SEALANT·WATERPROOFING & RESTORATION INSTITUTE

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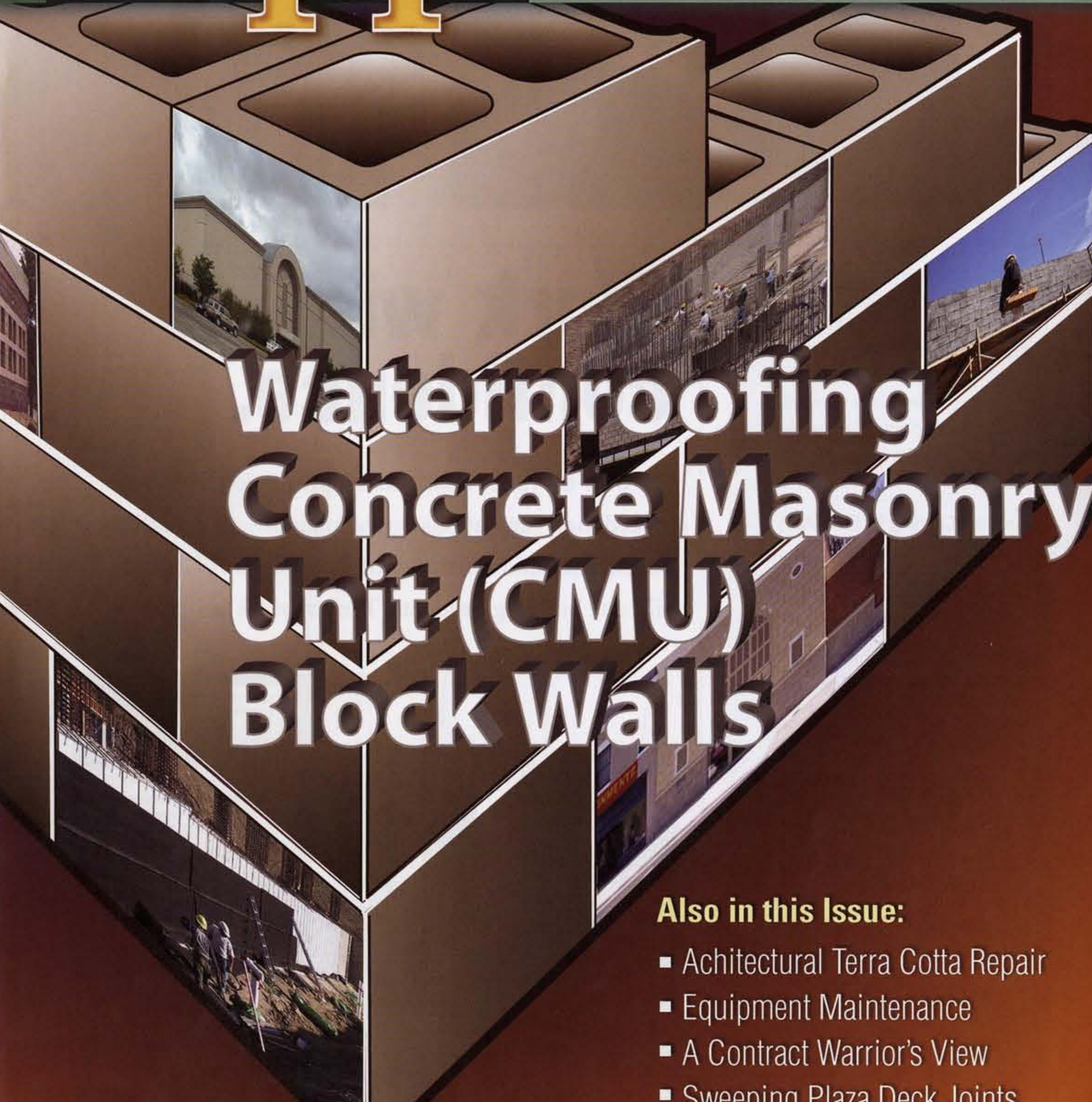

Waterproofing Concrete Masonry Unit (CMU) Block Walls

Also in this Issue:

- Achitectural Terra Cotta Repair
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- Sweeping Plaza Deck Joints Under the Rug

PHOTO #1: Before
This image shows leaking joints on a plaza deck, prior to treatment with joint sealing technology.

Sweeping Plaza Deck Joints Under the Rug

By Lester Hensley

PHOTO #2: Static Membrane Components
This photo shows system components--retainer legs installed onto structural slab, side flashing sheets and movement gland-before installation of stainless steel retaining caps and before integration into the deck waterproofing membrane.

The hidden pitfalls of "buried band-aid" joint sealing solutions.

Plaza deck, or waterproofed split-slab, joint sealing is serious business. Usually over occupied space, plaza decks are actually heavy-duty roofs. Until the emergence of a watertight, purpose-designed system about 20 years ago, designers were left with the ineffective option of a buried looped membrane, a "band-aid" approach to addressing these critical joints.

Buried-membrane options offered today are nothing more than a throwback to band-aid solutions for plaza and roof deck joint sealing. These out-dated solutions in no way respect an owner's desire for durability, nor do they honor the reputation of designers who research, engineer, detail and specify solutions in the long-term interest of building owners.

Purpose-designed, watertight, plaza, roof deck, and roadway joint systems do exist, and they are specifically engineered to address the shortcomings of buried, sheet-membrane joint treatments. Specification of these systems results in attention to detail and quality assurance appropriate to the objective of achieving a watertight structure.

It is lack of attention on many projects that causes joints to prematurely leak, resulting in exorbitant costs of inspection, investigation, repair and replacement of buried systems. These direct costs are compounded by the costs of disruption of operations or lost lease revenue in the affected facility.

The list of criteria on which band-aids (buried-membrane products) do not match the specification for plaza deck sealing is lengthy. Fundamentally, however, the buried membrane approach does not meet split-slab design philosophy in the following ways:

1) Principle of Operation
2) Composition
3) Track Record

1) DESIGN PHILOSOPHY AND PRINCIPLE OF OPERATION: Buried Membrane Approach vs. Static Membrane Integration with Movement Gland

Plaza and roof deck waterproofing involves a waterproofing membrane applied to a structural deck. These components are covered with some sort of topping that is porous by design, allowing water to reach the membrane on the structural slab where it is managed to drains. When plaza or roof decks require expansion joints, the joints must be waterproofed using a method and material that accommodates movement while reducing or eliminating the stresses that will cause a buried membrane to fail.

Static Membrane Integration with Movement Gland Design Philosophy

The static membrane integration with movement gland design philosophy recognizes the need for the joint system to have a static integration with the deck waterproofing membrane. In addition, the specified design recognizes the need to have a purpose-designed, heavy-duty gland to

PHOTO #3: During
This photo documents the project in process. The joints are being completely integrated into the deck waterproofing membrane with joint-sealing technology, a watertight, plaza, roof deck, and roadway joint system specifically engineered to address the shortcomings of buried, sheet-membrane joint treatments that pre-date it by decades.

PHOTO #4: After
This photo shows the finished product. The finished planters and roadway surface sit safely over a watertight plaza deck.

accommodate movement at the joint that is integrated with the deck-waterproofing tie-in that is accessible for repair, if necessary, without disruption of the topping system.

Buried Membrane Design Philosophy

The design philosophy that characterizes the buried membrane approach involves placing a strip of reinforced membrane over joints and adhering it to the deck or to the waterproofing deck membrane. The problem with this approach is that the accumulation of water combined with freeze/thaw cycles, as well as flex fatigue from movement, compounded by abrasion between topping and buried components, often results in the inevitable rupture of the buried "band-aid," usually at its interface with the abrupt concrete joint edge.

These conditions, when combined with joinery required to handle changes in plane and direction, exacerbate the tendency to failure. Remediation of failures of these buried systems involves nothing short of the removal of the entire surrounding topping system and all adjacent landscaping to expose the membrane. Because the location of roof and plaza decks is over-occupied, often sensitive, interior space, the disruption to tenant operations that is common in this type of remediation work usually renders the space below unusable for the duration of the repair or replacement.

2) COMPOSITION

Static Membrane Integration with Movement Gland Composition

Static membrane integration with movement gland systems have a combination of corrosion-free, aluminum and stainless-steel mounting rail components that are mechanically secured to the structural slab to provide a positive anchoring of the waterproofing components. The metal mounting components ensure that tension, compression, torsion and other forces that result from joint movement are isolated from the critical connection of the deck waterproofing membrane to the side flashing sheets of the joint system.
The waterproofing components of static membrane integration with movement gland systems are state-of-the-art thermoplastic, rubber materials. These materials can be heat-welded in the factory to produce transitions for addressing changes in plane and direction. In addition, these materials can be welded in the field using simple hot-iron tools for attaching transitions to straight runs and to address field conditions as they arise.

Buried Membrane Composition

In contrast, the buried membrane is usually a simple piece of EPDM, thermoset rubber. It contains none of the evolved mounting components of the static membrane integration with movement gland system and does not provide positive mechanical anchoring. There is no barrier between the sheet and the deck membrane for separation, from the point of adhesion, of tensile stresses caused by joint movement.
The use of wood blocking to build up the system where elevation is necessary is inappropriate in several respects. Wood blocking, which eventually decays even when treated, cannot be considered a lasting construction method for this purpose. It is a validation of the need for a system that stands proud of the deck in certain application areas. In fact, the static membrane integration with movement gland mounting rail legs form an integral part of multi-layer deck composition, ensuring that water is kept away from structural joint-gaps. Given this, wood blocking is a far cry from having non-corrosive metal supports specifically designed for this purpose.

In contrast to thermoplastic rubber, thermoset rubber is an earlier generation of material that has been nearly totally replaced in most industrial sectors, including automotive and construction, by better-performing thermoplastic alternatives. EPDM's limitations in respect to flex-fatigue resistance, abrasion resistance and chemical resistance have been understood for years. The use of EPDM lying flat on a roof as roofing material requires vastly different physical characteristics when offered for use in a dynamic structural expansion joint application.

The addition, by some manufacturers, of a fleece to the EPDM in is further recognition of the EPDM's fundamental shortcoming in respect to long-term bondability to other materials. This degradation of bond is caused by the migration of plasticizer oils to the surface of EPDM. While the fleece may provide a surface to which the membrane waterproofing can bite, it also has the effect of restricting elongation thereby increasing tensile stress at the bond line.
The need to have factory representatives execute all field splices using specialized equipment is a warning flag. It is the fundamental nature of thermoset rubber that it cannot be reliably joined except through vulcanization. Vulcanization is a process used to achieve a finished state of certain rubber compounds that requires specialized equipment normally confined to manufacturing facilities.

The term, "thermoset" refers to the final application of heat to a rubber compound to achieve its final, finished, unalterable, solid state. It is precisely this characteristic that led to the evolution in rubber technology of thermoplastic materials. Unlike thermoset rubber, thermoplastic materials can be, through the application of heat, softened, joined, and added to, enabling the achievement of desired shapes and joins. The resulting joins are as strong as the original material particularly when reinforced as part of the welding process.

The assertion by some that buried membranes facilitate deck drainage across a joint should be considered in light of the following: Incorporating a structural expansion joint into a drainage plane, while sometimes unavoidable, is generally considered a waterproofing-design compromise. This condition can usually be addressed through attention to drain location.

While it is true that static membrane integration with movement gland systems, by design, typically stand proud of the structural slab, only in extremely rare retrofit occasions might this pose an obstruction to drainage. This instance is where a joint has been located mid-span in a ramp where due to other constraints no option existed at the top of the ramp. Details are available for addressing this condition.

3) TRACK RECORD

Static membrane integration with movement gland systems have an unrivaled 20-year track record of waterproofing plaza and split-slab deck, stadium concourse, garden roof, and roadway expansion joints. Specialty waterproofing contractors, under guidance of qualified field technicians, have installed thousands of feet of the systems for satisfied owners. These installations have been integrated primarily with hot-rubberized asphalt waterproofing membranes. The reputation for properly engineering these systems to be watertight and the workmanship of trained contractors are the cornerstones of these systems' success.

Band-aid joint treatments were historically the only choice available to designers and therefore were widely specified in years past. The existence of a place in the market for a purpose-designed plaza-deck joint system is the direct consequence of owners' having to spend a fortune replacing failed buried and looped membrane materials.

Conclusion

For many years static membrane integration with movement gland systems have set the bar for plaza and roof deck joint sealing. Owners, designers, estimators, project managers and installers nationwide have demonstrated the philosophical, technical, and craftsmanship commitment to installing this superior system thereby addressing deficiencies that typically make expansion joint leakage one of the major headaches an owner lives with during the life of a structure.

John Ruskin, a nineteenth-century commentator on architecture among other things warned:

"It is unwise to pay too much, but it's worse to pay too little. When you pay too much you lose a little money—that is all. When you pay too little you sometimes lose everything, because the thing you bought was incapable of doing the things it was bought to do. The common law of business balance prohibits paying a little and getting a lot. It can't be done. If you deal with the lowest bidder, it is well to add something for the risk you run, and if you do that, you will have enough to pay for something better."

Lester Hensley is president and CEO of the Emseal group of companies. Having first joined the company in 1990, Hensley is credited with using Emseal's base product offering as a springboard for market-driven product innovation.

SWR Institute
Validated Products

Sealant Validation Program

Degussa Building Systems

Sonolastic NP-1 Sealant
Validation Date: 5/14/01-5/13/06

Sonolastic Ultra Sealant
Validation Date: 5/14/01-5/13/06

Dow Corning Corporation

995 Silicone Building Sealant
Validation Date: 6/30/04 – 6/30/09

Contractors Weatherproofing Sealant
Validation Date: 6/30/04 – 6/30/09

756 SMS Building Sealant
Validation Date: 3/25/04-3/25/09

790 Silicone Building Sealant
Validation Date: 2/7/01-2/7/07

795 Silicone Building Sealant
Validation Date: 8/21/02-8/21/07

791 Weatherproofing Sealant
Validation Date: 9/03/04-9/03/09

Contractor's Construction Sealant
Validation Date: 8/19/04-8/19/09

GE Advanced Materials, Silicones

SILPRUF LM SCS2700
Validation Date: 01/27/05-01/27/10

SILPRUF NB SCS9000
Validation Date: 2/25/03-2/25/08

SILPRUF SCS2000
Validation Date: 2/25/03-2/25/08

Geocel Engineered Polymers

200 Sealant
Validation Date: 6/30/04 – 6/30/09

1000 Two-Part Polyurethane Sealant
Validation Date: 3/31/04-3/31/09

SL 1500 Self Leveling Polyurethane Sealant
Validation Date: 3/31/04-3/31/09

400 Construction Tripolymer Sealant
Validation Date: 9/15/04-9/15/09

500 Polyurethane Sealant
Validation Date: 9/15/04-9/15/09

May National Associates, Inc.

Bondaflex PUR 25
Validation Date: 12/19/05 – 12/18/10

Bondaflex Sil 290
Validation Date: 12/19/05 – 12/18/10

Bondaflex Sil 295
Validation Date: 12/19/05 – 12/18/10

Pecora Corporation

864 Silicone Sealant Architectural Sealant
Validation Date: 12/8/03-12/8/08

Dynatrol II Polyurethane Sealant
Validation Date: 12/12/03-12/12/08

Dynatrol I-XL Polyurethane Rubber Sealant
Validation Date: 12/12/03-12/12/08

PRO-SIL 1 – One-Part Hybrid Sealant
Validation Date: 12/8/03-12/8/08

Sika Corporation

Sikaflex 1A Construction Sealant
Validation Date: 1/10/02-1/10/07

Sikaflex 15LM
Validation Date: 11/9/2005 – 11/8/10

Tremco Incorporated

Spectrem 1 Silicone Construction Sealant
Validation Date: 1/27/05 – 1/27/10

Wall Coating Validation Program

Edison Coatings

ELASTOWALL 351
Validation Date: 10/16/03-10/16/08

STO Corp.

222 Sto Silco Lastic
Validation Date: 3/07/04-3/07/09

212 Stolastic
Validation Date: 3/07/04-3/07/09

Dow Corning Corporation AllGuard Silicone Elastomeric Coating
Validation Date: 5/21/04-5/21/09

Geocel Engineered Polymers

Geolastic GPX Architectural Wall Coating
Validation Date: 9/18/04-9/18/09

For more information on test data and about the SWR Institute Sealant, Pre-cured and Wall Coating Validation Programs, contact SWR Institute headquarters at 816.472.7974 or online at www.swrionline.org.