heat to escape the building more rapidly, a *thermal break*, or thermal barrier, helps block that pathway. Scientifically speaking, it's an "element of low thermal conductivity placed in an assembly to reduce or prevent the flow of thermal energy between conductive materials." For example, insulated glazing is the thermal break for windows. The air or gas between the panes stops the conductive thermal energy from passing through the glass.

In metal and wood-framed buildings, wrapping a building's envelope with a layer of continuous insulation cuts off *thermal bridging*. However, common issues to look out for include discontinuities in the insulation, particularly at

junctions and around openings. Insulating materials such as rigid foam should be cut to fit tightly together and sealed with a thermal break tape to further prevent gaps.

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Common Ways to Reduce Thermal Bridging in Construction

There are a number of ways contractors and builders accomplish thermal breaking. Here are some of the most common:

- Use advanced framing techniques, which reduce the amount of wood by increasing the spacing between framing members. For example, 16 inches on center becomes 24 inches on center for a stud-framed wall. A thermally broken double-stud wall can also be used with advanced framing. (The whole cavity is filled with insulation. This can eliminate thermal bridging in the walls, but it does not address the floor. You can insulate the rim joist, but all of the other floor joists telegraph to the outside.)
- Consider adding a continuous layer of exterior insulation, such as rigid foam or rock-wool (mineral fiber) board, over the wall before sheathing it.
- A newer approach involves applying strips of insulation over the wood studs to provide a thermal break.
- Use an alternative wall system. For example, the wood I-

joist splines in structural insulated panels are thinner than most studs, and panels are usually 48 inches on center (or more), which further reduces thermal bridging.

- Implement proper insulation and thermal breaks around the foundation/slab. A well-insulated slab may mean two pours: one for the foundation wall and one for the slab, so you can provide a layer of rigid foam between the two components.
- Avoid metal fasteners of any kind that span the entire wall assembly.
- Design your basement wall so it is better protected against moisture and water damage. This can allow you to use wood instead of switching to metal as a durability precaution.

As building codes evolve and homeowners become more savvy, more attention is going to be placed on thermal bridging, at every level. Whether you're building a new home to be Zero Energy Ready, or retrofitting an existing building, care should always be taken to minimize and eliminate unnecessary thermal bridging. If you're looking for a high-performance adhesive tape to help with your next project, contact us. We love solving tape challenges!

How to Choose The Right Flashing Tape

Builders have long battled the intrusion of unwanted moisture and air into their structures. Water is a major factor in building damage, causing mold, decay, and corrosion responsible for structural durability and health issues.

When it comes to preventing moisture, **flashing tape is** on the front lines of defense.

This isn't new information for contractors, builders or tape manufacturers. Thanks in part to new code regulations, construction flashing and seaming tapes are transitioning from "optional" building materials to required products that building professionals rely on to improve the tightness of the building envelope.

Here's everything you need to know about flashing tape.

What is Flashing Tape?

By definition, **flashing tapes are thin continuous impervious materials that prevent water and air infiltration within the**

building envelope. By taping seams and flashing rough openings, builders ensure a tight seal to prevent water from entering a building and create air barriers that lower AC costs and improve interior air quality.

In recent years new “flexible flashing” tapes have been introduced to the marketplace. These new materials have significant advantages over traditional flashing materials. Unlike most metal flashings, for example, flexible flashings conform easily to unusual shapes, i.e., folding to form a waterproof end-dam on a rough windowsill during window installation.

In theory, a properly installed flashing system solves a multitude of moisture and airflow problems around windows, doors, and nail holes, a property that has made them especially useful on roofs.

But do they stick to everything?

It depends.

How to Choose The Right Flashing Tape

When it comes to choosing the right flashing tape, here’s what you need to consider:

UV Protection

It is essential to know how much UV protection a roll of tape has, especially if the tape is going to be exposed for long periods. Sunlight degrades certain tapes and will become less effective over time if it does not have UV protection built-into the tape. Many factors contribute to the amount of UV protection in a roll of tape, and if this is a critical factor for you, you need to find out just how much protection.

Modified Bitumen vs. Butyl vs. Acrylic

Many contractors will choose a more cost-effective bitumen flashing, which is made from petroleum and asphalt. However, it will dry out over time, reducing the effectiveness of flashing.

The next step up would be butyl adhesive technology, but not all butyls are created equal. While most butyl rubber products bond better to difficult substrates than modified bitumen and can be peeled off and adjusted during installation, it is crucial to look carefully at the temperature range. Some butyl adhesives are modified and stay more flexible in cold weather and more stable at high temperatures.

The best flashing adhesive is ones with acrylic adhesive technology. It’s the longest lasting and has the most extensive temperature range, but it is also the most expensive.

Cold Weather

Temperature plays a key role in choosing the right flashing tape. In general, modified-bitumen products do not work well in cold weather. Most become less sticky at around 50°F and will not stick well below about 40°F. **A butyl-based (better) or acrylic-based (best) product is the better choice for cold weather**.

Installation

Last, but not least, proper installation is paramount.

To obtain good results and maintain warranty coverage, it is critical to follow the manufacturer's installation instructions. These vary from product to product, but generally, they address the same issues: installation techniques, application temperatures and compatibility with substrates as well as surrounding materials that come into contact with the membrane.

Compatibility of materials is critical, especially on hard to bond materials, which is why choosing the right tape for the application is as important as proper installation.

Choosing and Installing Flashing

Tape with Windows and Doors

Besides choosing the right kind of flashing tape, another critical consideration is *installation*. These days, every manufacturer seems to have a specific set of installation guidelines that must be followed to uphold each respective product's warranty.

Sounds easy enough, but there's not one single "correct" way. Guidelines vary between manufacturers, making a contractor's job that much more difficult. When in doubt, though, follow the manufacturer's instructions. The International Residential Code (R613.1) requires windows to be "installed and flashed according to manufacturers' instructions." If there's ever a problem, you've done what was required by the building code.

The folks at *Fine Homebuilding* give a fantastic tutorial here: Installing and Flashing Windows Correctly

When it comes to using flashing tape with these installations, temperatures and compatibility of materials is critical, especially on hard to bond materials. We're going to cover the basics below, but you can also find great information and case studies here and here.

Temperature

Again, weather and temperature play critical roles in installation. Modified-bitumen products do not fare well in cold weather. Most become less sticky at around 50°F and will not stick well below about 40°F. Unless you are working with a

tape formulated explicitly for low-temperature usage, a **butyl or acrylic-based product is a better choice in cold weather**.

High temperatures can also be a problem. Standard modified bitumen can ooze at high temperatures, especially when installed under metal exposed to direct sunlight. For example, under metal roofing or on south or west facing windows.

In general, **butyl tapes are more stable at higher temperatures**, but also have upper limits.

Unless specially formulated for high temperatures, flashing tapes can begin to soften at somewhere between 120°F and 180°F. Some high-temperature formulations made for commercial applications can tolerate temperatures over 200°F, but are generally not as sticky and may be difficult to find. If the manufacturer does not publish the highest temperature value, contact them directly, or look for another product that does.

Substrates

Each manufacturer specifies which building products are safe to stick to and which require special attention. Generally speaking, solid wood, plywood, vinyl, and metal (like aluminum) are usually okay as long as they are clean, i.e., free of oil, dirt or dust. Some manufacturers suggest that concrete, masonry, and OSB will have better results when primed, while others will recommend that all substrates be primed for best performance, especially in cold weather

That said, it’s worth noting that priming is only one

solution; if you choose the right tape, you may be able to reduce this step and save labor.

Shingle

According to Building Advisor, you can't go wrong following the shingle principle:

> *"Given all the factors that can affect the longevity of an adhesive bond, it's best not to rely on on a taped joint to keep water out of your home's exterior. Every flashing detail, adhesive or not, should follow the age-old "shingle principle."*

In this approach, the upper material is always lapped over the lower material, so water naturally flows down and away from the building structure, even if the adhesive bond fails. This is how materials like roof shingles, cedar shingles, and horizontal sidings work – they shed water naturally. Peel-and-stick flashings still simplify many flashing joints, but they are not magic."

All told, when it comes to flashing installation and choosing the right adhesive, keep in mind that moisture management is the primary consideration with any type of airtight construction. Alex Lukachko, a researcher with Building Science Corp., recommends making sure that subcontractors clearly understand the importance of maintaining a continuous drainage plane and the continuous air barrier.

> *"For each hole in the building enclosure, subcontractors need to know that the hole is a break in the continuous rainwater control, air flow control, moisture control and thermal control layers in the building enclosure," says Lukachko.*

Lukachko recommends sealing penetrations on the interior with low-expanding foam sealant or caulking, depending on the size of the gap that needs to be filled. On the outside, flashing and flashing tapes are used as part of a well-constructed weather resistant barrier. Diligence paid to sealing techniques, whether in windows, doors, or elsewhere is crucial in creating an airtight enclosure and achieving the energy performance.

Flashing And Seaming Tape on the Rise

The 2012 International Building Code requires wall assemblies, including all combustible weather barrier materials, to pass NFPA 285 requirements which will impact the selection and use of certain flashing and tape products. Other code regulations, i.e., IECC and LEED, are driving more emphasis on energy conservation for all buildings, whether residential or commercial, newly built or renovated.

The experts at Principia Consulting support this trend, recently reported :

> *The $2.1 billion market is experiencing a shift in preferred*

> *product types, expansion through increased market penetration, and new opportunities for sustainable market growth. An average growth rate of 6% through 2017 is forecast for construction flashing and tapes. Roofs drive the potential for increased market growth, whether in new or replacement construction; however, all applications are projected to increase through 2017 (figure available at principiareports.com).*

What this truly means is: construction flashing and tapes are transitioning from "optional" building materials to required products.

Recently, *Adhesives & Sealants Industry magazine*, allowed us to dive deeper into construction tape trends; specifically, rubber, butyl, and acrylic adhesive tapes. It is obvious to us that as customers demand more energy-efficient homes and building energy codes become stricter, it will become essential for U.S. builders to educate themselves on the newest construction tapes, identifying the differences between tapes' performance level over time, longevity in weather extremes, watertight and airtight features, and more.

That said, another trend coming are hybrid flexible products that provide superior adhesion, greater stretchability, and conformability. Stretch tape, which is a flashing tape made of a high-performance composite acrylic that easily stretches to fit sills, curves, and corners, makes installation easier while providing a better way of sealing mismatched surfaces.

It’s clear that flashing tapes are critical to most wall, door, and window assemblies; therefore, the durability of pressure-sensitive adhesive flashing tapes is critical to the durability of those assemblies.

ECHOtape plans to stay on top of construction trends and is working alongside our construction customers to develop innovative products for this ever-changing market. If you have a specific flashing or sealing need, let us help.

What’s the Difference Between Air Barriers and Vapor Barriers?

Is it an air barrier? Or is it a vapor barrier?

Are you sure? Although both are extremely important components of high-performance buildings, the two are not the same.

With very different functions to perform in the building assembly, understanding the core differences between air barriers and vapor barriers are paramount to building the high performing homes of the future.

Here’s what you need to know about air barriers vs. vapor barriers.

What Is An Air Barrier?

Air barriers are systems of materials designed and constructed to control airflow between a conditioned (indoor) space and an unconditioned (outdoor) space.

Air barriers can be mechanically fastened building wraps, adhesive membranes, fluid-applied materials, insulating board stock, non-insulating board stock, spray polyurethane foam, poured concrete, metal, glass, and a host of other materials.

But no matter what material you choose, all air barriers should be:

- impermeable to air flow;
- continuous over the entire building enclosure or continuous over the enclosure of any given unit;
- able to withstand the forces that may act on them during and after construction;
- durable over the expected lifetime of the building.

Keep in mind there are two kinds of air barriers – interior and exterior – and while both serve similar purposes, each complements and/or enhances the effectiveness of the other. Interior air barriers control leakage of a home’s interior air

into the wall cavity and attic, limit the ability of moist indoor air to enter the wall cavity during the heating season, and limit convection losses within walls.

Exterior air barriers control infiltration of exterior air into the wall cavity and through the attic, limit the ability of moist outdoor air to enter the wall cavity during the cooling season, and prevent wind-washing of wall insulation (i.e., even though a house tests tight on the interior, it could have a leaky exterior wall and top plate that cause big energy losses). It's a good idea to install both types of air barrier so as not to negate the benefits of one by neglecting the other.

Related: *learn more about building envelopes and why they matter*

What Is A Vapor Barrier?

Vapor barriers (or vapor retarders) are materials used to slow or reduce the movement of water vapor through a material. Vapor barrier materials are installed on the warm side of the insulation in a building assembly, as determined by climatic conditions. In warm climates, it will be on the exterior and in cold climates, it will be on the interior.

A vapor barrier can be a mechanically fastened sheet-material, adhesive membranes (depending on composition), fluid-applied materials, insulating board stock or medium density spray polyurethane foam. The thickness of the material will impact

whether it is a vapor barrier or not.

But Wait… There's More

Here's where things can get confusing. Water vapor may be transported by air leakage, but you address this issue by installing a proper air barrier, not by a vapor barrier.

Vapor barriers are intended to control the rate of diffusion into a building assembly. Therefore, the vapor barrier does not have to be continuous, does not have to be free of holes, does not have to be lapped, does not have to be sealed, etc. A hole for example in a vapor barrier will simply mean that there will be more vapor diffusion in that area compared to the other areas of the vapor barrier.

To simplify, consider this wool sweater analogy: A wool sweater is insulation. It will keep you warm when there is no air movement, but it still allows the wind to move right through it.

A wool sweater with a raincoat will keep you warm, but hold moisture inside and soak your insulation. A wool sweater with a windbreaker will keep you warm, stop the wind from stealing your heat, yet allow moisture to diffuse through it.

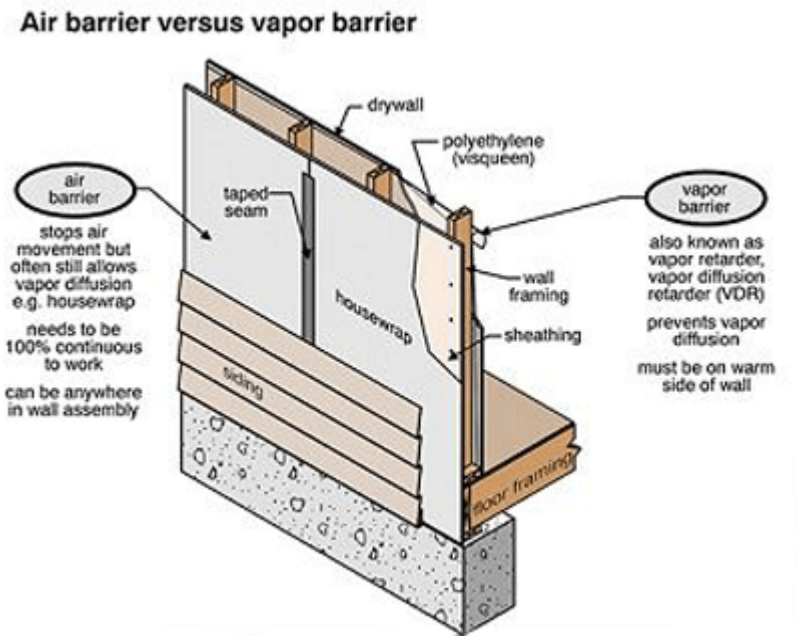
So think of a windbreaker as an air barrier and a raincoat as a vapor barrier.

In high-performance buildings, air barriers and vapor barriers, as well as water-resistive barriers, can be

combined. There are also vapor-permeable air barriers, and there are water resistive barriers which are not air barriers.

It's important to understand the separate functions and then determine whether the material provides more than one function. As an example, you can have two, three or even four air barrier materials in a wall assembly, but its effectiveness will depend on which material you have chosen and how you have connected the air barrier materials together.

Why Do Air Barriers Really Matter?



Now that you understand the difference between air barriers and vapor barriers, the bigger question is **why do they really matter**? That's a question being asked by many architects, contractors, engineers, and building owner-developers, and the answers are varied.

For one, air pressure and moisture control in buildings have become a *very* important element in constructing durable and energy-efficient structures.

Air leaks can cause havoc because air not only short circuits

insulation, but air is a “carrier” for unwanted elements inside a home (i.e. noise, dust, vapor and heat/cold). When there is uncontrolled air movement from outside to inside (and visa versa), there is an increased risk for building failure or lackluster performance. Moisture in all three states (vapor, liquid, solid) is a hazard to a building.

Additionally, the International Energy Conservation Code (IECC) and several state energy codes now require the use of air barriers in building codes. In addition, a growing number of municipal authorities having jurisdiction (AHJs) and green-building trade groups are calling for their use. Some federal agencies and large owner and developer groups also require them.

More important, energy efficiency and occupant comfort—two key ingredients of sustainable design—are driving the use of air barriers across market sectors. Consider this:

> *39 quadrillion British thermal units (BTUs). According to the U.S. Energy Information Administration (EIA), that’s how much energy was consumed by all the residential and commercial buildings in the United States in 2015. Those BTUs represent approximately 40 percent of all the energy consumed nationwide. Concurrently, these structures account for about 38 percent of all CO2 emissions in the country.*

This statistic comes from a blog post by our friends over at Barricade Building Products. Like us, they are diligently working on new product innovation addressing the rapidly

changing needs of high-performance building products.

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Choosing the right house wrap is much like choosing the right tape. With today's high cost of energy and concerns about Indoor Environmental Quality (IEQ), air barriers are one of several construction systems with a critical role to play.

In order to design and build safe, healthy, durable, comfortable and economical buildings airflow must be controlled. Airflow carries moisture that impacts a building material's long-term performance, integrity and durability, behavior in fire (spread of smoke), indoor air quality (distribution of pollutants and location of microbial reservoirs) and thermal energy. One of the key strategies in the control of airflow is the use of air barriers.

By essentially "wrapping" the building shell, air barriers (a.k.a. air sealing) ensure that the building is protected from the effects of airflow and air leakage. Here are four tangible benefits to air barriers:

1. Preventing the Loss of Conditioned Air

For most consumers, the biggest reason "why" is air barriers are important is comfort.

In summer, we normally cool and dehumidify the air to a lower temperature and humidity than the exterior environment. In winter, we typically heat and humidify the air to a higher

temperature and humidity than the exterior.

Controlling interior temperature is paramount to comfort. The United States Department of Energy reports that over 30 – 40 percent of the cost of heating and cooling a home is lost to uncontrolled air leakage. This can hamper the performance of other building systems such as insulation and HVAC.

Proper air sealing helps reduce uncomfortable temperature fluctuations and often allows for smaller, more efficient HVAC equipment.

2. Lower Utility Bills

Maintaining conditioned air means less energy is needed to recondition the air. Less energy means lower utility bills. And since all building systems must perform well together to optimize the energy efficiency of a home, the savings can add up.

Buildings which have a properly installed air barrier system can operate properly with a smaller HVAC system as the mechanical engineer does not have to compensate for a leaky building. In some cases, the reduction in mechanical equipment size and cost can also offset the cost of the air barrier system in addition to lowering utility bills.

3. Preventing Moisture

Wherever air moves, water vapor can follow. Proper air sealing reduces the risk of water vapor moving into the wall system

where prolonged exposure can result in moisture issues such as wood rotting and mold, which can cause expensive structural or health problems. Air leakage has the ability to transport exponentially more moisture into and through the building enclosure than occurs through vapor diffusion alone.

4. Improved Indoor Air Quality

Air barrier systems help keep out pollutants such as suspended particulates, dust, allergens, insects, odors, noise and more.

Lastly, it's important to note that the International Energy Conservation Code (IECC), the DOE Zero Energy Ready Home program and several state energy codes *(see California Title 24)* now require the use of air barriers.

In addition, a growing number of municipal authorities having jurisdiction (AHJs) and green-building trade groups are calling for their use. Some federal agencies and large owner and developer groups also require them.

It's no longer a question of should you use an air barrier, but how to design and install high-performance air barriers that will stand the test of time. Be sure to look at ECHOtape's collection of seaming tape.

Don't see something that meets your specific needs? Let us help! We love solving tape challenges.

5 Myths About Fiberglass Insulation for Metal Buildings

Fiberglass is a popular choice for insulation but it’s not a one-size-fits-all solution. Understanding its specific properties as well as its strengths and drawbacks can go a long way towards making the right insulation choice for your metal building needs.

Let’s examine some common myths and misconceptions about fiberglass insulation.

MYTH 1: Moisture does not impact the effectiveness of fiberglass insulation.

Fiberglass is an example of open-cell insulation. It works in much the same way as materials like Styrofoam, Gore-Tex, and neoprene. The woven fiber strands contain hundreds of small air pockets, which provide the insulation. If it is exposed to

moisture, those little pockets will fill up with water (instead of air) and lose its ability to produce any kind of insulation. Therefore, if fiberglass insulation becomes wet, its performance is compromised, but in many cases, it will regain its effectiveness as the material dries out.

Since metal buildings do not have vapor barriers on the exterior walls, the fiberglass insulation needs to come with its own laminated facing. There are several types of facing to choose from and it largely depends on the level of workability, permeability, and durability you need for your building. You can find out more by reading our Field Guide to Insulation for Metal Buildings.

MYTH 2: Cramming extra fiberglass rolls into a small space will increase the R-value.

The question you are really asking is: ***Does Adding More Rolls of Insulation Increase the R-value?*** And the answer is no. While it is true that doubling up rigid foam board insulation will increase its R-value, the same does not hold true for rolls of fiberglass. As mentioned above, fiberglass relies on small pockets of air in order to provide insulation. If those pockets are compressed than they can't hold as much air. Hence compressed fiberglass is not as effective, and the R-value is

reduced.

MYTH 3: A high R-value guarantees good insulation.

R-value, or the ability to resist heat flow, is a standard metric used by all manufacturers and industries. The common perception is that the higher the R-value, the better (and more expensive) the insulation. But as we've learned above, there are certain conditions that can cause fiberglass rolls to lose their R-value. Proper installation techniques are just as important as choosing a material with a high R-value. This includes using the right adhesive to protect the laminated fiberglass from any tears, splices, or cutouts around plumbing and electrical fixtures, choosing a reflective facing rather than a roll that's more the 4 inches thick, and making sure the fiberglass fits properly into tight or unusually-shaped spaces.

MYTH 4: Fiberglass is not a "green" insulation material.

In the current trend towards green and sustainable building, fiberglass is left out of the conversation. That's due to two

factors; 1. fiberglass is a man-made material (unlike cellulose or sheep's wool) or 2. some believe it poses a health risk. But did you know that fiberglass is made from secondary sources (up to 50%-70% recycled glass) so it diverts materials from landfills? And unlike the more popular green alternative, cellulose, it poses no fire hazard. Cellulose has to be treated with chemicals in order to make it flame and critter resistant.

MYTH 5: Fiberglass poses a health risk

It's true that fiberglass can irritate the eyes, skin, or respiratory system. But that's only if the material is improperly handled at installation. Rest assured that a professional will always use protective gear such as safety goggles, gloves, and a mask to avoid these risks.

There has also been much speculation as to whether fiberglass causes cancer. In 1987 the International Agency for Research on Cancer identified all man-made vitreous fibers as possible carcinogens. This is what led to those warning labels on fiberglass. However, after much international scientific research, they reversed their decision in 2001. And in 2011 the National Toxicology Program officially removed fiberglass from its list of "Reasonably Anticipated to Be Carcinogens".

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Two Great Reason to Insulate Metal Buildings

When designing a metal building, is insulation really necessary? Aren't metal buildings known for their durability and low maintenance?

Yes, and yes.

When it comes to metal buildings, insulation addresses two important goals—**stabilizing the structure's interior temperature** and **preventing moisture from entering or collecting via condensation**.

At ECHOtape, we offer a full range of specialty insulation tapes specifically designed for metal building and metal building insulation.

To learn more about adhesive tape, refer to our Technical Guide to Adhesive Tape. Or, contact the ECHOtape team with your tape request if you want help determining which product is best for your particular project.

7 Ways to Use Double-Sided Tape in Construction Applications

Double-sided tape is any tape that is coated with adhesive on both sides. Designed to stick two surfaces together without being seen, these versatile tapes deliver neater-looking projects and better craftsmanship. And unlike screws or rivets – which join materials at a single point – high-strength double-sided tape permanently adheres one substrate to another while **spreading the stress load**.

Sounds great, right!? Yet, much like everything else on the job site, choosing the right double-sided tape for the specific application is not as easy as it sounds. Whether you're bonding glass, wood, steel, concrete, foam, and/or plastic together, it's important to understand the materials you are bonding. Concrete with a textured surface is going to require more adhesive strength than, say, carpet padding.

Best Uses for Double-Sided Tape in Construction

Outside of materials, it's also important to understand the field conditions. A product that you used in spring or summer might not work in sub-zero winter. Ice, rain, humidity, heat, UV, and dirt are all factors to consider when choosing the right tape or, more importantly, preventing tape failure. For more on this, check out our infographic, The Secret to Choosing the Right Tape.

That said, we are thrilled to see more and more tape being used in construction applications, especially since adhesive technology has come a long way. As more and more builders start to focus on seaming the building envelope and getting improved HERS scores, tape is fast becoming a way to get the job done well. Here are just some of the construction applications where double-sided tape plays a major role and we expect more and more in the future.

Overlap housewrap seams. Here's the deal: single-sided tape used to seal housewrap may allow water to migrate behind the tape, and ultimately into the structure. Using a roller to bond the tape may help, but the better solution is to use double-sided tape as a housewrap tape so you can overlap seams and ensure no water gets through.

Overlap vapor barrier seams and attach them to cement walls in crawlspaces. More and more builders are putting vapor barriers down in crawlspaces to seam the building envelope as even in

the basement there is air leakage. You can also use a high-performance double-sided vapor barrier tape to attach the barrier to the walls instead of using screws.

Overlap any flooring underlayment including sound attenuation barriers. With more buildings becoming airtight, sound is becoming a big issue. Use double-sided tape for any flooring underlayment including sound attenuation materials.

Permanently attach insulation to walls. Use double-sided insulation tape to attach insulation to the building and ensure it sticks.

Temporarily mount something prior to permanently fastening. Temporary double-sided tape is the perfect solution to hold something in place while you permanently mount it. Examples include light switch junction boxes; electrical panels; electronic thermostats; baseboards; and crown moldings.

Floor protection. Often you need to cover floors or walkways with carpets or floorboards to protect the surface while construction is underway. Our double-coated carpet tape features an aggressive adhesive system that's perfect for carpet hold-down but will leave no residue once removed.

Easy installation of building materials. More and more manufacturers are making their products with double-sided tape for easy installation. As labor shortage becomes a big issue, finding ways to save installation time is becoming critical.

For more information on double-coated adhesive tapes,

please visit The Complete Technical Guide to Double-Sided Tape. And if you still have questions, please contact us! We love solving unique tape challenges.

3 Steps to Seam Housewrap The Right Way

No matter where you live, you will find housewrap being used on construction sites. It's one of the most widely applied water and air barriers in modern home building. Unfortunately, house wrap is often installed poorly – blowing in the wind, loose seams, ripped or torn sections, laid edge-to-edge, and even left with large gaps. All of which prevents housewrap from doing it's job, even after it's been covered with cladding or stucco.

To get it done right and have house wrap do its intended job, Building Envelope Specialist Bill Robinson shares the three steps necessary for proper installation.

Step 1: Start With a Clean Surface

Dust, dirt, and debris will keep any tape from sticking, including seaming tape. Using a wide bristle brush, clean the housewrap from the top down.

Step 2: Seal The Seams with Seaming Tape

One of the biggest, most common issues surrounding any house wrap is improper seaming. Robinson says: “Housewrap without

seaming tape is like an umbrella with holes. You're going to get wet."

Which is exactly why IBC 1402.2 and IRC R703.1.1 insist that "Other *approved* materials [i.e. housewrap] … are used as a WRB they shall be installed in accordance with the water-resistive barrier manufacturer's installation instructions."

Most housewrap manufacturers require that every house wrap seam – vertical *and* horizontal – be sealed with tape, ensuring that the tape is wide enough to sufficiently cover the seam.

Robinson reminds us that there is another important consideration when taping a wrapped home, ambient temperature. "Tape applied to house wrap that is too cold or too hot may not adhere properly. Be sure to choose a high-quality seaming tape best suited to the extremes of your climate region.

Here we used PE-M4535, a seaming tape specifically formulated with a proprietary extreme weather adhesive, that can be applied at -4°F to 105°F (-20°C to 40°C), and will adhere -40°F to 148°F (-40°C to 120°C)!

Step 3: Apply Pressure

Pressure sensitive adhesive tape needs pressure to form a proper bond. Without it, the tape may gap, wrinkle or lift, all of which will allow unwanted air or water incursions.

Using a squeegee, roller or J-roller, apply firm pressure to the tape in upward and downward strokes, making sure to smooth any wrinkles or gaps. The appropriate amount of pressure will cause the aggressive adhesive on the seam tape to form a permanent bond with the housewrap within 72 hours.

Consider Using a Tape Gun

Although many contractors will apply seaming tape by hand, Robinson recommends using a tape gun. “A tape gun allows you to apply seaming tape more easily, quickly and evenly than by hand. Plus, even though ECHOtape’s Seaming Tape tears really easily by hand, a tape gun is just plain faster.”

“Also, don’t make the mistake of thinking that a tape gun replaces a roller or squeegee. It doesn’t. You still need that additional pressure to really seal the overlap. It’s a step most contractors skip, and it’s almost always a costly or even litigious mistake.”

Seaming house wrap is not difficult. Clean. Seal. Apply pressure. Repeat. But for large projects, it can be time-

consuming and tedious to do it right the first time. Is it worth it? Absolutely! Seaming tape is critical for creating a weather-resistant seal on the exterior of new construction, so it is vital that the tape properly adheres to the housewrap material.

Keep in mind, not all seaming tapes are created equal. Seaming tape for house wrap should have high shear and holding power to ensure that the tape will hold long-term. It should also have the ability to withstand a wide temperature ranges and humidity levels in order to prevent flagging or failing, and should be hand-tearable for easy application. UV-resistance is another critical characteristic that allows housewrap tapes to withstand sun exposure throughout the duration of the project.

Have more questions? Check out our Field Guide to Housewrap Seaming Tape or call us directly at 800-461-8273. We love solving tape challenges!

The Pros and Cons of Rigid

Foam Sheathing

We're seeing a material shift, literally. There's a sweeping wave of synthetic, fabricated materials being used more frequently in construction, and this is a paradigm shift in construction. Leading the pack are changes in how we insulate.

Read on to learn more about the pros and cons of Rigid Foam Sheathing in high-performance building.

Rigid Foam as an Insulation Strategy

Rigid foam sheathing is a form of insulation – continuous insulation, to be exact – that's applied to the exterior of the building. Continuous rigid insulation is a construction solution that provides a thermally efficient building enclosure. Rigid insulation sheathing is made of a rigid plastic foam that is typically sold in 4×8- or 4×10-footboards. The boards are available in several thicknesses and R-values; 1-inch and 2-inch thicknesses are common. Rigid insulation provides thermal protection and it can also serve as an air and moisture barrier.

There are three primary types of rigid insulation: expanded polystyrene (EPS), extruded polystyrene (XPS), and

polyisocyanurate (polyiso). EPS and XPS are thermoplastics, which are non-cross-linked polymers so they are susceptible to deterioration in high temperatures (BSC 2007). Polyiso is a thermoset, which is made up of cross-linked polymers so it has a much higher melting temperature. While properties can vary among specific products, XPS and polyiso tend to be higher density, higher R-value, and lower permeance than EPS.

When rigid foam insulating sheathing is installed on the exterior walls of a home, the foam can serve as a drainage plane, taking the place of house wrap for time and cost savings. To serve as a drainage plane, the seams in the foam sheathing must be properly taped with sheathing and flashing tapes to provide continuity of the drainage plane at joints between panels. The tapes must be durable enough to prevent ingress of water at panel joints for the life of the system. Sheathing tapes and sometimes flashing tapes are also needed to integrate the top edge of diversion flashings (head flashings, flashings over penetrations, step flashings, kick-out flashings, etc.) with the drainage plane.

Rigid Foam and Building Codes

Because of its thermal properties, rigid insulation is being called for by certain codes and programs. ENERGY STAR(TM) requires that rigid foam or insulated siding be installed over walls if they are metal framed (ENERGY STAR 2015). ENERGY STAR also requires that rigid foam sheathing or insulated siding or

a combination of the two be installed to a thickness of ≥R-3 in Climate Zones 1 to 4 or ≥R-5 in Climate Zones 5 to 8 (ENERGY STAR 2015).

Continuous rigid insulation also provides an effective solution to thermal bridging. Thermal bridging occurs wherever assembly components with low R-values (such as wood or steel) span from the interior to the exterior of the building. In traditional building construction, while the wall cavities are filled with insulation, there is no insulation at the window frames, door frames, studs, top plates and bottom plates; together this framing comprises nearly one-fourth of the wall area. Rigid insulation can be attached to the exterior side of the framing to provide a continuous insulating layer that reduces thermal losses through thermal bridging.

3 Benefits of Rigid Foam Sheathing

More effective insulation
With R-values ranging from 3.6 to 8.0, rigid foam sheathing has much better insulation per inch than other materials (i.e. plywood has an R-value of 1.25 and fiberglass batts have an R-value of 3.14). This is especially critical in preventing damage (such as mold and rot) to framing and walls in areas with extremely cold or damp climates. Since rigid foam is applied on the outside it also prevents thermal bridging. Thermal bridging happens when there is a loss of heat due to an interruption in the insulation by a material that is more

conductive. This typically happens when interior insulation intersects things like stud frames or electrical boxes.

Better at controlling moisture When it comes to controlling moisture, rigid foam serves two functions. It protects the wood sheathing or framing from any rain or water that leaks in under the siding. And it warms the interior sheathing or framing enough to prevent moisture accumulation from the heated interior air in the winter.

Better at preventing air leaks
When sealed with proper techniques and a suitable adhesive, rigid foam is an excellent air barrier. The same principle mentioned above that prevents thermal bridging also applies to air transfer. Unlike house wrap, which works to prevent infiltration (air coming into the building) but is poor at stopping exfiltration (air moving out of the building), rigid foam is able to do both.

Disadvantages of Rigid Foam

Must be installed properly to limit air leaks and act as a weather-resistive barrier
Rigid foam does not require specialized equipment to install it but you do need to follow strict seam-sealing procedures to meet code.

Less structural strength than plywood or OSB sheathing

If rigid foam sheathing is used on top of wood sheathing, this doesn't matter. However, if you want to use rigid foam in place of wood sheathing it needs additional bracing to prevent racking.

Slightly more expensive
Adding a layer of rigid foam on top of plywood or OSB sheathing will increase the cost of the project. However, this is just a short-term, fixed cost. Rigid foam often pays for itself with lower utility bills over the long term. And it may put off or prevent costly work to repair rot in walls or framing.

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Installing Rigid Foam Sheathing

When using foam insulation, you'll need to decide whether you intend to use OSB in addition to the rigid foam to serve as the building sheathing or if the rigid foam layer will itself serve as the sheathing, and you'll need to determine what will serve as the drainage plane and where this layer will be. These decisions are determined somewhat by climate.

- Extruded polystyrene (XPS) and foil-faced polyisocyanurate (polyiso) are high-density rigid-foam insulations that can be used as exterior insulation and are generally approved, per Building America(SM) to be

used as a drainage plane if the joints are sealed.
- Insulation sheathing membranes rely on tape to complete the air barrier; the tapes should be applied on a clean, dry, warm surface.
- For the rigid insulation to be used as a water-resistive barrier, the vertical plane of the exterior face of the sheathing must be as smooth and continuous as possible.

The lowest cost, highest performing rainwater management strategy is rigid polymeric foam sheathing with sealed joints (Lstiburek 2006, 2010). There is an existing construction challenge of sealing the joints in rigid polymeric foam sheathing in a reliable and durable manner to prevent water ingress.

Best Practices for Taping Rigid Foam Sheathing

The Building America Solution Center has the following builder guidelines for taping rigid foam:

1. When rigid foam is used as the weather-resistive barrier and/or the air barrier, tape all seams using manufacturer-recommended tape per the manufacturer's instructions. Wipe the surface of the foam with a clean dry cloth before taping to ensure good adhesion by removing dirt or oil residue which is common on foil-

faced polyiso.

2. When rigid foam is used as the weather-resistive barrier, apply flashing shingle fashion around all openings for doors, windows, etc., to reduce bulk moisture intrusion and air infiltration.
3. Center the tape over the joint to cover the fasteners. Fasteners located in the center areas of the boards do not need to be taped. Use a shingle fashion technique when taping joints. Avoid taping during extremes in temperature; install tape per the manufacturer's instructions, which is generally between 15°F and 120°F.
4. Apply pressure along the entire surface for a good bond. Remove all wrinkles and bubbles by smoothing the surface and, if necessary, repositioning.

When working with any new material, you have to make sure you have enough available surface contact. We're seeing applications where tape works well with synthetics, but we're also seeing materials that offer a very imperfect surface to bond to. As new materials are introduced, and airtightness remains a critical requirement, the industry needs a pressure-sensitive tape that's going to bond quickly to rigid insulation and stay that way.

Which is exactly why ECHOtape launched our new, next generation seaming tape. PE-M4535 is a proprietary high-performance building tape, made from an advanced polyester backing, which makes it extremely strong and easy to apply. Available in red, silver and white, it is a versatile product used in a wide variety of building envelope sealing

applications, including cold weather applications. As excited as we are about PE-M4525, ECHOtape R&D team is continuing to develop additional seaming products to meet the needs of a rapidly changing building industry, products that will adhere to a wide range of building materials and surfaces including house wrap, exterior, and rigid insulation, sheathing, vapor barriers and a variety of underlayments.

Do you have a specific need or seaming challenge? Tell us about it! We love to solve tape challenges.

Seaming Housewrap with Double Sided Tape

Using tape to seal seams in weather resistant barriers after wrapping is the best way to for achieving maximum benefit of an air and water barrier to protect the building envelope. This much we know for sure.

But did you know that double sided tape may actually be a more efficient option when it comes to seaming housewrap?

Building Envelope Specialist Bill Robinson shows us how.

Why Choose Double Sided Tape for Housewrap

Here's the deal: single-sided tape used to seal housewrap may allow water to migrate behind the tape, and ultimately into the structure. Using a roller to bond the tape may help, but the better solution is to use double-sided tape as a house wrap tape so you can overlap seams and ensure no water gets through.

Robinson says, "The benefit of using double-sided tape for seaming house wrap is that the tape is not exposed. There is no fish-mouth, no UV degradation, and therefore no opportunity for the moisture intrusion."

Of course, that idea is fraught with pushback.

"Obviously, seaming house wrap with double sided tape adds an extra layer of work, more attention to detail. A better product always does," says Robinson. "Getting sub-contractors to do it consistently will be a challenge. And that attention to detail will come at a cost. Not only in labor, but the additional material cost per job site.

"Outside of contractors, housewrap manufacturers will be reluctant to spec out another product or installation step. Especially one that might affect warranties. For production builders, the pushback is financial, the additional labor and

materials cost. It’s really marginal on a per-project basis, but it could add up to hundreds of thousands of dollars for the Lennar and Hortons of the world.”

Currently, there aren’t many manufacturers other than Tamlyn advocating for double-sided seaming tape that we know of. But there are companies investing in products like VaproShield, which is a housewrap that has an integrated adhesive on one side.

Bottom line: we’ve changed the way we’ve built. As we make house tighter, houses have to be built with a tighter attention to detail.

Seaming House Wrap with Double Sided Tape

Seaming housewrap with double-sided tape isn’t that different from regular seaming tape. The same rules apply.

Step 1: Clean the surface.

Step 2. Affix the double sided tape.

Step 3. Apply pressure.

Step 4. Peel back the release liner.

Step 5: Press the housewrap overlap into place using a squeegee or roller.

When it comes to applying pressure, Robinson recommends using a squeegee, roller or J-roller in long, even strokes. The appropriate amount of pressure will cause the aggressive adhesive on the seam tape to form a permanent bond with the housewrap within 72 hours.

Why Seaming Tape Matters More Than Ever

In just about every climate in which we live and build, the No. 1 job of any building enclosure is environmental separation.

Keeping water, air, and heat locked in or out of buildings can make them more resource-efficient, durable, and safer for occupants.

The greatest challenge in this endeavor is maintaining the continuity of our air barriers, drainage planes, and insulation layers, particularly at penetrations, transitions, and margins of building assemblies.

The answer?

High-performance seaming tape.

Seaming Tape – A Brief History

In the early 1970s, residential builders knew almost nothing about airtightness and air movement. Even engineers were

ignorant about hot and cold air leakage in buildings because the basic research hadn't been done yet.

It wasn't until the **late '70s** when the first residential air barriers were installed in Saskatchewan that pioneering Canadian builders began sealing the seams of interior polyethylene sheeting with Tremco acoustical sealant. (The first seaming tape, if you will.) The results were self-evident, and since then, most North American building codes now require builders to include details designed to reduce air leakage.

The same holds true in Europe, where using tape to seal the building envelope is the standard operating procedure in **passive house** (a.k.a. Passivhaus) construction. Passive Haus results in ultra-low energy buildings that require little energy for space heating or cooling.

In fact, tape experts cite Europe as the best example of the overall utilization of acrylic tapes in construction. "In Europe, they tape up everything when building or retrofitting to create an air-tight seal," says David Joyce, nationally known construction and tape expert, and owner of Synergy Companies Construction LLC. "Energy costs are much higher there, and it's a matter of necessity." Joyce notes that the industry here in the U.S. "is just recently becoming more aware of the benefits of air-tight building practices and that acrylic tapes make that much easier."

It's easy to see why the practice of seaming is seeing a surge among insulation professionals: The energy benefits of air

barriers are huge.

A 2005 study from the National Institute of Standards and Technology, "*Investigation of the Impact of Commercial Building Envelope Airtightness on HVAC Energy Use*" by Steven Emmerich and others, found that just **incorporating an air barrier in a building can reduce its heating and cooling cost by up to 36%.**

Furthermore, uncontrolled air leakage could have consequences beyond increased energy consumption, regarding health and safety of the building occupants, as well as premature deterioration of building materials.

Additionally, the International Energy Conservation Code (IECC) and several state energy codes now **require the use of air barriers**. In addition, a growing number of municipal authorities having jurisdiction (AHJs) and green-building trade groups are calling for their use. Some federal agencies and large owner and developer groups also require them.

More importantly, energy efficiency and occupant comfort—two key ingredients of sustainable design—are driving the use of air barriers across market sectors. With today's high cost of energy and concerns about Indoor Environmental Quality (IEQ), air barriers are one of several construction systems with a critical role to play.

As our building profession evolves to becomes more energy-efficient, more sustainable, and more "green", air sealing every building is going to become the norm. And, of course,

more tape will be used to do this.

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Benefits of Seaming Tape in High-Performance Building

There are three primary drivers for the increased usage of seaming tapes on job sites:

1. More stringent codes. Increased building envelope requirements – air and moisture control layers;
2. Improved tape technology.
3. Heightened awareness of the high-value seaming tape by builders, contractors, and building scientists.

Don't just take our word for it. Consider this direct quote from [Building Energy Code Resource Guide]

> *To limit air leakage, builders use tapes to seal the seams of a variety of membranes and buildings products, including housewrap, polyethylene, OSB, and plywood. Tapes are also used to seal duct seams, to seal leaks around penetrations through air barriers – for example, to seal around plumbing vents – and to seal sheet goods to a variety of materials, including concrete.*

"Tapes have become much more commonplace in the construction

industry today than they were 10 years ago," Joyce says. "And they're going to become more and more so as air sealing, energy efficiency and durability become more important, and builders are becoming more educated about the benefits of tapes over other sealants or flashing materials."

Indeed, trend reports indicate that overall, tapes used on job-sites will outpace the overall construction industry growth (3%-5%) with an estimated 6%-7% annual growth rate. New residential tape use will increase the fastest in double digits due to code compliance. In the past, tapes were used sparingly on joists and viewed as a temporary fix or cheap solution.

Today, tapes have transitioned into high value and highly functional products that enhance building airtightness, prevent water intrusion, and even increased roof safety and integrity in high wind events.

While no single tape works well in every air sealing application, there are four common benefits worth considering:

1. Seaming tape is very easy to use.
2. In context to other building materials, tape is inexpensive.
3. Effective air sealing – air control, moisture control, and "protection" of finished materials – depends on both the materials being used (what are you taping?) and what are the conditions (in heat, in cold, etc.).

There are a lot of tapes available so you can match the conditions with the situation.

4. Tape can create a continuous barrier when applied correctly, which is what you need an air seal to be for it to be effective. This is hard to get with other kinds of fastening systems.

Today's newer and higher-performing adhesive tapes offer builders better choices and multiple advantages over conventional building materials. These tapes actually stick better over time, are more durable, and are more weather resistant. Indeed, modern adhesive technology is much more sophisticated as a whole.

The Next Generation of Seaming Tape

When it comes to choosing the best construction tape, the maxim that "if it ain't broke, don't fix it" doesn't cut it. High-performance construction tapes will become more important as the construction industry deals with stricter regulations and as best practices in the industry change with the times. To stay ahead of these changes, and meet the needs of high-performance builders across North America, we've recently launched a new seaming tape that uses advanced adhesive technology to stick to just about anything

PE-M4535 is a next-generation seaming tape for the

construction professional looking for superior performance. Formulated with a proprietary cold weather adhesive –excellent cold climate adhesion to -4°F! – PE-M4535 is engineered to adhere to a wide range of building materials and surfaces. Made from an advanced polyester backing, it is extremely strong, yet can still be torn by hand, which makes it easy to apply.

Highly adaptable and versatile, PE-M4535 can be used in a wide variety of building envelope sealing applications, such as:

- House wrap
- Insulation, including polysio-cyanurate and reflective insulation
- Exterior sheathing
- Vapor barriers, including polyethylene films
- Flooring and roofing underlayments

At ECHOtape, we're focused on generating real-world adhesive solutions that help Building and Construction professionals work more efficiently and cost-effectively on every job site. It's why we've engineered such an extensive line of durable, resilient, weather-resistant construction tapes, including seaming tape, insulation tape, foil tape, stucco tapes, cold weather tape and more. So, no matter what project comes your way, the quality and reliability of your work are guaranteed.

Sticking in the Rain: The Challenge for Construction Tape

In an environment where dirt, rain, and temperatures fluctuate daily, adhesive tape is the 'glue' that most often secures a building's key weather resistive barriers in place.

So what happens when tape meets water and humidity? **How does tape stick in the rain??**

Understanding Adhesive Tape and Field Conditions

Builders have been taping and sealing joints in insulating sheathing for more than two decades, notes Joseph Lstiburek, Ph.D., P.Eng. and Aaron Grin, over at Building Science Corporation.

> *"Today's tapes are resistant to UV and heat and rain. How do we know? We stick them outside for years and watch them and we also take apart older buildings that have used them to see how well they did," Lstiburek writes. "Nothing beats real world exposure."*

Which is exactly why Green Building Advisor Editor Martin Holladay performed his preeminent Backyard Tape Test in 2012 and 2013. Holladay tested the performance of 11 air-sealing tapes by simply attaching samples to six different substrates mounted on the exterior wall of his woodshed (talk about real world exposure!). After a month he tried to remove the tape samples to determine which tapes were most tenacious. Holladay repeated the experiment at 10 months.
"On some substrates – especially the foil-faced polyiso, the housewrap, and the polyethylene – the best tapes were so tenacious that the substrates were damaged by my attempts to remove the tape," writes Holladay.

That says a lot about the power of tape to establish a permanent, weather-tight bond. However, is it safe to assume that if water penetrates the structure, it's the construction tape's fault?

Not necessarily.

You've heard the expression, "*location, location, location.*" Well, when it comes to adhesive tape sticking in the rain and other tricky field conditions, that might as well be: *application, application, application.*

Best Practices for Adhesive Tape

Application

Homebuilders and researchers have developed best practices to tape the remaining joints in the insulating sheathing to create a simple, long-term, and durable drainage plane.
Building America asked contractors and homebuilders to identify three significant strategies for successfully using taped insulating sheathing as the drainage plane:

- Limit or eliminate horizontal joints wherever possible.
- Where a horizontal joint exists, use superior materials.
- Require frequent installation inspection and regular trade training to ensure proper installation.

Installers also found that tape should be offset, favoring more tape on the upper sheet of the substrate. A decent rule is that 2/3 of the tape should be on the top sheet, and the remainder lapped over the bottom sheet.

Commissioned by Building America, Lstiburek and Grin created a Measure Guideline and Report (2014) on taped insulating sheathing drainage planes. Here are six key takeaways:

1. Z-flashings can be used on all horizontal joints and should be used on any high-risk horizontal joint.
2. Drainage planes and tapes must be smooth, clean, dust free, and ideally warm.
3. A termination strip of thin tape should always be used for thick tapes.
4. Backup wood blocking should be installed behind horizontal joint locations.

5. Vertical joints should land on framing members and be taped with a minimum 3” wide acrylic tape and gravity lapped with the horizontal joint.
6. In terms of flashing tapes, almost all groups interviewed prefer butyl based tapes over asphaltic based tapes.

In the end, what tape did they recommend for such a job? An acrylic adhesive based, superior thin tape, available in wide widths up to 4”, and has good temperature and UV resistance. Builders also responded that, through their experience, superior thin tape should be able to adhere to almost any substrate with high reliability in a range of climatic situations.

When it comes to superior flashing tape characteristics, the report indicated that a butyl adhesive based flashing tape, not more than 20 mil thick to ensure overlaps do not build-up too much, available in 6”, 9”, and 12” widths, and should have a facer that is very expansion/contraction compatible with its adhesive substrate.

Builders noted that the best flashing has a facer that is no wider than the adhesive as to not trap water and has good temperature and UV resistance. Again, superior flashing tape will be able to adhere to almost any substrate with high reliability in a range of climatic situations.

Both acrylics and butyl tape systems have UV stabilizers to address solar exposure and antioxidants to address long term

aging which can change properties over time, Lstiburek notes. **In fact, defying common perception, the tape systems tend to be as durable, or even *more* durable, than the building wraps and housewraps they are adhered to.**
Holladay discovered this as well, during his Backyard Tape Test, finding that while the bond created by a high-quality acrylic adhesive is slow to develop, it is powerful enough to remove the surface of the substrate after 10 months.
With any tape for it to function well, it must be firmly pressed into place. This is particularly important with acrylic tape systems. They should be installed with a roller or squeegee to maximize contact.

> *"Many of the problems related to the seam seal tape start with the wrap installation, particularly the fastener placement. Oftentimes cap fasteners installed at the tape edge prevent a complete seal. Wrinkles in the wrap can leave voids at the tape contact surface," writes Jeff Hoch. "All of these conditions can allow water to migrate behind the tape, follow the horizontal seam to the nearest vertical seam, and ultimately into the structure. Since most areas of housewrap are over wood-based sheathing, leaks at the seams may go undiscovered for years."*

Advancements in Adhesives and Tape

Specialization

Today, we're also seeing the specialization of tape for specific applications. What's happened is tapes are now developed to marry up with a warrantied system, whether it is supporting a weather-resistive barrier (WRB), window manufacturer, or for SIPS construction.
"Just because a tape does well on one substrate doesn't mean it will work well on another," cautions Holladay.

> *"At the end of the day, taped sheathings work as well as building wraps and housewraps and vice versa," writes Lstiburek. "But there are limitations to both. With building wraps and housewraps the biggest single problem is making sure gravity laps are actually used. Amazing as it seems reverse lapping is still the most common residential construction defect I see. With construction tapes the biggest single problem is folks thinking they can stick them to muddy, dirty, cold, wet and frozen surfaces. You would think this is obvious… [yet] folks keep trying to do it."*

Of course, this is just one expert opinion. What it all boils down to is knowing these three things: your job, your materials, and your field conditions. Only then can you match the right adhesive with your project.

As tape technology continues to evolve and advance each year and becomes more relevant in energy efficient and high-performance construction, **knowing the secret to choosing the right tape** will improve the longevity and success of your project!

Top 50 Resources for Contractors & Builders

No matter where you live in the US or Canada, it’s always building season.

Which means that building pros don’t have the time to search the web for construction news, building trends, building code updates, and inspiration. Which is why we did the work for you.

We’ve compiled 50 of the best online resources for contractors and buildings, covering everything from green building news to sustainable design to metal building. We also list the best podcasts for general contractors, so you can soak in the news while you’re on the move.

Without further ado, here are 50 of the best influencers, podcasts, online links and resources for contractors, builders, stucco professionals and more.

Start Here: Top Online Resources for High-Performance Building Pros

This are the go-to resources for everything construction related. The following sites have videos and informative articles that cover a wide range of topics relevant to contractors.

1. **Matt Risinger.** This Austin-based builder explores the principles of building science, discusses best practices in building and remodeling and features product reviews all on his amazing YouTube Channel, Build with Matt Risinger.
2. **Construction Instruction**. We discovered this gem at the IBS Trade Show in Orlando… and all we can say is, how did we ever live without it? P.S. It's not just a YouTube Channel, it's also an app.
3. **Corbett Lunsford.** For home performance professional and homeowners alike. We especially love the awesome and weird things Corbett and his wife, Grace, share from their field work as building forensics experts. And, as if that weren't enough, tune into the Building Performance Podcast for more hands-on insight from Corbett.
4. **The High-Performance Building Exchange**. Information and insights from building industry experts. Simply amazing content.
5. **Journal of Light Construction**. An awesome compilation of videos from the industries top pros. Plus, we can't live

without their weekly newsletter, delivered on Sundays.

Stucco Specific Resources

Do you make your living from stucco and plaster? The following stucco specific resources will keep you up-to-date.

6. **Giordano Plastering.** If plastering and stucco is your game, don't miss Kirk and Jason Giordano's 700+ video treasure chest covering everything you could ever want to know about plastering.
7. **The Stucco Guy** (a.k.a. Ryan) made it his mission to educate people about every aspect of stucco, including materials, the different systems, stucco application techniques, and everything in between. It is the single most comprehensive website on the subject of stucco that we've found.
8. **The American Society of Home Inspectors** is is a great resource for virtually all builders and contractors, but we bookmarked this particular stucco post, written by ASHI Past President David Tamny, for its unique perspective.
9. **Stucco Manufacturers Association.** If stucco is your trade, this is a must-belong membership site. Much of the information is membership-protected, but this FAQ is a great resource for builders needing info on the fly.
10. Sometimes the best place to get answers is from other contractors. **ContractorTalk** is a free online forum for

contractors from all fields, including stucco. Can't find an answer to your question? Post a question and you're sure to get an answer from a pro.

Construction Trends

Keeping up with construction trends is a full-time job in itself. But this site cover construction trends so thoroughly that you will never have to go searching the web again.

11. **Construction Dive.** The site is a treasure chest of valuable info, but the CD Daily Newsletter is one of our favorite morning reads. It delivers a bird's eye view of the construction industry in 60 seconds or less.
12. **The Construction Specifier** is the official magazine of the Construction Specifications Institute (CSI), the only peer-reviewed U.S. publication targeted to those construction profs who select, recommend and influence buying decisions.
13. "**Buildings of the Future: It's Time to Rethink the Bottom Line**" addresses the evolution of the construction industry, and how ROI is, or will be, calculated. FYI: We're including this link for the downloadable white paper on the subject at the end of the blog. You are going to have to give up your email address to read it, but it's worth it.
14. How do we in the construction industry balance the challenges of achieving building performance while

balancing other variables including budget, project milestones, and an extensive project team? The Living Building Challenge at Georgia Tech is working to answer that. A must read.

15. It takes great teams to build great projects. That's the impetus behind Building Design + Construction Network and it's the only resource we've found that unified the architect, engineer, contractor audience with the owner/developer. Great content.

Building Codes & Practices

Don't get caught violating building codes or failing to know best practices because you're out of the loop. Check out these building code resources so you don't get left following out-of-date practices.

16. **Building Science Podcast.** 70 episodes and counting, and we can't get it enough. Presented by Positive Energy, an engineering firm in Austin, the hosts are at the forefront of building technology, but also have a love of conservation and keeping things simple.
17. **Avoiding Wet Walls.** JLC's Sunday Update is one of our favorite email newsletters. But it's this article that ever contractor shoud bookmark. It talks about how important CI has become in the fight against condensation and water penetration, so much so that it's now part of the energy codes in specific climate zones.

18. **The American Society of Home Inspectors**'s (ASHI) Standards of Practice—covering all of a home's major systems—are now part of many pieces of state legislation and are recognized by consumers as the authoritative standard for professional home inspection.
19. **Legal Ease.** Ever wonder what a lawyer would think about your building project? **Quality Built** knows. The lessons learned from analyzing more than 2,000 litigation cases and investigations have formed the basis of the site's ever-growing knowledge database – which is used to evaluate builder quality and minimize construction defects.
20. Bookmark this: **Energycodes.gov.** You can find the current status of energy code adoption for each state here, with detailed information on each state's status.
21. And this: **Code Watcher.us.** Conceived and produced by expert staff with decades of code knowledge and experience, here's a "clearinghouse" for all things code-related.
22. And this: **BCDNetwork**. Another great resource on current energy codes, along with trends, proposed changes and case studies.
23. The Institute for Market Transformation did a two-part series on "What To Expect from the 2015 IECC" here and here. This organization's mission is "promoting energy efficiency in buildings" and consistently publishes from this standpoint.
24. The *National Association of Home Builders* has also compiled a list of what they consider to be "Critical

2015 Code Change Proposals" and the outcome of each proposal.

25. With a comprehensive circulation of 110,000 new-home builders and their subcontractors, **BuilderOnline.com** provides balanced, analytical coverage of the economy, housing policy, building codes, design, construction, new products, sales and marketing, technology, and business management.

Resilient & Sustainable Design

27. Curious about resilient design? Start here: The **Resilient Design Institute**. It's ground zero for practical solutions that can be employed by communities, businesses, and individuals to adapt and thrive amid the accelerating social, ecological, and climatological change being experienced today.
28. We talk a lot about building resilience on the blog, a subject that's obviously moved to the forefront of daily conversation. This article from **Building Design and Construction** talks about relocation efforts after major disasters, where this has already happened and the hurdles that Homeowners have to deal with.
29. **US Climate Resilience Toolkit.** This is probably one of the best "one-stop shop" resources for resilient design and supporting documentation for issues related to climate change. A great resource for architects and builders to use and share with clients and developers.
30. **National Institute of Building Sciences** has a whole section of their website dedicated to Building Resilience Resources.
31. Although specifically targeted at addressing typhoons and earthquakes, the information within The United Nations Economic and Social Commission for Asia and Pacific's Resilient Construction and Design Guide can easily be applied for buildings on the east coast, which are prone to some seismic and hurricane hazards.
32. The World Bank's Sustainable Cities blog presents a

fascinating look at resiliency on a global scale. Start here.

33. **Whole Building Design**. This free resource is a gateway to up-to-date information on integrated 'whole building'high-performance design techniques and technologies.

Green Building

34. **Does Green Building Pay? Yes.** At least according to a new study from The University of Texas at Austin and the

U.S. Green Building Council (USGBC) found that new homes built to meet green building standards like LEED), are worth an average of $25,000 more in resale value than conventional homes.

35. **Thermal Insulation Growth.** Last year, the Building Thermal Insulation Market was valued over $25 billion, and it's slated to surpass $34.9 billion by 2024. The article and report provide great insight on what to expect on thermal building insulation in the next several years when it comes to the different types of insulations. To get a full report, simply request a sample here.
36. It's no secret that **zero energy ready homes** are the future of building. But this article by Green Building Advisor dives deep into a San Joaquin County Habitat for Humanity project that cost less to build – not to mention less to own – than any of their previous standard energy-efficient Habitat homes.
37. **Go For Solar.** Last year, South Miami passed a building code that required a solar panel on new residential construction. This is the first solar requirement of it's kind outside of California and one that we are paying close attention to.
38. Green Building Continues to Rise. To date, almost 130,000 homes have earned NGBS Green certification and almost 97,000 homes have been registered to earn NGBS Green certification. Home Innovation Research Labs is paying close attention.
39. **Green Building Advisor**. A single resource where design

and construction professionals and knowledgeable homeowners can get the full complement of the information – proven construction details, in-depth how-to advice, a green-products database, green business strategies, design tools, and alternate paths to code compliance together in one place.

40. **EcoBuildingPulse**, powered by EcoHome and Eco-Structure, provides the news, products, and best practices for green-building professionals focused on best practices and innovative new developments from the industry's thought leaders.

Metal Building

41. **Metal Construction News** is your one-stop shop for all things metal building news, products and strategies driving this sector.
42. **Metal Building Insulation.** This is a great technical overview of continuous Insulation for the Metal Building industry. Emphasis on technical.
43. **Metal Building Insulation Trends.** Not one, but two great articles by Ceco Building Systems on metal building insulation and energy codes. Part 1 dives into energy codes. Part 2 examines code-compliant, cost-effective metal building design.
44. Metal Walls. Metal Roofing. Metal Buildings. Sustainability. **DesignandBuildwithMetal.com** won't win

any web design awards, but it's crammed full of up-to-date information on all things metal building.

45. Every year, *Metal Construction News* asks industry experts to present their ideas on where the industry will go in the next few years. Here's the **2018 State of the Industry Report.**

Listen Up! Best Podcasts for Contractors

46. **Building Performance Podcast.** Hosted by Corbett Lunsford of the Building Performance Workshop, this podcast is for contractors, from contractors. The Building Performance Podcast is an interview series that draws on the experience and ideas of high-performance building pros around the world. Think engineers, policymakers, contractors, diagnosticians, architects, and building managers, among others.
47. **ConTechCrew.** If you haven't had a chance to listen to this show yet, check it out! Rob McKinney (@conappguru), James Benham (@JamesMBenham), Josh Bone, and Jeff Sample discuss the latest construction news and are typically joined by a heavy hitter in the construction tech world.
48. **Constructrr.** Construction manager and consultant Brittanie Campbell-Turner (@Brittanie_ct) launched

this podcast last year to examine the evolving nature of construction. She often highlights individuals who are finding new ways to make the industry more efficient and collaborative.

49. **Protractor Podcast.** Do you ever wish you could talk to other successful contractors who are in the trenches just like you? Or even just listen to them as they share the stories, failures, and secrets they have learned over the years? Well… that's the Protractor Podcast in a nutshell, delivering the latest Inspiration, Motivation, and Education to grow your business with purpose.
50. **Contracting Coachcast.** The Contracting Coachcast is a daily 15-minute podcast hosted by Tony Booth (@anthonybooth). With over 170 episodes under its belt, this podcast has covered a large array of topics, including budgets, recruiting, leadership, and more. This is an especially helpful resource for construction startups and regional construction business owners.