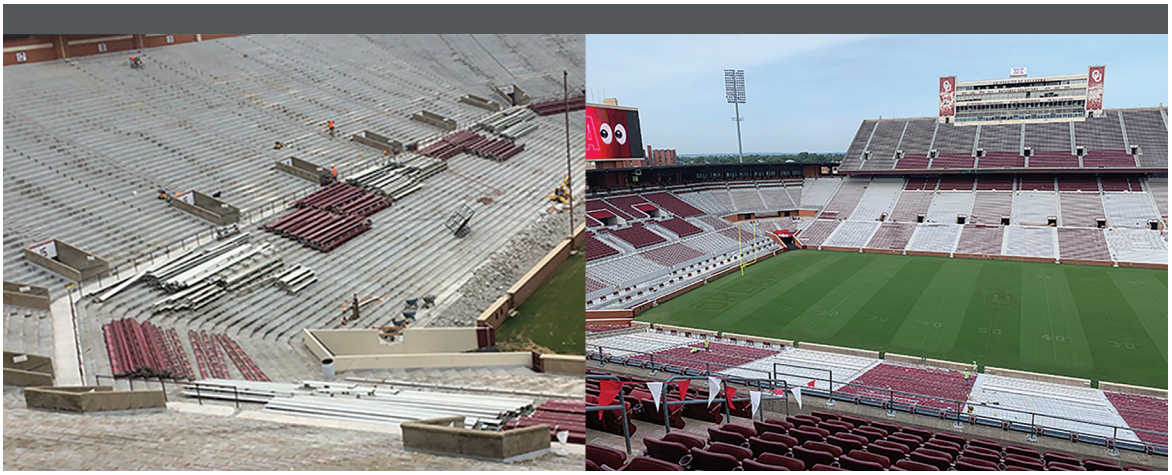
SPRING 2020

CHAMBERLIN
Roofing & Waterproofing

NEWSLETTER

Game-Changing Stadium Renovation



Gaylord Family Oklahoma Memorial Stadium in Norman, Oklahoma, before and after renovation and leak remediation.

The Gaylord Family Oklahoma Memorial Stadium is one of the most well-known football stadiums in college football. With a total seating capacity of 82,112, the stadium ranks among the 15 largest on-campus facilities nationwide. For years, the stadium struggled with moisture intrusion, especially at expansion joint locations throughout the stadium bowl. Multiple unsuccessful attempts to retrofit and repair these conditions were made evolving into an annual maintenance item for the university and creating escalating repair costs.

Chamberlin was hired to find a permanent solution for the expansion joints and ultimately stop the leaks. Additionally, their scope for the stadium renovation included structural concrete repairs, crystalline waterproofing, epoxy injection, joint sealants, extending concrete steps for widened aisles and adding intermediate steps to the east side of the stadium. Chamberlin used carbon fiber reinforcement (FRP) to repair and reinforce support beams under the stadium allowing them to withstand more force to increase the lifespan of the stadium. The existing traffic coating on the north, west and east sides of the stadium bowl was prepped to receive an overlay traffic coating system in lieu of removing the entirety of the existing coating. Bentonite waterproofing was installed at the below grade walls where new concessions were built under the north end zone.

A QUALITY TEAM

When installing liquid traffic coating, common issues caused by inconsistencies in membrane thickness are bubbling, blistering and elongation reduction which can ultimately result in material failure. Having been around the traffic coating block a time or two, Chamberlin crew members

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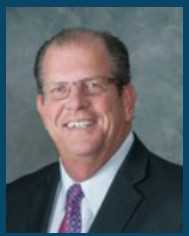
CONSULTANT'S CORNER



Roy Schauffele, FCSI, CCPR, FABAA
LEED Green Associate
ABAA Certified Air Barrier Specialist
Division 7 Solutions, Inc., Founder

Water Vapor Transmission of Materials, aka Permeance

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

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knew how to combat these potential mishaps. The coating thickness was checked with a mil gauge every 200 square feet during application to establish its consistency and confirm it met the manufacturer's specifications.

Various methods can be utilized to test the integrity of structural concrete repairs after they are completed. At the stadium, Chamberlin chose to conduct a chain drag sounding test for this purpose. This sound test indicates if an area of the concrete patching is hollow. While dragging a chain across the repaired concrete, the noise will change from a clear ringing to a somewhat mute and hollow sound when passing over deficient concrete. Chamberlin's test was successful and did not indicate any deficiencies.

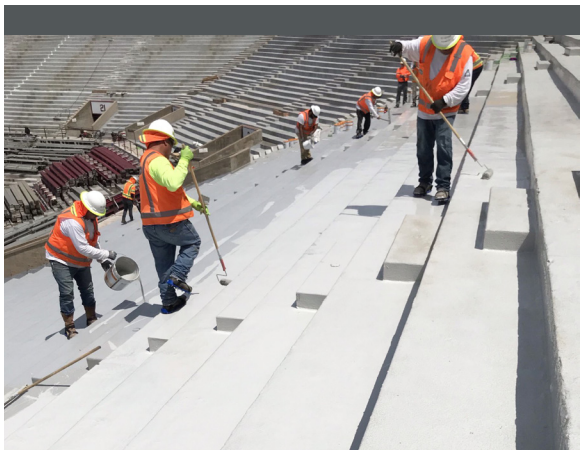
STRONG DEFENSE

This was a very fast-paced project, as everything had to be completed within six months for OU's first football game of the season. With the compressed schedule and anticipated weather delays, Chamberlin had to execute multiple scopes simultaneously and take a proactive approach to planning. An added challenge was the logistics of removing, storing, and reinstalling over 82,000 stadium seats around the traffic coating application.

Prior to job start, numerous discovery meetings were held to determine each trade's needs. Chamberlin's Project Manager Kraig Murray created a detailed schedule and phasing sequence for all trades on the project that determined who would work in what areas from day to day to maximize everyone's time, avoid conflicts or slowdowns and prevent unnecessary damage to renovation finishes.

Once summer started, Chamberlin adjusted their start time from 7:00am to 4:00am. This not only protected the crew from heat-related illness but aided in the installation of the traffic coating. Installing traffic coating in high temperatures can cause outgassing which results in material bubbling that could ultimately lead to material failure. The stadium was not shut down for the renovations, which meant Chamberlin had to work around OU activities such as the spring football game and commencement. Chamberlin combatted imminent lost time due to this as well as expected weather delays by boosting manpower

Chamberlin crew member patching concrete prior to traffic coating installation.



Traffic coating installation on OU stadium bowl.

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Installation of fluid-applied air barrier with hand roller at computer software office building in Austin, Texas. Photo courtesy of Chamberlin Roofing & Waterproofing.

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 on 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

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resulting in the project being completed on time.

OVERCOMING FUMBLES

One area in need of structural repair was the concrete blockouts that housed and supported the existing expansion joints. These blockouts required extensive repair for placement of the new joints. To begin, Chamberlin cut out the existing joints to complete the repairs. While this work was in progress, the open joints left the facility exposed to the elements. In case of rain, Chamberlin engineered a plan to quickly close the joints when needed and efficiently resume repairs when the rain passed. The solution was a sheet membrane waterproofing which was easily installed to seal the joints and swiftly cut away to allow quick access to the work afterward.

Chamberlin strengthened structural concrete beams underneath the stadium with carbon fiber reinforcement to stabilize it and prevent settling that could cause future damage to the structural integrity of the bowl. Access to this area was challenging as the beams were below the stadium bowl but above a sub-roof. Approximately 25-foot high scaffolding was needed but had to be constructed without compromising the sub-roof or the crew members' safety. Since the sub-roof could not support the scaffold, a scaffold assembly was built up to rest on a tie beam. In addition, the traditional assembly of standard frames and braces would not fit in the area, so a modular scaffolding system with interlocking poles was erected.

Before and after: Chamberlin remedied expansion joints in the OU stadium to stop water intrusion.

TOUCHDOWN-WORTHY RENOVATIONS

Chamberlin was able to find a permanent solution for the expansion joint leaks, alleviating water intrusion issues and, in turn, costly maintenance upkeep for the university. Additionally, their project team offered alternative materials for the traffic coating and expansion joints that provided the owner improved performance and durability at no increased cost. Chamberlin's proactive planning helped the scheduling and sequencing of all trades run smoothly and the project complete in just six months. The stadium was left rejuvenated and watertight by kickoff of the first football game of the season. ■

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hard about another part of your project manual where you'd allow a 20% variability in testing data.

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

ASTM E96		
	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 two (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.		

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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:

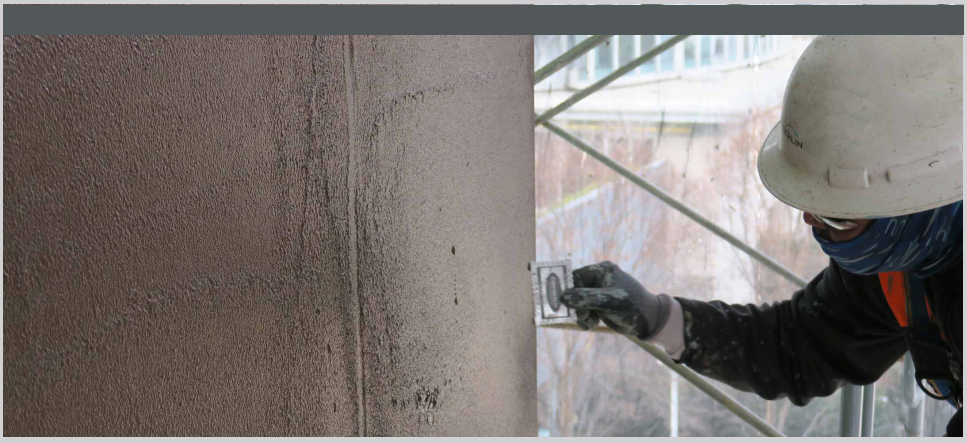
- Class I – 0.1 perm or less
- Class II – 0.1< to ≤1.0 perm
- Class III – 1.0< perm and ≤10 perm
- NOTE: there is a definition in the code to call anything with a perm of 5.0 perms or higher a Vapor Permeable membrane when tested to Procedure A.

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 64 times 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. ■

Installation of flashing on a self-adhered vapor permeable, water resistive air barrier membrane in Dallas, Texas. Photo courtesy of Chamberlin Roofing & Waterproofing.



Quality control check of spray-applied air barrier's mil thickness to adhere to manufacturer's specifications. Photo courtesy of Chamberlin Roofing & Waterproofing.

Schauffele is an internationally published author and speaker in the fields of energy conservation and sustainable building envelopes including insulation, air barrier technology, roofing & waterproofing, vegetative & cool roofing, all with an eye towards improving building science, performance and quality of life. He is the acknowledged inventor of "The Perfect Wall" which is now the nationwide building code standard for wall construction. He is President and Founder of Division 7 Solutions, Inc., now entering its 32nd year of continuous operations.

He was the first Technical Director of SPRI (Single Ply Roofing Institute) and a Construction Specifications Institute (CSI) Board Director. He has been an elected City Councilperson, a Texas Senate and Gubernatorial appointed official in the State of Texas and currently serves by mayoral and city council appointment on the City of San Antonio, Small Business Advocacy Committee.

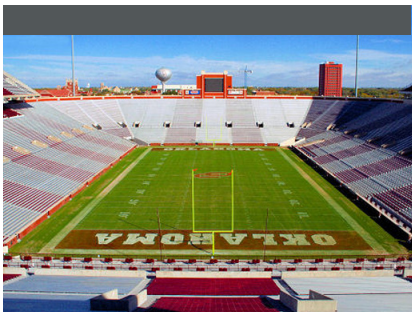
He currently serves as a Past Board Chairman of the ABAA (Air Barrier Association of America), after three terms as Chairman and the first Regional ABAA Advocate. He is a Technical Advisor to Build San Antonio Green (BSAG), an award winner in 2012 for his Technical Contributions to BSAG and was named the (2016) Individual Green Practitioner by the City of San Antonio for Sustainable Education and Outreach.

Globally, he is the only person to be a Fellow of both CSI and ABAA, and at this time he is the only Certified Air Barrier Specialist. He continues to be a requested national speaker on air barriers, roofing, insulation, energy conservation design and sustainability. Roy can be reached at 210-859-3749 or roys@division7.com.

Outstanding Safety & Quality

Associated Builders and Contractors' (ABC) Excellence in Construction Awards program honors the nation's most innovative and high quality construction projects, safety programs and diversity programs. Chamberlin Roofing & Waterproofing received a first-place Eagle award for their roof replacement on St. Andrew's Episcopal Church in Fort Worth, Texas. The company was also proud to receive a second-place Pyramid award for their renovation of the Gaylord Family Oklahoma Memorial Stadium in Norman, Oklahoma.

Chamberlin received an ABC Eagle award for their work on St. Andrew's Episcopal Church.



Chamberlin received an ABC Pyramid award for their work on GFOM stadium.

The winning projects are judged on complexity, attractiveness, unique challenges overcome, completion time, workmanship, innovation, safety and cost. This year's panel included representatives from Building Owners and Managers Association International, Smithsonian Facilities Construction Division, Construction Management Association of America, Engineering News-Record, Design-Build Institute of America and various construction-related firms nationwide.

"The craftmanship of Chamberlin and their hardworking employees continues to raise the bar when it comes to how we define excellence in construction," said 2020 ABC National Chair Tim Keating, owner and president of R.C. Stevens Construction Co., Winter Garden, Florida. "It's an honor to recognize these award winners for their respective commitments to building safely, on time and on budget, as well as contribute to the communities in which they work."

Additionally, Chamberlin's safety program was recognized with an ABC Safety Merit award. The National Safety Excellence Award winners were selected from ABC member firms that achieved Diamond, Platinum and Gold status in ABC's STEP Safety Management System. During the selection process, contractors were judged on self-evaluation scores, lost workday case rates, total recordable incident rates, leading indicator use, process and program innovations, and video interviews conducted by members of ABC's National Safety and Health Committee.

Another national safety awards program Chamberlin achieved recognition from is the Associated General Contractors' (AGC) Construction Safety Excellence Awards (CSEA). This celebration credits construction companies' commitment to safety, occupational health management and risk control. Award submissions are reviewed for evidence of a company's management commitment, active employee participation, safety training, work site hazard identification and control plus safety program innovation. Chamberlin is honored to have received a third-place AGC CSEA.

Finally, Chamberlin is the proud recipient of an Engineering News-Record (ENR) Texas & Louisiana Best Project award for their work on the Museum of Fine Arts Houston Glassell School of Art building in Houston, Texas. Judges selected the winning entries based on the following criteria: overcoming challenges and teamwork, safety, innovation and contribution to the industry and community, construction quality and craftsmanship, design function and aesthetics. The new art school doubled in size, encompassing 93,000 square feet with a sprawling plaza out front. Chamberlin sealed the building, green roof, plaza and parking garage with approximately 300,000 square feet of waterproofing materials.

Chamberlin's work on the new Houston Museum of Fine Arts' Glassell School of Art earned an ENR Regional Best Project award.

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The Certified Safety and Health Official (CSHO) program was developed to equip construction industry professionals with the responsibility for jobsite safety and supervision with a solid foundation in regulatory knowledge. This certification may only be obtained after more than 200+ hours of specific OSHA regulatory training have been completed.

Two Chamberlin Safety Coordinators, Edgardo Franco and William Silva, recently earned their CSHO certification. Director of Safety & Risk Management Justin Lambert expressed his praise for their accomplishments saying, "We continue to expand the knowledge base of our safety team at Chamberlin, and I am proud of the growth and dedication both Will and Ed have shown over the years. I look forward to their future efforts of advancing Chamberlin's safety culture." ■

Chamberlin Safety Coordinators obtain CSHO certificates after more than 200 hours of regulatory training.

PROJECTS IN PROGRESS

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Fax (405) 680-0508

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Tulsa, OK 74116
Ph. (918) 439-0055
Fax (918) 439-0067

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Endress + Hauser New Office - Pearland, TX
New Construction Roofing
Contract Amount: $1,000,000 (approx.)
Owner: Genesis Property Development, Inc.
Architect: Ziegler Cooper Architects
General Contractor: Genesis Property Development
Scope of Work: Installation of TPO roofing, flashing and sheet metal
Project Description: Gulf Coast Regional Campus

Margaritaville Guest Tower - Houston, TX
Roof Replacement
Contract Amount: $2,350,000 (approx.)
Owner: Lakeside Resort JV, LLC
Architect: Gensler
General Contractor: McCarthy Building Companies
Scope of Work: Removal of BUR roofing and clay tile and installation of wood blocking, base wall and curb flashings, TPO roofing, PVC membrane roofing, roof coating, flashing and sheet metal
Project Description: Resort hotel

Hurst Junior High School - Hurst, TX
Remedial Waterproofing
Contract Amount: $2,000,000 (approx.)
Owner: HEB ISD
Architect: Armco Industries
General Contractor: Chamberlin Roofing & Waterproofing
Scope of Work: Installation of water repellents, joint sealants, site and paving sealants
Project Description: Public high school

Oklahoma State Capitol - Visitors Center - Oklahoma City, OK
Remedial Waterproofing
Contract Amount: $200,000 (approx.)
Owner: The State of Oklahoma
Architect: FSB Architecture
General Contractor: Manhattan Construction
Scope of Work: Installation of fluid-applied waterproofing, bentonite waterproofing, water repellents, air barrier, joint sealants and expansion control
Project Description: Welcome center

Hilton Canopy Hotel - San Antonio, TX
New Construction Waterproofing
Contract Amount: $750,000 (approx.)
Owner: Hilton
Architect: Gensler
General Contractor: Sundt Construction
Scope of Work: Installation of hot fluid-applied waterproofing, bentonite waterproofing, traffic coating, air barrier, joint sealants, flashing and sheet metal
Project Description: Riverwalk hotel

AMLI Fountain Place - Dallas, TX
New Construction Roofing
Contract Amount: $750,000 (approx.)
Owner: Goddard Investment Group
General Contractor: Archer Western Construction
Scope of Work: Installation of hot fluid rubberized asphalt waterproofing, sheet waterproofing, cementitious and reactive waterproofing, traffic coating, air barrier, flashing and sheet metal
Project Description: Luxury high-rise

Tafolla Middle School - San Antonio, TX
Roof Replacement
Contract Amount: $900,000 (approx.)
Owner: San Antonio ISD
Architect: Alamo Architect
General Contractor: Gilbane Building Co.
Scope of Work: Removal of PVC and modified bitumen roofing and installation of hot modified roofing, wood blocking, PVC roofing and counterflashing
Project Description: Public middle school

City of Austin Planning and Development - Austin, TX
New Construction Waterproofing
Contract Amount: $1,000,000 (approx.)
Owner: City of Austin
Architect: Gensler
General Contractor: Ryan Companies, Inc.
Scope of Work: Installation of fluid-applied waterproofing, sheet waterproofing, traffic coating, thermal insulation, air barrier, flashing and sheet metal, below grade waterproofing, hot fluid-applied waterproofing, joint sealants, fire caulking, window sealants, expansion joints and site sealants
Project Description: Business campus

New South Parking - Houston, TX
Remedial Waterproofing
Contract Amount: $350,000 (approx.)
Owner: New South Parking - Texas
General Contractor: Chamberlin Roofing & Waterproofing
Scope of Work: Removed and reinstalled expansion joints and repaired mortar
Project Description: Airport parking garage

Oracle Waterfront Phase 2 - Austin, TX
New Construction Waterproofing
Contract Amount: $1,600,000 (approx.)
Owner: Oracle Corporation
Architect: STG Design
General Contractor: Austin Commercial
Scope of Work: Installation of hot fluid-applied waterproofing, sheet waterproofing, pre-applied sheet waterproofing, water repellents, thermal insulation, air barrier, flashing and sheet metal
Project Description: Business campus

For a complete list of specialty contracting services, visit www.chamberlinltd.com.

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- Water repellents/metal flashing

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