

How It Works ETT

A Technical Overview of Enzymatic TechCrete Technology

Internal waterproofing protection for concrete structures, activated by water, working below the surface.





The Science Behind ETT

ETT, Enzymatic TechCrete Technology, is Alchemco's proprietary internal waterproofing chemistry for concrete. Unlike surface-applied systems that depend primarily on external protection, ETT-based products are designed to penetrate below the surface, react within the concrete matrix, and help reduce permeability from the inside.

Once applied and activated with water, ETT supports the formation of an internal gel within cracks, pores, capillaries, and voids. This internal gel-forming reaction helps reduce liquid water migration while preserving the concrete's surface appearance, trafficability, and compatibility with appropriate finish systems.

The result is a long-term waterproofing approach that supports durability, reduces water-related deterioration, and helps protect reinforced concrete structures throughout their service life.

Technical Recognition and Documentation



ETT-based Alchemco products have been recognized multiple times as "Most Innovative Product" at the World of Concrete Convention in Las Vegas, in the Materials for Concrete Construction category.

Beyond industry recognition, Alchemco products are supported by testing programs, certifications, application documentation, and project experience across demanding concrete environments.

How a "Paper Cut" Inspired a Different Approach to Concrete Waterproofing



The original concept behind ETT was inspired by a simple observation: when the body experiences a small cut, it responds internally. Protection is not applied only to the surface; it is triggered from within.

The challenge was to bring that logic to concrete. What if concrete could be protected not only against existing cracks, pores, and capillaries, but also against future cracking that naturally occurs as structures age, move, shrink, and respond to environmental exposure?

The formula was originally envisioned by Bill Smith in the 1970s and later refined and stabilized by biochemist Curt Nelson into the ETT chemistry used today.



For more than four decades, ETT-based waterproofing systems have been used to help protect concrete structures around the world, including bridges, tunnels, dams, parking structures, stadiums, water treatment plants, ports, marinas, and other demanding infrastructure.



The Internal Waterproofing Reaction



ETT is designed to work below the surface of concrete. After application, the selected ETT-based product penetrates into the concrete matrix. When water is applied, the internal reaction begins.

This reaction helps form an internal gel within available cracks, pores, capillaries, and voids. As the gel develops, it helps reduce the pathways that allow liquid water, chlorides, and other contaminants to move through the concrete.

Because the reaction occurs inside the concrete, ETT does not create a film on the surface. The concrete remains visually and functionally similar after treatment, while the waterproofing protection works internally.

The Application Process

1 - Surface Preparation

Prepare the surface using the appropriate ACRtec product for the condition of the concrete.

2 - ETT Based Product Application

Spray the selected ETT-based product across the entire surface and allow it to absorb into the concrete.

3 - Water Activation

One to three hours later, spray water across the entire surface to activate the enzymes and initiate the internal waterproofing reaction.

4 - Detail Treatment

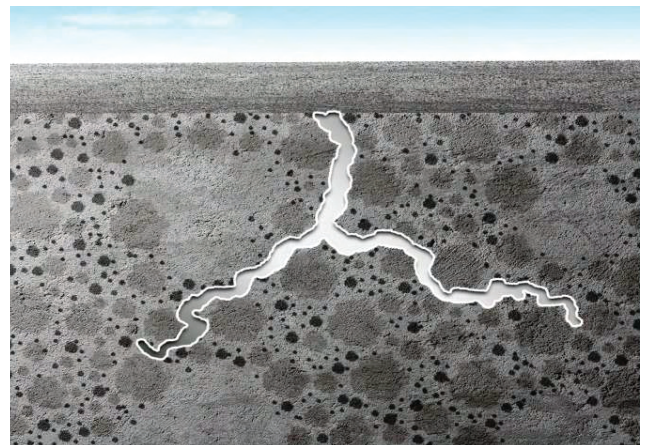
Treat angle changes, drains, penetrations, joints, transitions, and other critical areas as required by the project conditions and Alchemco's Application Guide.

Paint, coatings, paving asphalt, and other compatible finishing systems can be applied to the surface of the concrete following the completion of the waterproofing system, if desired.

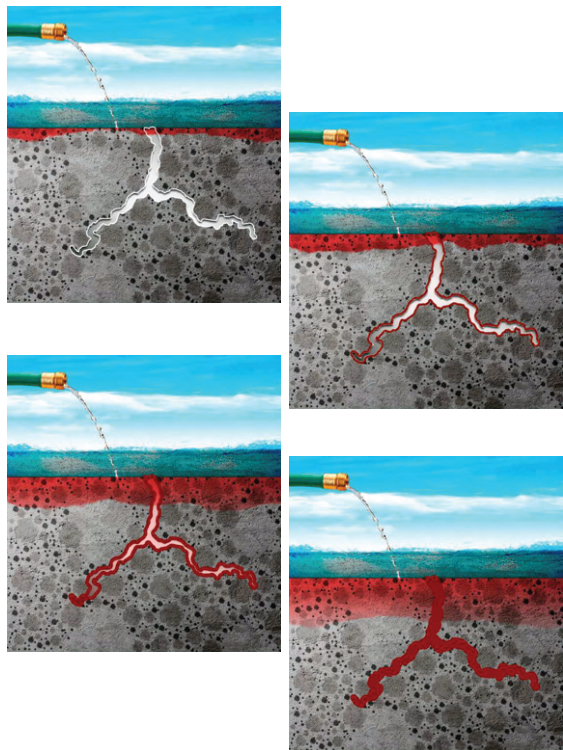
Required Elements for the Reaction

The ETT waterproofing reaction requires:

- **An ETT-based waterproofing product**
- **Water activation**
- **A suitable hydrated concrete matrix**



ETT Inside the Concrete Matrix



ETT penetrates below the surface during the initial application and remains integrated within the concrete matrix over time. When moisture enters the concrete in the future, the waterproofing chemistry can reactivate, helping reduce water migration through new or existing pathways.

In suitable concrete conditions, ETT-based products can penetrate up to approximately 20 mm, depending on concrete density, porosity, surface condition, and project conditions.

Stable cracks up to 2.0 mm in width can be addressed during the waterproofing application when using TechCrete 2500. Future stable cracks up to 1.5 mm in width can be supported over the remaining service life of the structure. Crack response capabilities may vary among ETT-based products. Cracks outside these conditions, as well as structural or moving cracks, must be properly treated using Alchemco ACRtec Products, as outlined in Alchemco's Application Guide.

ETT is not a structural repair system. It is an internal waterproofing chemistry designed to reduce permeability and help protect concrete from water-related deterioration.

Surface Compatibility

Because ETT works below the surface, it does not significantly change the appearance, slip characteristics, adhesion characteristics, or usability of the concrete surface.

After the waterproofing process is complete, compatible paints, traffic markings, asphalt overlays, or other approved finish systems can be applied when required by the project.

Self-Regenerative Behavior

ETT remains integrated within the concrete matrix after application. When future moisture exposure occurs, the internal reaction can be reactivated, helping support long-term protection against water migration and moisture-related deterioration.

This self-regenerative behavior is one of the key differences between ETT and systems that depend primarily on external surface protection.



How ETT Performance is Evaluated



ETT is activated by water and requires absorption into the concrete to begin the internal waterproofing reaction. For this reason, basic immersion or short-term absorption tests may not fully represent how the system performs after the internal reaction has developed.

A treated sample may initially absorb water during activation. This does not mean the system has failed. It means the material is entering the concrete matrix and the reaction is beginning.

Once the internal gel has developed, the performance should be evaluated by how effectively the treated concrete reduces water migration, permeability, chloride ingress, and crack-related leakage over time.

For this reason, ETT is better evaluated through performance-based testing such as:

- **Permeability testing**
- **Water migration testing**
- **Chloride ingress testing**
- **Crack response testing**
- **Freeze-thaw exposure**
- **Field performance under real service conditions**





Performance Areas Supported by Testing

ETT-based waterproofing systems are evaluated through performance testing that focuses on how concrete behaves after treatment: water movement, chloride ingress, surface hardness, crack response, and durability under environmental exposure.

The following performance areas provide technical context for how ETT-based waterproofing systems are evaluated and understood in practice.

Penetration Depth

Historical performance data indicates penetration up to approximately 20 mm in 25 MPa concrete, depending on concrete porosity, density, surface condition, and application conditions.

Why it matters:

The deeper the internal reaction develops, the more effectively the system can help reduce water migration below the concrete surface, where deterioration mechanisms often begin.

Chloride Ingress

Historical testing referenced in Alchemco/Radcrete technical materials reports significant reduction in chloride ingress at the 20 mm level.

Why it matters:

Chloride ingress is one of the primary contributors to reinforcement corrosion in parking structures, bridges, marine environments, and other exposed concrete structures.

Surface Hardness

Historical testing reports an increase in treated concrete hardness from approximately 6 to 8 on the Mohs scale.

Why it matters:

Improved hardness supports better resistance to wear, pitting, rutting, and surface degradation in high-traffic environments.

Slip Resistance

ETT-based treatment is designed to work below the surface and should not reduce the slip resistance of the concrete.

Why it matters:

This makes ETT-based products appropriate for trafficable concrete surfaces where maintaining surface functionality is critical.

Permeability and Water Migration

ETT-based systems are designed to reduce water movement through cracks, pores, capillaries, and voids by forming an internal gel within the concrete matrix.

Why it matters:

Reduced water migration helps protect against moisture intrusion, freeze-thaw deterioration, chloride transport, corrosion risk, efflorescence, and other water-related deterioration mechanisms.

Freeze-Thaw Exposure

By reducing liquid water migration into the concrete matrix, ETT-based waterproofing systems help reduce the conditions that contribute to freeze-thaw damage.

Why it matters:

When liquid water enters concrete and freezes, expansion can damage the concrete from within. Reducing water migration helps protect the concrete under aggressive freeze-thaw exposure.

Efflorescence

ETT helps reduce the movement of water that can transport soluble salts to the surface.

Why it matters:

Efflorescence is not only an aesthetic issue; it is also evidence of water movement through the concrete. Reducing water migration helps reduce the conditions that allow efflorescence to occur.

Carbonation

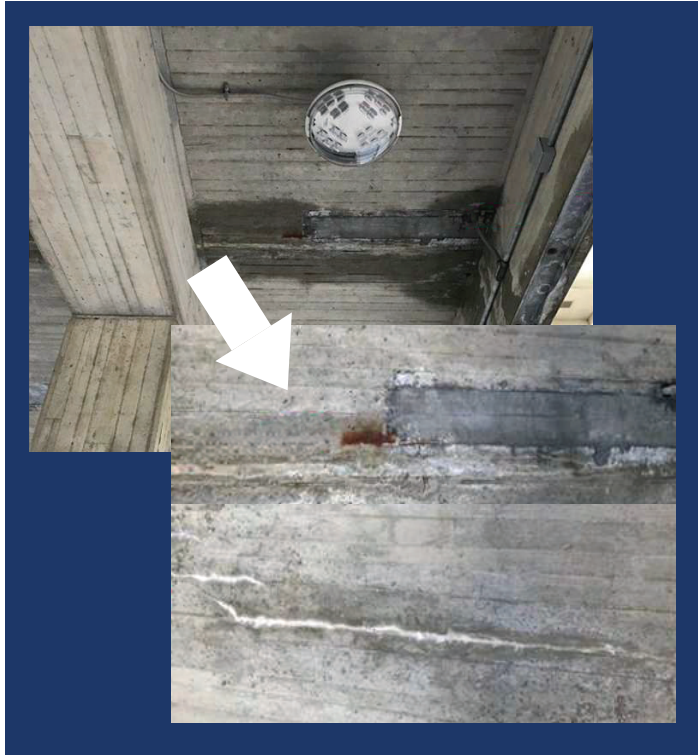
ETT helps reduce moisture and contaminant pathways within the concrete matrix, supporting protection against mechanisms associated with carbonation and reinforcement corrosion.

Why it matters:

Carbonation can reduce the alkalinity of concrete around reinforcing steel, increasing corrosion risk over time. Reducing pathways for moisture and contaminants supports long-term durability.

The waterproofing reaction remains reactive within the concrete matrix throughout the service life of the structure.

How ETT Responds Over Time



Another important aspect of ETT is its ability to remain reactive within the concrete matrix over time.

Because the waterproofing reaction occurs below the surface, the system helps reduce water migration through cracks, pores, capillaries, and voids while continuing to support long-term durability and protection.

Unlike rigid surface-applied systems, ETT works within the concrete itself. This allows the structure to maintain normal thermal and shrinkage-related movement without depending exclusively on an external waterproofing layer.

As moisture enters the concrete over time, the proprietary waterproofing reaction can reactivate within the structure, helping reduce water migration and support continued long-term protection against future moisture intrusion.

Limitations and Proper Use



ETT is designed for waterproofing and durability protection. It is not intended to correct structural defects, active movement, severe cracking, or improperly prepared substrates.

Structural cracks, moving cracks, wide cracks, joints, penetrations, drains, angle changes, and other critical details must be addressed using the appropriate Alchemco ACRtec Products and procedures, as outlined in Alchemco's Application Guide.

Proper surface preparation, correct product selection, adequate absorption, and water activation are essential to performance.

Using Scanning Electron Microscope (SEM) photography, it is possible to confirm that an ETT-based product was properly applied within the concrete structure.



ETT in One Statement

ETT is an enzyme-based internal waterproofing chemistry that penetrates below the surface of concrete, activates with water, forms an internal gel within the concrete matrix, and helps reduce liquid water migration, chloride ingress, and moisture-related deterioration over the service life of the structure.



Where ETT Adds Value

ETT-based systems are designed for concrete structures where long-term water migration, durability, and maintenance are critical concerns, including:

- Parking decks
- Roof decks
- Stadiums
- Tunnels
- Marine and port structures
- Balconies, podiums, and exposed slabs
- Wastewater and treatment facilities
- Bridges and transportation infrastructure
- Water tanks and water-retaining structures

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