air barrier

abaa

association of america

3RD QUARTER NEWSLETTER

FEATURE TECHNICAL ARTICLE

WATER VAPOR TRANSMISSION OF MATERIALS, AKA PERMEANCE

by Roy F. Schauffele, FCSI, CCPR, FABAA, LEED Green Assoc.

GREETINGS FROM THE CHAIR

3RD QUARTER NEWSLETTER

ABAA's Executive Committee held a planning meeting at the end of July to discuss the current status of the ABAA initiatives and focused on what ABAA's goals should be over the next year, three year, and five-year time periods.

We hear comments all the time about how the ABAA is an association that is moving the industry forward by concentrating on codes, standards development, research, technical expertise, education, training and support in the field. There were a lot of great ideas at the meeting and we discussed a number of the initiatives that are currently being worked on in various committees…and then our Secretary, Craig Wetmore, said to the group…"we need to focus." Those few words made all of us stop and think about what our priorities are in moving our organization and the industry forward and what we can realistically accomplish.

As I look back at my summer and realize that I have been trying to accomplish a long list of work, association & personal goals, I also now have a long list of half-done things…I need to bring focus to accomplishing the important things in my life! I know most of the great ABAA volunteers are probably going through the same scenario.

The ABAA is an association that is doing more than any other group I know of working to move the building enclosure community forward, yet as a whole we too need to take that breath and focus. I want to ask each ABAA committee to discuss what their goals are, focus in on what is important, and let me and the staff know what we can do to help them accomplish these focused goals.

I want to thank all of the volunteers within the various committees for their dedication and commitment to our industry.

Brian Stroik
Chair ABAA
Tremco Sealants and Waterproofing
Manager: Building Envelope Solutions Team

air barrier
abaa
association of
america

FEATURE TECHNICAL ARTICLE

WATER VAPOR TRANSMISSION OF MATERIALS, AKA PERMEANCE

by Roy F. Schauffele, FCSI, CCPR, FABAA, LEED Green Assoc.

One of my favorite movie lines is “you’re killing me Smalls”, from The Sandlot, a baseball movie. Well in today’s world, especially specifications for air barriers, the construction industry is killing me. I have written about this item before on #letsfixconstruction but to no avail. One of the technical data points I hear design folks dig their feet in on is the “perm rating”. Permeance is a measurement of water vapor transmission through a material often based on testing performed in accordance to ASTM E96, either Procedure A (dry cup or desiccant) or Procedure B (the wet cup). Big note here, the IBC (International Building Code) in Chapter 2, only references Procedure A.

For the record, I love good reproducible usable data but the ASTM E96 method of testing leaves me flat. At this moment I’m sitting here looking at the same material, tested by two different accredited laboratories and there is a 300% difference between the two labs between both two (2) Procedure A samples and two (2) Procedure B samples. With that type of difference how can one rely of this type of data.

The ASTM E96 specification itself states, in part, “A permeance value obtained under one set of conditions may not indicate the value in another set of conditions”. Based on a round-robin testing effort, ASTM reports E96 has about 20% lab-to-lab variability. I bet you are going to have to think fairly hard about another part of your project manual where you’d allow a 20% variability in testing data.

	PROCEDURE A	PROCEDURE B
Cup %RH	0% (desiccant)	100% (water)
Test T°F	100°F	75-85°F
External to cup %RH	90%	50%
Duration of the test	Until you obtain enough data points to make a conclusion, it could be two (2) days or (2 months)	

NOTE: The E96 test method does allow you to design the test parameters to a specific climate but most don’t run the test that way.

Permeance data are not an evaluation criterion for ABAA (Air Barrier Association of America), the data is listed by ABAA because the Design Community has requested it. Going back to the Code definitions, the language used in the air barrier business is constantly changing as the industry and technology evolve. Nowhere is this more evident than in Building Code language, which now fully defines Vapor Retarders and Vapor Permeable in Chapter 2 of the 2015 & 2018 IBC (International Building Code). The new code lexicon does not contain the terms of Vapor Barrier, Vapor Impermeable, breathable or nonbreathable. There is only one reference to vapor permeable and three (3) references to vapor retarder. The new definitions are based, and only based on ASTM E96, Method A (dry cup method). The dry cup method places a desiccant in the bottom of a cup which creates a 0% RH environment, and the environment above the membrane is 90% RH, the material being tested is placed between these two %RH conditions and the whole assembly is maintained at 100°F for the duration of the test.

The Vapor Retarder Classifications included in the IBC are:

- Class I – 0.1 perm or less
- Class II – 0.1< to ≤1.0 perm
- Class III – 1.0<perm and ≤10 perm

NOTE: there is a definition in the code to call anything with a perm of 5.0 perms or high a Vapor Permeable membrane when tested to Procedure A.

It is suggested that these definitions should be considered for the next round of literature printing by manufacturers in an attempt to comply with code definitions and to remove some of the misleading labeling of material properties.

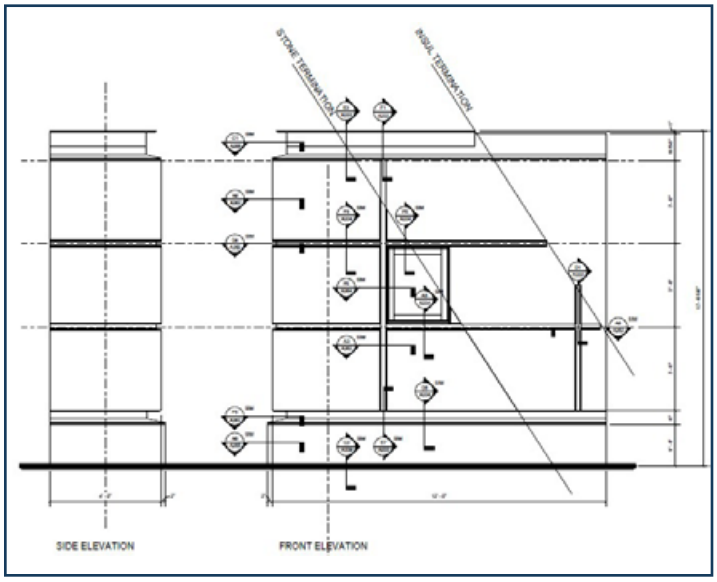
The air barrier is just one component of an Evaluated Assembly (air, thermal, vapor and water control). Don’t hang your hat on such a difficult to reproduce and highly variable point of testing data such as the “perm”. With the ever-growing use of CI (continuous insulation) the perm rating of the air barrier takes on an ever diminishing and substantially reduced significance. Please remember that the mold issue had many parents and the more dominant parents were the almighty R-value of insulation and its relationship to vapor retarders, don’t get caught in that same trap again with over reliance on perm data. Please remember that today’s science tells us that unimpeded air infiltration can move 32 to 64xs more moisture into a building than can water vapor transmission alone and that is why the development of air barrier technology was so critical.

SPECIAL THANKS to Andrew Dunlap, AIA, CDT, LEED AP, NCARB, Principal at The SmithGroupJJR for technically reviewing and critiquing this brief article and for translating my Texan to English.

TECHNICAL BLOG

THE BENEFITS OF PROGRESSIVE MOCKUP WALLS

by Joe Mitra



The importance of an independent progressive mockup wall is tremendous and has a large impact on the success of a project, as well as on the profitability of the design team. Not only does a progressive mockup wall verify that trade contractors understand the design intent of each building system, but it also confirms the constructability of each detail. A physical mockup allows the construction team to see firsthand the exterior envelope's requirements and supports creation of the envelope's construction processes, which cannot be visualized fully by digital 3-dimensional and 4-dimensional models. When done correctly and embraced by the CM and trades, ownership of the exterior envelope transfers from the design team to the construction team – the synergy between the trades to discuss and coordinate each component is an added value. As a team, they determine installation sequence and the efficiencies for the envelope.

Construction of the mockup wall needs to be scheduled as early as possible so it can be constructed prior to the exterior component / system submittals. The construction team (all trades associated with the exterior envelope) along with the architect should meet periodically during the mockup phase to discuss each layer.

When complete, all parties understand how the envelope will be constructed. Architecturally, this is a tremendous time saver during the construction administration phase. Major issues are eliminated, the submittal process has fewer review comments, and RFIs about the exterior envelope are drastically reduced.

With more than 35 years of experience in the field of architecture, Joe Mitra is a senior associate and exterior envelope specialist at Stantec. He is also a board member for the Building Enclosure Council (Greater Detroit).

EXTERNAL ARTICLE

BACK TO BASICS – DIFFERENCES BETWEEN AIR AND VAPOR BARRIERS

by Peter Barrett

It has been said before, but bears repeating: as much as 80% of premature building wear expenses are related to moisture in one way or another.

Water is the most significant factor in the premature deterioration of buildings, as it can cause corrosion of metals, rotting and mold in organic substances, dissolution of materials, reduction in effectiveness of insulation, and more.

To continue reading the article written by one of ABAA's Board of Directors, Mr. Peter Barrett, click the following link. Mr. Barrett's article was recently published in the July 2019 Construction Specifiers magazine.

https://www.constructionspecifier.com/back-to-basics-differences-between-air-and-vapor-barriers/

WHAT IS A PERM?

by Mr. Laverne Dalgleish

A perm is simply a unit of measure for the amount of water vapor that will pass through a given area of a material over a period of time when there is a static vapor pressure difference between the two atmospheres on each side of the material. So, put differently, when the vapor pressure (the combination of relatively humidity and temperature) is different on one side of a material than on the other, the water molecules in the air (water vapor) want to work their way through the material. The direction of movement is always from high water vapor pressure to low water vapor pressure.

A practical example would be when the interior temperature and humidity (between 68 and 72 deg. F in the winter and 30 to 60 percent relative humidity per ASHRAE guidelines) is maintained in the building and it is cold and dry outside. In cold climates, the interior conditions are warm and moist and the outside is cold and dry. The water molecules that are in the air inside the building want to work their way through the building materials to the outside. Similar vapor pressure differences can also be experienced in summer conditions when the temperature and humidity (between 72 deg. and 80 deg. F and 30 to 60 percent relative humidity per ASHRAE guidelines) vary from the hot and humid environment at the exterior. In this instance, the water molecules on the outside want to work their way through the building materials to get inside.

But let's go back to what is a perm. Sure, it's a unit of measurement, but how much water are we really talking about?

Well, a US perm is one grain of water vapor per hour per square foot per inch of mercury. In metric it is 57.2135 nanograms per second per meter squared per Pascal (57.213 ng·s·m²·Pa).

A nanogram is one billionth of a gram. To put this into perspective, a US penny weighs about 2.5 grams. So, take a penny and cut it into 2,500,000,000 pieces. Yes, that is right - two billion five hundred million pieces. Now, take 57 of those pieces (or go wild and take 58 pieces) and now you have the weight equal to the weight of water that is considered one Perm. So, the point here is that one Perm is a very small amount of water – well, it's an extremely small amount of water.

It is also important to understand how materials are tested to determine their water vapor transmission rate.

The most common standard is ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.

In this test method, there is the "dry cup" and the "wet cup". In both methods, a circular glass dish, normally is about eight inches in diameter, is used. For the dry cup method, desiccant is used in the dish. For the wet cup method, water is used in the dish. Then material is put over the mouth of the dish and sealed with a paraffin wax and bees wax combination to prevent any water vapor from escaping out of the dish other than through the material. This creates an atmosphere of either 0% relative humidity or 100% relative humidity on the side of the material that is inside the dish. Next, to produce a water vapor pressure across the material, you put it in an oven that will maintain a constant 50% relative humidity at a temperature of 73.4 *F (23 *C).

If you are testing for the dry cup method, the desiccant will absorb the water that transfers through the material and will increase in weight. For the water method, the weight of the water will decrease as the water moves through the material and escapes out of the dish. From this, you can calculate how much water is transferred in or out of the dish over time.

To give you a sense of scale about how much water is transferred through a material over time, I asked Oak Ridge National Laboratory to calculate the water that would transferred through a material which would have a permeance of 0.1 Perms, 1.0 Perms and 10 Perms.

A perm is equal to 57.2 nanograms meter-2 second-1 Pascal-1.

Since there are 31,536,000 seconds in a year, 2985Pa of vapor pressure at saturation, 1,000,000,000 Ng per gram.

The vapor pressure for both the wet cup (100%-50%Rh) and dry cup (50%-0%RH) is 50% of the saturation vapor pressure or 1492Pa.

The weight of water vapor going through one square meter of a 0.1 perm (inch-pound) in a year would be 0.1*1492*31,536,000/1,000,000,000 or 4.71 grams (0.166 ounces).

The weight of water vapor going through one square meter of a 1.0 perm (inch-pound) in a year would be 1.0*1492*31,536,000/1,000,000,000 or 47.1 grams (1.66 ounces).

The weight of water vapor going through one square meter of a 10 perm (inch-pound) in a year would be 10*1492*31,536,000/1,000,000,000 or 471 grams (16.60 ounces).

Going back to the test method, that means for a material that is 0.1 Perm, it will take a whole year to get 0.166 ounces of water to pass through one square meter of material (slightly less than 11 square feet).

Keep in mind that no building ever would have a steady state condition with the moisture flow only in a single direction for a whole year – that is a water vapor flow from high vapor pressure on one side of the assembly to low water vapor pressure on the opposite side of the assembly. The rate of water vapor transmission will change from hour to hour, day to day and season to season. The direction of the water transmission can change and one day you may be "wetting" the building assembly and the next hour, the next day or the next month, the change can reverse and go to "drying" the building assembly.

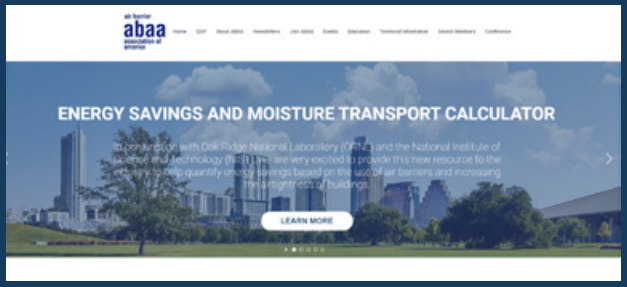
Additionally, one side of the building assembly can be "wetting" and at the same time the building assembly could be "drying" on the opposite side.

So, when you look at the water vapor transmission of a 10 Perm material and it says that over a year you could have two cups of water enter into a stud cavity, those numbers have no relation to real life. The differences of 1492 Pa of pressure difference in the same direction will never be there for 365 days and that does not take into account any drying that is happening at the same time. The actual volume of water will only be a fraction of the two cups, and in some assemblies in specific locations, you could be looking at a net of zero. However, this does not mean that vapor retarders should be completely ignored in some building assemblies.

The point of this article is simply to point out that the amount of water that enters a building assembly due to water vapor permeance is exceedingly small. Information is available to show that air leakage can result in much larger rates of moisture transfer; therefore, as you reduce air leakage the potential for moisture problems are reduced and if you have no air leakage, the moisture problems are almost eliminated.

Buildings are becoming more complicated to design and construct and the old "rules of thumb" cannot give us the information we need to understand the performance of materials after they are installed. Work is being done to produce better modeling, to better characterize materials and research is being done to better understand how various materials perform under real life conditions. We need all of this to produce the buildings we need for the future.

CHECK OUT THE ABAA WEBSITE AND FIND:



www.airbarrier.org

LIST OF AIR BARRIER MATERIALS THAT HAVE BEEN EVALUATED

TECHNICAL PUBLICATIONS

FIND MEMBER CONTRACTORS, MANUFACTURERS, CONSULTANTS, TESTING LABS, AND ARCHITECTS

LIST OF EVENTS AND TRAINING

CLICK THE LINK BELOW TO ACCESS ALL THESE FREE RESOURCES, AND MORE.

EDUCATIONAL PROGRAMS COMPLETED SO FAR THIS YEAR!

(28) LUNCH & LEARN EVENTS, REACHING 470 ARCHITECTS

(2) AIR BARRIER SYMPOSIUMS IN CONJUNCTION WITH BEC DETROIT AND BEC RESEARCH TRIANGLE IN RALEIGH NC, WITH A COMBINED AUDIENCE OF 157 PEOPLE

(2) WEBINARS REACHING 705 PARTICIPANTS

(9) SPEAKING ENGAGEMENTS AT CONFERENCES, REACHING AN AUDIENCE OF 910 PEOPLE.

ABAA had 17 one-on-one meetings with specifiers at the SpecME event promoting ABAA initiatives.

Laverne Dalgleish and Tamara Honza Foncerrada at AIA Conference and Tradeshow.

SpecME Specifier Retreat

ABAA participated in this one-on-one event to talk to leading specification writers across the U.S. that are either employed by an architectural firm or are an independent specification writer that develops specs for a number of architectural firms.

Seventeen one-on-one meetings were scheduled to talk to the specifiers and then time for networking events. This was an excellent event in regards to the value of promoting ABAA QAP, education, our members to top spec writers. A number currently specify ABAA already and a number will be including it for upcoming projects.

AIA Annual Conference and Trade Show

ABAA participated in this one-on-one event to talk ABAA once again had a booth at the AIA annual conference. The booth was managed by Laverne Dalgleish and Tamara Honza Foncerrada. The show allowed an opportunity to promote ABAA, but also connect with our manufacturer members.

ABAA INDUSTRY PRESENTATIONS IN JUNE 2019 – AUGUST

DATE	FACILITATOR	AUDIENCE	TOPIC	# ATTENDEES
6/19	R. Dalgleish	CSI Webinar	New Tools to Update Your Specs	150
6/19	L. Dalgleish	SEABEC	Technical A.B. Detailing	50
8/19	L. Dalgleish	BNP Media **>Webinar Link**	How to Properly Specify an AB	555

TRAINING & EDUCATION

UPCOMING EVENTS

AIR BARRIER EDUCATION FOR THE CONSTRUCTION INDUSTRY

ABAA SPEAKERS

OH NO! WHAT DID I MISS? HOW TO PROPERLY SPECIFY AN AIR BARRIER SYSTEM - RYAN DALGLEISH, ABAA
Construct Show - National Harbor, MD *BOOTH 331
Oct 9-11, 2019 www.constructshow.com

IMPORTANCE OF AIR BARRIER MATERIAL PROPERTIES BY MATERIAL CATEGORY - WHAT YOU NEED FOR THEM TO WORK - RYAN DALGLEISH, ABAA
IIBEC Building Envelope Symposium - Louisville, KY
Nov 11-12, 2019 www.rci-online.org/building-envelope-edu/be-symposium

TRUST, BUT VERIFY! QC FOR YOUR AIR BARRIER - RYAN DALGLEISH, ABAA
AIA Minnesota - Minneapolis, MN
Nov 14, 2019 www.aia-mn.org/events/conference/

BUILDINGS XIV - CLEARWATER BEACH, FL
Workshop 1: No Way, That's Impossible
Workshop 2: Fun in the Lab: Air and Moisture Leakage Calculator
Dec 8, 2019 (Workshops are on Sunday, 8am - 12pm)

UPCOMING INSTALLER TRAINING

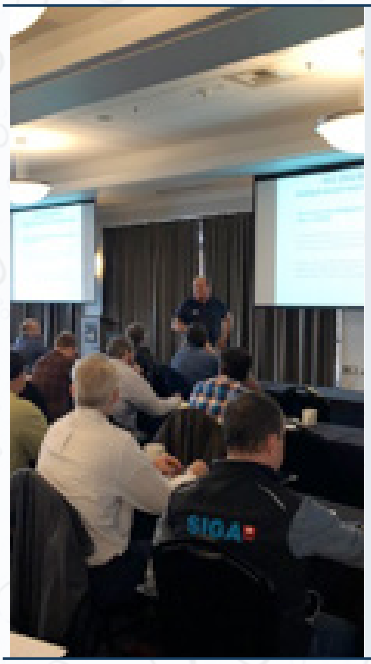
SELF-ADHERED & FLUID TRAINING
Oct 8-10 in Charlotte, NC
Oct 22-24 in Portland, OR
Nov12-14 in Chicago, IL
Nov 19-21 in Hayward, CA
Dec 3-5 in Northbrook, IL

SPRAYED POLYURETHANE FOAM INSTALLER TRAINING
Nov 5-7 in Mount Airy, NC
Feb 11-12 in Pasadena, CA

FIELD AUDITOR TRAINING
Stay tuned for more details on additional Auditor and SPF Training

For registration details, please visit the ABAA website here:
www.airbarrier.org/education/installer-courses/

SYMPOSIUM AND PRESENTATION SCHEDULE



DATE	ORGANIZATIONS	CITY/STATE
2-Oct-19	CSI Dallas	Dallas, TX
3-Oct-19	BEC Houston	Houston, TX
9-Oct-19	Construct Show	National Harbor, MD
15-Oct-19	CSI Fresno	Fresno, CA
16-Oct-19	PG&E, AIA San Francisco	San Francisco, CA
17-Oct-19	CSI Sacramento	Sacramento, CA
18 Oct-19	CSI / AIACV	Sacramento, CA
29-Oct-19	AIA/BEC Indianapolis	Indianapolis, IN
5-Nov-19	CSI Cincinnati	Cincinnati, OH
6-Nov-19	BEC Seattle	Seattle, WA
7-Nov-19	BEC Spokane	Spokane, WA
11-Nov-19	IIBEC Louisville	Louisville, KY
12-Nov-19	The Minnesota Conf. on Architecture	Minnesota, MN
19-Nov-19	BEC Philadelphia	Philadelphia, PA
3-Dec-19	CSI, BEC Charleston	Charleston, SC
4-Dec-19	CSI Charlotte	Charlotte, NC
9-Dec-19	2019 Buildings XIV International Conf.	Clearwater Beach, FL

INDUSTRY EVENTS

NZ19: The Net Zero Conference & Expo
The Los Angeles Convention Center
October 2 - 4, 2019

Join leaders in green at NZ19, the world's largest net zero building conference and expo. A hub for thought-leaders and industry-shapers in the Energy, Water, Waste, Transit, and Carbon sectors, NZ19 will bring 1,200+ green building pioneers from around the world to Southern California to inspire, educate, and evolve our built environment.

The three-day event will feature exciting keynotes from ILFI CEO Amanda Sturgeon and Architecture 2030 CEO & Founder Ed Mazria, panels and workshops from innovative leaders in sustainability, Los Angeles-area green building tours, premium networking opportunities, and an expo hall featuring 100+ exhibitors. CEUs will be available for AIA, GBCI, and LFA credential holders.

Visit www.NetZeroConference.com to learn more.

Facades+
Empowering the Facade Design Community

The goal of the Facades+ conference is to focus on the design and performance on the next generation of facades. We provide proven insights on how to make your ideas become reality.
We bring together some of the world's most productive building professionals and leading researchers to share insights on how facades ideas are brought to life.

Upcoming conference schedule:
Toronto October 11
Los Angeles November 14 & 15
For more information, check out the website:
https://facadesplus.com/

HAVE AN INDUSTRY RELATED ARTICLE YOU WOULD LIKE TO SEE FEATURED IN OUR NEWSLETTER?

Submit it to us for review and you could see your work published in the next newsletter! Also, we would love to hear your feedback on our newsletters and any content you want to see more or less of?

Email it to us at: abaa@airbarrier.org