



INSTALLATION GUIDE

Pool and Water Feature Installation

Installation Materials

Reactive Tile Adhesive: TEC® TotalFlex® XMS Tile Adhesive

Cementitious Waterproofing: TEC® Triple Flex™ Waterproofing Crack Isolation Membrane

Latex-Modified Mortar Bed: TEC® Floor Mud with TEC® Xtra Flex™ Acrylic Latex Additive

Waterproofing and Crack Isolation Membrane: TEC® HydraFlex™ Waterproofing Crack Isolation Membrane

Premium Thinset Mortar: TEC® Super Flex™ Ultra-Premium Thin Set Mortar

Premium LHT Mortars: TEC® 3N1® Performance Mortar or TEC® TotalFlex® 150 Universal Polymer-Modified Mortar

Premium Cementitious Grout: TEC® Power Grout®

Epoxy Grout: TEC® AccuColor EFX® Epoxy Grout and Mortar

100% Silicone Caulk: TEC® AccuColor 100® 100% Silicone Sealant

Installing Tile in a Pool or Water Feature

Setting tile in a pool or water feature is a challenging task for all contractors. Prior to any installation, proper planning must be done on how to handle different substrate conditions, intended uses, and environmental factors. These are all critical to ensure a long-lasting installation with no issues. This guide will help educate on the unique challenges of pool and water feature installations.

Tank Preparation

Before the installer can begin setting tile, the pool tank shell must be concrete that is properly prepared. Fiberglass pools are not suitable substrates. The pool tank surface must be free of grease, oil, wax, curing compounds, or other bond inhibiting coatings. Shotblast or sandblast if necessary. Protect surrounding work from damage.

The tank preparation and requirements will follow Tile Council of North America (TCNA) specification P602-19. The flatness requirements for tiles with at least one side longer than 15" must be $\frac{1}{8}"$ in 10 ft. and no more than $\frac{1}{16}"$ in 2 ft. when measured from the high points. The flatness requirements for tiles that do not have a side longer than 15" must be $\frac{1}{4}"$ in 10 ft. and no more than $\frac{1}{16}"$ in 1 ft. when measured from the high points.



Per TCNA requirements, the architect must specify type, width, and location of all movement joints and all joints must be honored throughout the entire installation according to TCNA Handbook EJ 171.

- Directly over any joints in the concrete tank (EJ171A or EJ171E)
- In tilework on 8' to 12' centers when exterior or interior areas exposed to direct sunlight (EJ171F)
- Perimeter joint between the tile assembly and coping/decking (EJ171I)
- Perimeter joint at all changes in plane and at all restraining abutments (EJ171G)
- When glass tile is used, it is recommended to increase the usage of movement joints at the higher end of the ranges listed in EJ171

The first step in prepping the pool or water feature is pre-treating all concrete cracks, joints, changes in plane, drains, penetrations, jets, etc. with [TEC® Triple Flex Waterproofing Crack Isolation Membrane](#) which is an elastomeric cementitious system used for waterproofing and crack isolation. Apply Triple Flex according to product data sheet instructions. Once finished pre-treating the pool, install Triple Flex ensuring the application has a wet thickness of at least 45 mils. When applied correctly, Triple Flex meets ANSI A118.10 Specifications for Waterproof Membranes and exceeds ANSI A118.12 Specifications for Crack Isolation. Triple Flex has a water vapor transmission rating of <1 perm meaning that it is a semi-impermeable vapor retarder. If flood testing is required, allow 72 hours for Triple Flex to cure. If flood testing is not required, Triple Flex is ready for further application after 4-8 hours. Triple Flex changes from light gray to a dark gray color when cured.

After the Triple Flex has transitioned to the dark gray color and flood testing is complete, a commercially available, prepackaged, 4:1 mud bed mixed with [TEC® XtraFlex™ Premium Acrylic Mortar Additive](#) is needed to make the bonded mortar bed. A bonded mortar bed is a thick-bed installation used to reach the flatness requirements and provide reinforcement to the substrate. The bonded mortar bed does not provide protection against cracking or movement in the substrate. Ensure the pool is dry after flood testing prior to application of the mud bed. TCNA requires the floor have $1\frac{1}{4}"$ mortar bed and the walls have $\frac{3}{4}"$ thickness.

The walls must be plumb and the floors must meet the requirements of the tile as stated earlier. Allow the mortar bed to cure for a minimum of 7 days.

Once the mortar bed has cured for 7 days it is required to add [TEC® HydraFlex Waterproofing Crack Isolation Membrane](#) to further protect the installation from cracks and the substrate from water damage. HydraFlex should be used for all tile sizes. When applied correctly, HydraFlex exceeds both ANSI A118.10 Specifications for Waterproof Membranes and ANSI A118.12 Specifications for Crack Isolation Membranes. Two coats of 25 mils wet thickness are required when waterproofing. The second coat must be applied perpendicular to the first coat. HydraFlex will turn dark purple as a visual indicator when dry as opposed to light purple when it is wet. After application of the second coat, wait 2 to 12 hours, dependent on ambient conditions, prior to flood testing.

Tile Setting Notes

An important element of ensuring the tile installation performs as expected and has a long service life is choosing the proper setting materials. It is crucial to select adhesives, mortars, grouts, and sealants specifically engineered to safeguard against natural elements when installing pools or water features.

Mix approved TEC mortars using the recommended water amount being sure not to exceed the maximum water demand. Slake the mortar for the recommended amount of time by leaving it alone. This allows all of the individual components to "wet out" and helps form stronger bonds. **DO NOT** add additional water after the product has slaked for the required time. Organic adhesives (mastics) should never be used on pools. **DO NOT** cover up expansion joints. You must honor the expansion joint up through the entire installation. If covered up, the installation will crack.

Another option is the use of modified silane adhesive for porcelain pool tile, glass tile or small ceramic tiles. [TEC® TotalFlex® XMS Adhesive](#) was developed for use in chlorinated or saltwater pools. See unique pool installation guidelines below.

When installing exterior pools or water features, the ambient conditions are very important and must be monitored to ensure a successful installation. When installing in hot weather, properties like open time, working time, pot life, etc. will all be accelerated. **TEC Mortar Tips:** ensure the powder and water temperature are 80°F or lower, shade the install area, work in the mornings, and work in small areas. Pre-moisten the substrate to extend working time. Pre-moistened substrates are called Saturated Surface Dry (SSD) which helps prevent the moisture in the mortar leaving too quickly. Cold temperatures present the opposite problem of extended open time, working time, pot life, etc. Some cold weather **TEC Mortar Tips:** ensure the powder and water temperature are 50°F or higher, use heaters and tents, and double check that the temperature will remain above 50°F for at least 48-72 hours after installation. Longer foot traffic protection might be necessary. **TEC Modified Silane Adhesive Tips:** Application temperatures between 40°-95°F (4°C -35°C) are permissible. Misting or damp wetting the substrate prior to install will quicken cure times.

The installation team must understand the unique mortar coverage requirements of exterior installations.

Mortars: Minimum required mortar coverage is 95% for ceramic or glass tile and 100% for natural stone. To ensure adequate coverage, first "key in" the mortar by using the flat side of the trowel on the substrate. When done correctly it will make a scraping sound. Then, set the tile on freshly notched mortar and slide it back and forth perpendicular to the notches to ensure coverage and prevent voids. Flat back-troweling can also be used to meet coverage requirements. This involves keying in a thin coat of mortar to the back side of the tile with the flat side of the trowel immediately before setting. Mortars are not recommended as a skim coat on the walls. The dot or spot bonding method should **NEVER** be used with cement-based mortars. With this method, the installer puts globs, or dots, of mortar on the back of the tile, rather than carefully troweling it. Although it may seem like it saves time and reduces material expenditures, critical coverage requirements

are not achieved and the resulting voids in coverage leave tile susceptible to moisture trapping, which can cause debonding or compromise the bond.

TEC Tips for installing translucent tiles with mortar:

- Knock down trowel ridges
- Use white mortar from the same batch
- Use same amount of water for all mortar mixes
- Do a mock-up installation

Modified Silane Adhesive: Using the flat side of the trowel, key adhesive into the substrate. Apply adhesive with the recommended trowel combing it in straight lines parallel to the short side of the tile. Ensure 100% surface coverage including corners and edges. Spread only as much adhesive as can be tiled while the adhesive will transfer to the opposite surface. Do not allow the adhesive to skin over. Press the tile firmly onto wall and then push in a direction perpendicular to the notched trowel ridges to achieve optimum coverage. Clean excess fresh adhesive between tiles, maintaining a minimum of $\frac{2}{3}$ of grout depth between tiles for grouting. TotalFlex XMS allows for grouting after 12 hours and **pool filling after 7 days** when used with TEC® Power Grout® or TEC® AccuColor EFX® Epoxy Grout.

TEC Mortar Solutions

After the substrate meets all specifications and the proper precautions have been taken for extreme weather, it is time to start installing tile. For tiles with all edges 15 inches or less, the preferred product is [TEC® Super Flex™ Ultra-Premium Thin Set Mortar](#). Super Flex exceeds ANSI A118.4E, A118.11, and A118.15E specifications. It has proprietary bonding technology to allow for unsurpassed strength while also being flexible enough to handle $\frac{1}{16}$ " in-plane movement of the tile. The exceptional bond strength and flexible characteristics make it the ideal choice for exterior pools and water features or interior with direct sunlight. ANSI A118.15 mortars have a greater resistance to shock and impact which will help in freeze/thaw conditions. Mix Super Flex according to data sheet instructions and let slake for 10 minutes. When installing tiles remember to first key in the mortar to promote adhesion. Check for coverage within the first few tiles to make sure the correct trowel is being used and periodically throughout the installation. If 95% coverage isn't being achieved, switch trowels or back-butter the tiles. Allow 16-24 hours for the mortar to cure before grouting.

For tiles with at least one edge 15 inches or longer, choose [TEC® 3N1™ Performance Mortar](#) which exceeds ANSI A118.4TE, A118.11, and A118.15TE. It is non-sag and non-slump so it can support heavy tile weighing up to 6 lbs./ft² on vertical and horizontal applications. As with Super Flex, 3N1 is an ANSI A118.15 mortar so it has higher bond strengths and better resistance to shock and impact than regular latex-modified mortars. The improved performance helps extend the service life of pools. Mix 3N1 according to the water demand and instructions listed on the data sheet. Ensure at least 95% coverage is being achieved by periodically pulling a tile and checking. If 95% coverage isn't being achieved, back-butter the tile or select a different sized trowel. Allow 16-24 hours for the mortar to cure before grouting.



TEC Modified Silane Adhesive Solutions

After the substrate meets all specifications and the proper precautions have been taken for extreme weather, it is time to start installing tile. For steel, aluminum, epoxy, and fiberglass, clean the surface of the substrate to remove bond breakers. Caulking/grouting the tile joints may be accomplished when tiles are held firmly in place, typically 12 hours after installation is completed. Low humidity and low temperatures will extend cure time, working time, and pot life. High humidity and high temperatures will decrease cure time, working time, and pot life. Gauged porcelain panel manufacturers typically specify the use of 100% silicone sealant to allow for dimensional changes in exterior applications. The use of TEC brand high performance grouts and TEC® AccuColor 100® 100% Silicone Sealant is highly recommended.

Gauged Porcelain Tile Panels/Slabs Installation: To ensure consistent adhesive curing, immediately before tile installation, dampen the substrate surface with a moist sponge or spray mist. Substrate surface should be SSD (surface saturated dry). Apply adhesive using the recommended trowel to either the substrate surface or the back of the tile. Only one side requires adhesive coverage. Refer to Coverage Guide for trowel size.

1. Using the flat back side of the trowel, key in a light coat of adhesive to the substrate or back of tile.
2. Apply additional adhesive with the recommended trowel combing it in straight lines parallel to the short side of the tile. Ensure 100% surface coverage including corners and edges.
3. Spread only as much adhesive as can be tiled while the adhesive will transfer to the opposite surface. Do not allow the adhesive to skin over. Edge leveling straps and caps are required to minimize lippage between panel edges.
4. Carefully align and firmly place the tile.
5. Using a high-speed cordless orbital sander with pad, work from the center of the panel outward to the edges. This will expel air from behind the panel and maximize edge-to-edge adhesive coverage.
6. Cinch down the leveling caps tightly to bring adjoining panel edges into alignment.
7. Clean excess adhesive from the panel's surface and clean out between the panel joints to the full depth of the panel while the adhesive is still fresh.

Glass Tile Installation: TotalFlex XMS has been tested and approved to be used with glass tile for the following applications:

1. Interior and exterior
 2. Dry, intermittent water exposure, and submerged applications including chlorinated and salt water
 3. Maximum glass tile sizes: Exterior installations up to 6" x 6". Interior installations up to 2' x 4'. In specifying a setting system for the bonding of glass tile, the following factors must be taken into consideration: **Glass Tile Type:** Glass tile can be manufactured in multiple ways such as clear, translucent with a colored body, or translucent with a colored backing. Each tile type has a different aesthetic appearance. The color and composition of the adhesive can influence the final appearance, especially with translucent tile. Always pre-test a small area to confirm suitability. Refer to Coverage Chart for trowel size. Note that glass tile installations require 100% continuous adhesive coverage. Always read and follow the glass tile manufacturer's specifications for suitability and installation.
1. Using the flat side of the trowel, key adhesive into the substrate.
 2. Apply additional adhesive and comb in one direction with the notched side of the trowel.
 3. **Knock down the ridges to ensure they are not visible through the tile.**
 4. Firmly place the tile into the adhesive.
 5. Remove paper facings following the tile manufacturer's instructions. Removing the paper while the adhesive is still fresh allows for individual tile adjustment.
 6. Clean excessive adhesive from tile with a dry non-abrasive towel.
 7. Allow adhesive to cure for 12 hours before grouting.

Suitable substrates with adhesive for pool installations include TEC HydraFlex Crack Isolation Waterproofing Membrane, TEC Triple Flex Waterproofing Crack Isolation Membrane, aluminum, epoxy, fiberglass, stainless steel, existing ceramic tile and cured concrete masonry. Refer to Coverage Guide for trowel size. TEC TotalFlex XMS allows for grouting after 12 hours and pool filling after 7 days when used with TEC Power Grout or TEC AccuColor EFX Epoxy Grout. (mortars require 21 days for pool filling)



TotalFlex XMS Tile Adhesive is applied to one side only and cures by reacting with moisture from the air, substrate and tile. To ensure consistent curing, dampen the substrate with a wet sponge (SSD - surface saturated dry) or lightly spritz the substrate or applied adhesive with water just prior to setting the tile. Adding moisture is particularly important when installing tile in low ambient humidity conditions (<30% RH, when combining two non-porous materials and for large format tile. TotalFlex XMS is designed for applications where the maximum depth of adhesive will not exceed ½". Excess adhesive thickness will inhibit curing. Note

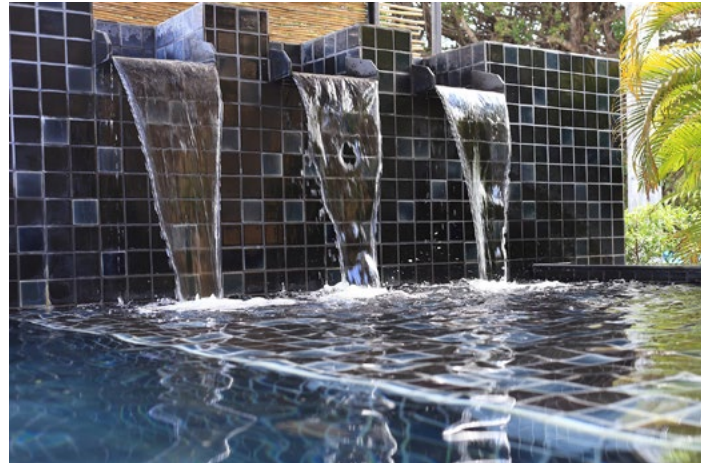
that open time and repositioning time will vary depending on humidity and temperature. Relative humidity above 50% will cause shorter open/repositioning times while relative humidity below 20% will noticeably extend cure times.

TEC Grout and Sealant Solutions

When installing grout in an exterior pool or water feature, all the **TEC Tips** for mortars should be extended to grouts. This includes hot weather grouting best practices of ensuring the powder and water temperature are 80°F or lower, shade the install area, work in the mornings, and work in small areas. Pre-moisten the joint to extend working time. When cold temperatures are present, the grouting best practices of ensuring the powder and water temperature are 50°F or higher, use of heaters and tents, and double checking that the temperature will remain above 50°F for at least 48-72 hours after installation should be followed. Longer foot traffic protection might be necessary.

The premier advanced performance cement grout for any and all submerged tile applications is [TEC Power Grout](#). Power Grout can be used in grout joints ranging from 1/16"-1/2" and is crack/shrink resistant. Its breakthrough formulation is stain-proof and efflorescence free ensuring that the joint is color-consistent for the life of the installation. Power Grout exceeds ANSI A118.7 Specifications for High Performance Cement Grouts for Tile Installation. It is always recommended to mix full bags of Power Grout but if less than a full bag or multiple bags from different batch numbers are used, dry mix the contents together. This practice will eliminate slight color differences between batches and ensures that all the fine particles that may have settled during shipping are evenly dispersed. Partial bags must be stored in a sealed air tight environment to ensure quality and performance for the next job. Start with the low end of the water range and add more water to get the desired consistency. However, **DO NOT OVER WATER**. Mix with a low-speed drill (350 rpm maximum) for a minimum of 2 minutes and slake for 3-5 minutes. After the slake is complete, remix for 1 minute and do not add additional water. Fully pack all joints and remove excess grout. Allow grout to firm up before cleanup. This will usually take about 15-30 minutes depending on ambient conditions. Check for firmness by lightly touching the grout with your finger. If there is no transfer to your finger, you may proceed with clean up. Once grouting is finished, you must wait 21 days (or 7 days when using TEC XMS adhesive in place of mortar) before filling the pool with water.

TEC offers a complete chemical resistant, 100% solids epoxy grout, [TEC AccuColor EFX Epoxy Grout and Mortar](#) that is less sensitive to pool chemistry variations. It exceeds ANSI A118.3 Specifications for Epoxy Mortar and Grout and has over 1,300 psi bond strength to quarry tile. EFX has superior UV stability which reduces yellowing. You must mix all of part A with all of part B to get the complete chemical resistance. Partial mixing is not an option. Pack all of the grout joints with a hard rubber float. Clean tiles immediately. **DO NOT ALLOW TEC ACCUCOLOR EFX EPOXY GROUT TO HARDEN ON THE TILES.** It will be difficult or



impossible to remove once hardened. Epoxy grouts can provide excellent long-term durability and reduce maintenance costs due to their superior chemical resistance.

All movement joints that were specified by the architect must be filled in with [TEC® AccuColor 100® 100% Silicone Sealant](#). It offers permanent flexibility and provides excellent weatherability. Since it is 100% silicone, it will not break down with UV light or any pool chemicals. AccuColor 100 allows for 25% joint compression AND 25% joint expansion. Use masking tape on both sides of the joint to allow for easy cleanup. Fill completely and tool to desired thickness immediately before a skin forms in the joint. Immediately after tooling, remove masking tape and wipe any sealant off the face of the tile. Silicone joints should be regularly checked as part of the maintenance schedule and replaced when needed.

Filling and Emptying Pool

Fill pool at no more than 1" (25 mm) per hour. Empty pool at no more than 1" (25 mm) per hour.

Maintaining Proper Pool Water Balance

Maintaining proper pool water balance is critical to ensure an attractive and long-lasting tile installation. Cement-based grouts, mortars, plumbing, and the concrete pool shell can be degraded if pool water is not regularly checked and adjusted to within recommended ranges. Achieving proper pool water balance includes maintaining pH and calcium hardness. Pool water must be maintained at a pH of 7.2-7.8. If the pH drops below 7.0 the cement grout and mortar will etch and degrade. When the pH is above 8.0 mineral deposits will form on the tiles. If the calcium hardness level drops too low, the pool water will leach calcium out of the cement grouts and mortar resulting in degradation over time. The Langelier Saturation Index (LSI) is an unbiased relationship between pool chemicals and environment. If the LSI is between -0.30 and +0.30 the pool water is balanced. Pool water below -0.31 will pull calcium from the grout; pool water above +0.31 will deposit calcium onto the tile in the form of hard water stains. Regular water quality checks and adjustments are required to ensure the water is balanced and safe.

Conclusion

Selecting and effectively using high-quality products for pools and water features requires careful consideration of various factors. No two projects are the same, but a comprehensive understanding of the conditions that should drive product selection will always contribute to more successful installations. Ensuring the material qualities are not only rated for submerged application, but also work together as a system, pays off in the creation of a beautiful and durable installation.



Contact your local sales rep to request a demo.
Have a question? Call our Technical Services team at
800-832-9023 Mon-Fri 7:00 a.m. - 6:00 p.m. CST.



TEC Specialty Products LLC
1105 South Frontenac Street
Aurora, IL 60504-6451
800-832-9002 | TECspecialty.com

TEC® and the TEC® logo are trademarks of TEC Specialty Products LLC