

Split-Slab Parking and Plaza Deck Joints

Hidden Pitfalls of "Buried Band-Aid" Joint Sealing

Deck expansion joint sealing is critical to parking structure performance and longevity. Even more critical than watertightness of joints is parking deck design that incorporates a structural slab waterproofing membrane under a wear-course or topping slab.

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 "band-aid" approach to addressing these critical joints.

For years, attempts have been made to seal expansion joints in asphalt-topped parking decks, without tying the joint into the waterproofing on the structural slab. Overtime, failure usually occurs at the transition between the joint and membrane.

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

Purpose-designed, watertight, parking, plaza, garden-roof and roadway joint systems do exist. Specifically engineered to address the shortcomings of buried, sheet-membrane joint treatments that pre-date it by decades, these systems are all descendant of a product called MIGUTAN by EMSEAL.

Specification of the MIGUTAN system results in attention to detail and

quality assurance appropriate to the objective of achieving watertightness in this critical application. It is precisely this lack of attention on many projects that causes joints to leak prematurely and result 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 buried membrane approach does not meet split-slab design philosophy in the following ways:

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

Buried Band-Aid Approach vs. Static Membrane Integration (Continued on page 48)

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SPLIT-SLAB PARKING AND PLAZA DECK JOINTS... (Continued from page 47)



with Positively-Anchored, Purpose-Designed, Repair-Accessible, Movement Gland:

1) Principle of Operation

Split-slab parking or plaza deck waterproofing involves a waterproofing membrane applied to a structural deck. The membrane and its related components are covered with some sort of topping or wear-course like asphalt, lightweight concrete or pavers. The topping is porous by design and allows water to reach the membrane on the structural slab where it is managed to drains. When expansion joints are necessary through parking decks they 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.

Design Philosophy

The MIGUTAN 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 accommodate movement at the joint that is integrated with the deck-waterproofing tie-in but that is accessible

for repair, if necessary, without disruption of the topping system.

Buried Membrane Design Philosophy

The design philosophy that characterizes the "buried, band-aid" approach involves placing a strip of reinforced membrane over joints and adhering it to the parking 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, 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 parking decks is over occupied, often sensitive interior space, the disruption to tenant operations of this type of remediation work usually renders the space below unusable for the duration of the repair or replacement.

2) COMPOSITION

The MIGUTAN system is 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, torsional, 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 are all 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 Band-Aid" Composition

In total contrast, the "buried, band-aid" is usually a simple piece of EPDM, thermoset rubber. (Continued on page 50)







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It contains none of the evolved mounting components of the MIGUTAN system and does not provide for positive mechanical anchoring of the system. 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 practice of designing wood blocking to elevate the joint system in plaza and roof decks, or similarly the use of concrete curbs in parking decks is validation of the need for a system that stands proud of the structural slab. Wood blocking, however, eventually decays even if pressure or chemically treated and concrete curbs crack perpendicular to the expansion joint allowing water to pass.

In achievement of the design intent of these methods, the MIGUTAN mounting rail legs form an integral part of multi-layer deck composition ensuring that the joint is elevated, integrated into the waterproofing membrane, and that water is kept away from structural joint-gaps.

In contrast to thermoplastic rubber, thermoset rubber typical of the buried system approach is an earlier generation of material that has been widely 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, such as those in parking facilities.

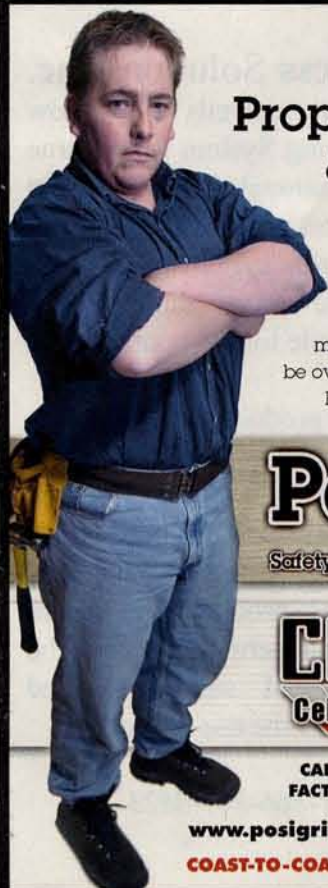
The addition, by some manufacturers, of a fleece to the

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 normally confined to manufacturing facilities to achieve a finished state of certain rubber compounds using specialized equipment.

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, to achieve desired shapes and joints. The resulting joints 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 the 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.



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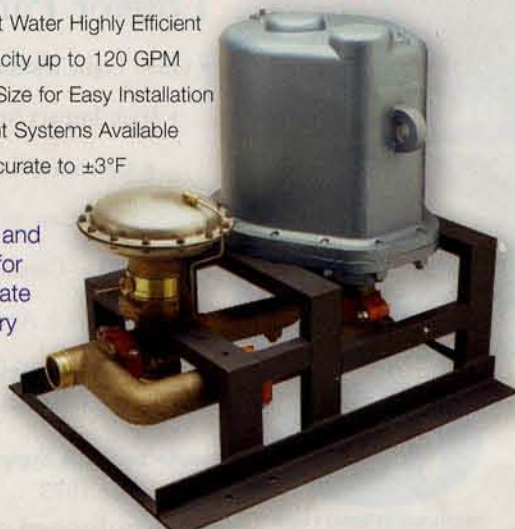
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While it is true that the MIGUTAN, by design, typically stands proud of the structural slab, only in extremely rare retrofit occasions might this pose an obstruction to drainage. This instance is where a joint has been located mid-span in a ramp where due to other constraints no option existed to locate it at the preferable location at the top of the ramp.

3) TRACK RECORD

EMSEAL's MIGUTAN has an unrivaled track record in over 20 years of waterproofing plaza and split-slab deck, parking decks, stadium concourse, garden roof and roadway expansion joints. Specialty waterproofing contractors, under guidance of qualified field technicians have installed thousands of feet of the system for satisfied owners.

These installations have been integrated primarily with hot-rubberized asphalt waterproofing membranes and are fully warranted. The reputation for properly engineering these systems for watertightness, combined with the workmanship of trained contractors, and backed by manufacturer and installer commitment to addressing problems should they arise, are the cornerstones of the product's success.

Using a joint-system designed to integrate into the waterproofing membrane on the structural slab, long-term watertightness is assured. An example of this type of system can be seen at the City of Toronto's CarPark 11. Benefits include the elimination of concrete curbs that are subject to cracking, and the ability to repair or replace sections of the thermoplastic sealing gland, if needed. Suitable for new and retrofit applications, integrated joint systems provide a long-term sealing option for parking facility owners.

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 parking-deck joint system is the direct consequence of owners' having to spend a fortune replacing failed "buried band-aid" and looped membrane materials.

For many years MIGUTAN has set the bar for parking, plaza, roof deck and roadway 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 their structure.

To avoid specifying "buried band-aid" materials based on the very technology that MIGUTAN was engineered to replace seems common sense and should prevent deficiencies in philosophy, principle of operation, composition and track record from being "swept under the rug."

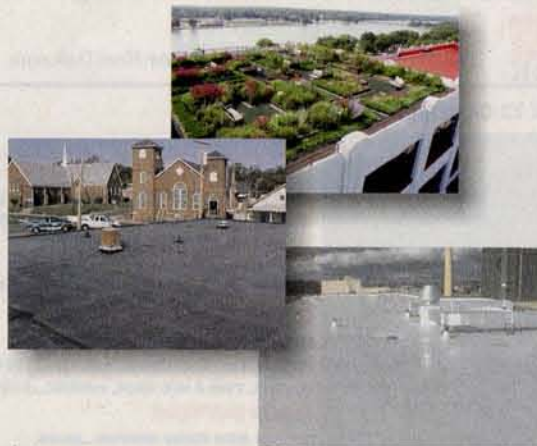
John Ruskin, a nineteenth-century commentator on architecture among other things warned:

"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." □

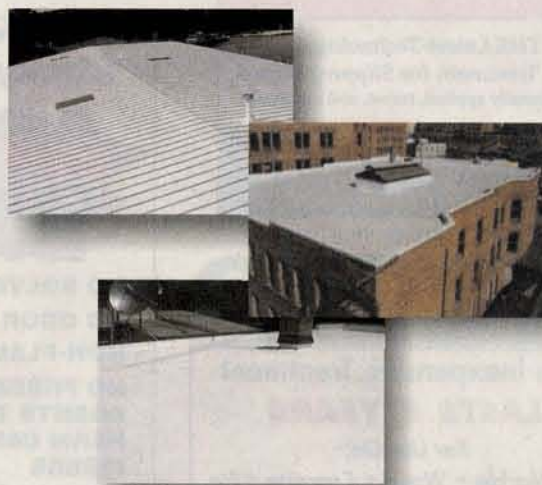


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