Installing Tile in Pools and Fountains

Waterproofing, Surface Preparation and Thin-set Mortar Selection are Critical Steps in Submerged Tile Projects.

Setting tile in a swimming pool or fountain is among the more challenging projects for any tile contractor. Creating a durable submerged installation takes extra planning and care to protect its integrity. If not properly set and maintained, the water feature may be damaged over time and its beauty ruined by cracked or loose tile. This document addresses the special needs of tile installations in concrete and masonry pools and water features.

By Steve Taylor, Director of Architecture and Technical Marketing, Custom Building Products and Dale Roberts, Architectural Consultant

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There are a number of important issues to consider when planning and installing a submerged tile project.

- Is the surface prepared properly for the tile installation?
- Have movement joints been properly specified?
- Does the schedule allow for proper flood testing, curing and filling?
- Are decorative tiles being added to the waterline or will the entire water feature be tiled?
- Are the tiles designated for submerged installations?
- Will mosaic tile backing materials inhibit the bond?
- What is the best grout color to stand up to pool chemicals?
- Can the tile, mortar and grout stand up to freeze/thaw cycles?
- Does the end user understand how to maintain water quality for tile longevity?
- Are the tile installation products formulated and warranted for submerged installation?

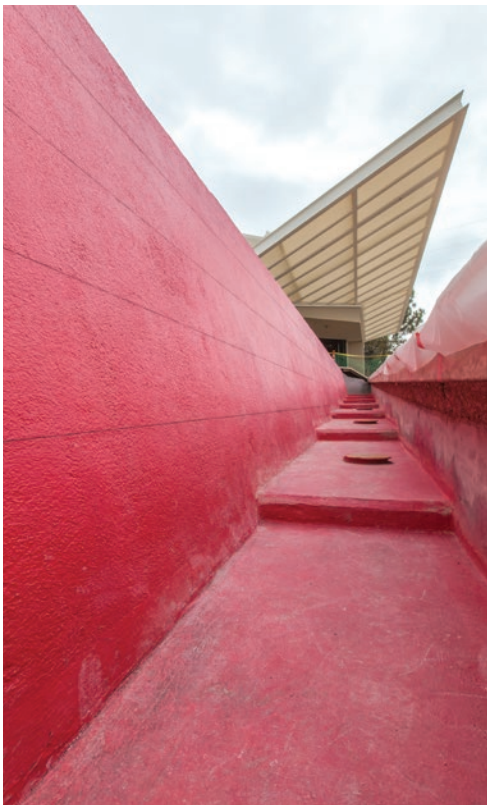
PLANNING

The first step to a successful submerged tile installation is reviewing the plans and confirming that the proper approvals and engineering stamps have been obtained. Review the installation details with the general contractor on the project in time to submit any request for information (RFI) to the architect or designer. Clarify the scope of the project and what is expected of the tile installer. In many cases, it may be best for the contractor installing the tile to also prepare the substrate. This ensures that the tile installation products are compatible with any surfacing materials.

SITE INSPECTION

Next, the tile installer should inspect the site where the tile will be installed. Look for structural cracks and overall integrity of the concrete shell, as well as exposed metal or rebar and the levelness of the bond beam. Movement joints must be installed between surrounding decking and the pool or water feature. Any observed moisture or water intrusion through the water feature concrete shell may indicate improper waterproofing.

Deficiencies in the substrate and waterproofing must be corrected by the contractor or tile installer before any tile is installed. This may add cost to the project and it is best to identify any issue early in the process, as it can be quite costly to repair later. The site inspection stage is an excellent opportunity to enlist the expertise of the installation products manufacturer's representative.



RedGard® Waterproofing and Crack Isolation Membrane is a liquid formula that is easy to apply to the unique curves found in many swimming pools.

APPROPRIATE TILE

Not all ceramic tiles are suitable for submerged applications. Rarely does the installer have a say in the selection of the tile, but the responsible party should be notified if the tile chosen is not suitable. Verify that the manufacturer recommends the selected tiles for use in submerged applications.

Many mosaic tiles are supplied in sheets with mesh backing or adhesive dots between the tiles. Always make sure that the netting and its adhesive are well bonded to the tile and not soluble in water. (The best way to check this is to place a sheet of mosaic tile in a bucket of water and check the bond the next day. If it comes off easily, it was not bonded well or the adhesive used is water-soluble.) It is best to use face mounted mosaic tile with no mesh on the back surface that can interfere with the bond.

When adhesive dots are used to attach small porcelain mosaics together to form larger sheets, they will often cover the majority of the back of the tile. If this is the case, the setting material must also bond to the adhesive dot, not just the ceramic tile. It may be necessary to remove the adhesive dot from the back of the tile to expose more of the porcelain back. This is time-consuming and can lead to setting individual mosaic tiles.

Though popular for use with water features, glass tile brings its own set of concerns. Since the coefficient of thermal expansion of glass is quite different from ceramic tile, glass tile is more likely to crack from thermal shock in exterior conditions. First, make sure the tile meets the requirements of ANSI A137.2 and that the manufacturer recommends its use in water features and pools. If possible, exposed glass tile that may be heated by sunlight should be protected from splashes of cool water during use. Be sure to select installation materials designed for installing the particular type of tile selected.

SUBSTRATE PREPARATION

The bond to the tile is only as good as the preparation of the substrate. Remove all curing compounds, release agents, debris, dirt and free standing water from the surface to be tiled. Grind all high spots and fill all low areas with a quality cement-based patching compound like CUSTOM Skim Coat & Patch Cement Underlayment.

If waterproofing is necessary, the interior surface of the water feature should receive a waterproofing membrane meeting ANSI A118.10. The waterproofing membrane must tie into all points of penetration including lights, pipes and niches. RedGard® Waterproofing and Crack Isolation Membrane is a liquid formula that is easy to apply to the unique curves found in many swimming pools.

CUSTOM offers several dry-set mortars that are suitable for the installation of submerged ceramic tile, such as ProLite® Large Format Tile & Stone Mortar and Glass Tile Premium Mortar.

RedGard cures quickly in controlled environments and is ready for tile installation in 24 hours. (Lower temperatures and higher humidity can delay the curing of the RedGard and it may require up to seven days to dry completely.) Once the waterproofing has fully cured, it should be flood tested to ensure that there are no leaks. After flood testing, all the water must be removed and allowed to dry thoroughly (no standing water) before installing tile. RedGard should not be left exposed to sunlight for extended periods of time, but must be covered with tile after completing the above steps. Follow all of the manufacturer's directions for installation of the waterproofing membrane.

TILE INSTALLATION

Tile that will be submerged should be set by an experienced installer that is familiar with the demands of pools and water features. Proper material selection becomes more important than ever with the challenge of a submerged application. In certain areas, the tile assembly may also be subjected to thermal shock from freezing conditions.

CUSTOM offers several dry-set mortars that are suitable for the installation of submerged ceramic tile. Choose a high-performance mortar that meets the requirements of ANSI A118.15, such as ProLite® Large Format Tile & Stone Mortar. If glass tile is being installed, select a bonding mortar that has been specially formulated for glass. CUSTOM Glass Tile Premium Thin-set Mortar has been formulated to meet the requirements of ANSI A118.15 and the requirements for bonding mortar in ANSI A137.2. Both of these mortars have high polymer content to absorb some of the thermal movement found in exterior applications and are extremely water resistant. Long working times help with the installation of tile in exterior features that may be exposed to harsh conditions.

In some cases, it may be necessary to use a rapid-setting mortar due to changing weather. These products cure in a few hours and can be exposed to inclement weather sooner than standard products. ProLite RS Rapid Setting Tile and Stone Mortar is suitable for water features when time is critical. (Note: the use of a rapid setting mortar does not shorten the time needed for the system to cure before filling with water.)

Movement joints in the concrete shell must be carried through the tile assembly per TCNA EJ171. Consult with the waterproofing membrane manufacturer for treatment at the movement joints. On large projects, it may be necessary to add movement joints to the tile assembly. It is the responsibility of the architect and project engineer to determine the location of the movement joints. Generally, movement joints should be installed in the tile assembly every 8-10 feet.

CUSTOM Commercial 100% Silicone Caulk meets the EJ171 requirements of ASTM C-920 and is suitable for these movement joints in water features.

Be sure to select a grout type and color that is suitable for submerged conditions. CUSTOM Prism® color consistent grout holds up well to the water chemistry found in most pools today.

The Tile Council of North America (TCNA) Handbook details the installation of ceramic tile in pools and water features. In Details P601 and P602, it shows placement of the movement joints between the ceramic tile and the coping at the edge of the deck.

There are many choices for grout to fill the joints between the tiles beyond the selection of color. Be sure to select a grout type and color that is suitable for submerged conditions. The color of some pigments used in cement grout can be altered by the chemicals added to maintain clear water in a pool. Check with the grout manufacturer to make sure the particular grout color selected is stable in treated pool water.

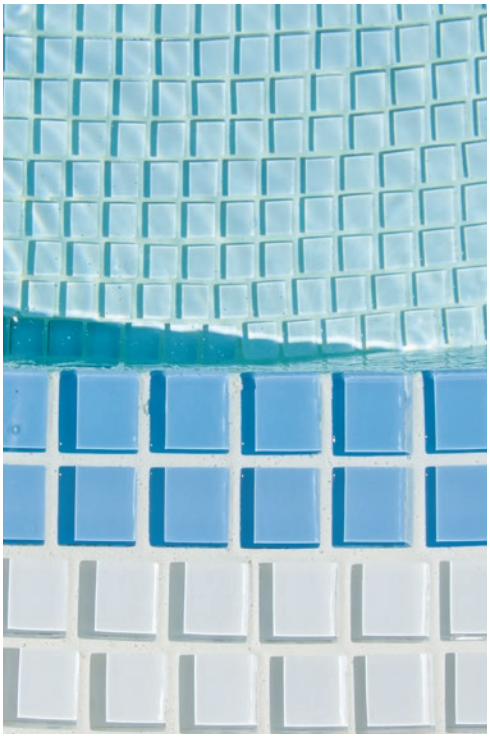
Epoxy grout is considered chemical resistant and should be safe in water features. However, epoxy grouts are not UV stable and will yellow over time when exposed to ordinary sunlight. Most epoxy grouts should not be installed in exterior applications. With proper water maintenance, a high performance cement grout meeting the criteria of ANSI A118.7 will hold up for years in submerged conditions. CUSTOM Prism® color consistent grout meets these requirements and its calcium aluminate base holds up well to the water chemistry found in most pools today, with no efflorescence.

Under ideal conditions, the pool or fountain can be filled with water after 14 days of allowing the completed tile assembly to cure. However, it is rare to get 14 days in a row of ideal conditions outdoors to allow the mortar and grout to properly hydrate. So, it is recommended to wait at least 21 days for the tile assembly to fully cure before filling with water. Some circumstances may extend the cure time; contact CUSTOM Technical Services with any questions about specific conditions.

FILLING AND MAINTAINING THE WATER

Unlike a plaster pool that should be filled as fast as possible to eliminate a visible ring in the plaster, tiled pools and water features should be filled slowly. After allowing the mortar and grout to fully cure, water should be added at a rate of two feet per 24 hour period. This will minimize the movement in the shell from the additional weight of the water and the risk of thermal shock to the tile. It will also help prevent tiles from cracking or coming unbonded.

The job is not over when the pool or water feature is filled. It must be maintained regularly to assure its beauty and durability. We all like the feel of "soft" water on our skin. It is also a fact that there will be less scale on and around the water feature with soft water. However, soft water will also shorten the life of a tiled pool or fountain. As the soft water tries to reach equilibrium with its surroundings it will pull calcium from the grout, mortar and plaster (underlayment) of the water feature. This weakens all the cement components



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and eventually the grout will disappear and ceramic tiles will come loose. To prevent this from happening, it is important to keep the water hardness (calcium content) between 250 – 400 ppm. The pH should also be maintained between 7.2 – 7.8 and the alkalinity between 80 – 120 ppm. Water should be checked daily and treated as needed.

SUMMARY

A tiled pool or water feature adds a timeless architectural element – and a big installation challenge – to any project. Even a plain office building becomes a work of art with the addition of a decoratively tiled fountain out front. However, lasting beauty takes careful planning beyond the choice of tile.

Selecting the right surface preparation and tile installation products are critical to creating a durable submerged project. Custom Building Products issues up to a Lifetime System Warranty on the installation when qualifying products are used as a system. The CUSTOM Technical Services team can help with identifying the proper preparation, bonding and grouting materials for tile installed in pools and fountains.

Contact CUSTOM Technical Services at 800-282-8786 to learn more about how to succeed with a submerged project, including tiling a stainless steel or fiberglass shell. (CUSTOM also has a national network of Regional Technical Service Representatives. These experienced reps are knowledgeable in proper tile installation products and methods, and they are available to review and inspect large jobs in the field.)

ABOUT THE AUTHORS

Steve Taylor is Director of Architecture and Technical Marketing for Custom Building Products and has more than 30 years of experience developing products for the construction industry.

Steve is a member of the Tile Council of North America (TCNA) and Materials & Methods Standards Association (MMSA). In these roles, he helps to determine proper tile installation methods and standards. This includes simplifying the tile installation process to save tile professionals time and money.

Dale Roberts is an Architectural Consultant for Custom Building Products. He has been in the tile industry for 30 years, including 16 as a tile and stone contractor, and has earned CSI, CDT, CCPR, CTC and LEED Green Associate certifications. In his role, Dale helps architects and specifiers ensure than their projects are successful, cost-efficient and done right the first time.

CUSTOM® TILE INSTALLATION SYSTEMS

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