



## TECHNICAL BULLETIN – TB198

# POOL COPING AND WATER LINE TILING – FIBREGLASS AND CONCRETE SWIMMING POOLS

AUGUST 2024

### INTRODUCTION & SCOPE

A typical construction method for swimming pools is to install a pre-formed fibreglass liner into the ground, usually with a concrete surface or Compressed Fibre-Cement (CFC) sheet surrounding the deck. This liner has a visible horizontal top edge around 100-150mm wide where the coping tiles will be laid. It is a common request made to ARDEX to supply an adhesive that will bond a coping tile to the top edge of the pool, and often the inquirer wants to span the joint between the liner and the surround.

The same general situation occurs with pools that have concrete shells or rendered blockwork rather than fibreglass, and hence the same rules about joints and coping in this discussion still apply.

In this bulletin, we will examine why such a course of action is not a sound practice, and some suggested ways to install tiles or 'pavers' in this situation. We will also briefly look at bonding waterline tiles within the pool.

### THE REQUESTED DETAIL

The usual request is, 'What adhesive would you recommend for installing coping tiles on a fibreglass or concrete pool edge?' A bit of further inquiry to the customer reveals that it is intended to bond the tiles across the boundary between the liner or shell and onto the surround. Usually, these tiles are large format or pavers; both overhang the water and extend to the surrounds. In other words, the tile covers over the joint to create a homogenous tile appearance to the finished job.

### WHAT IS THE PROBLEM?

What is the problem with this scenario? A solidly fixed tile across the pool surround boundary spans what is, in effect, a movement joint.

The definition of a movement joint, in this case, can be found in the tiling standard AS3958- 2023,

*'Clause 5.4.7.4 Movement joints should be installed at the following locations:*

*c) At junctions between different background materials, when cladding is continuous across varying types of background'*

and

*'E.2.9 Movement joints*

*...Movement joints should be inserted to coincide with the structural junction of the pool shell, the surround slab and where the pool surround tiling abuts walls...'*

What are the consequences of ignoring this requirement and tiling straight across the boundary? The pool shell and surround are made from two materials with different expansion and movement characteristics, creating unbalanced movements on either side of the joint.

Also, the pool fills and substrate below the surround create differences in movement due to their thermal properties, expansion and contraction during water absorption of the soil, structural movement of decks, and, in the case of the pool water itself, movements or seiche-effect caused by winds or pressure loading due to weight falling into the pool (i.e., diving).

These factors mean that anything rigidly bonded across the joint will likely crack, as shown in Fig.1 below (for simplicity, the schematics show fibreglass shells).

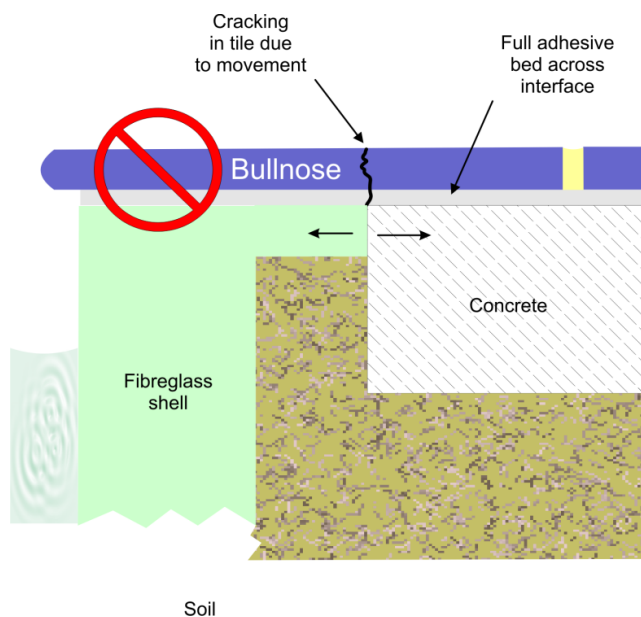


Figure 1.  
Schematic showing the situation where tiles have been bonded across the pool shell and surrounding junction.

A second option occasionally suggested is to adhere the tile only to one side of the joint. Usually, this is the concrete side since the width of the fibreglass edge is generally less than 150mm. Therefore, the concrete provides a larger and ultimately more compatible surface to bond.

However, this leaves the tile edge cantilevered and unsupported, hence subject to breakage due to lever arm moments from swimmers climbing out of the pools or flexural compressive forces from being stood on. This situation is shown in Fig.2.

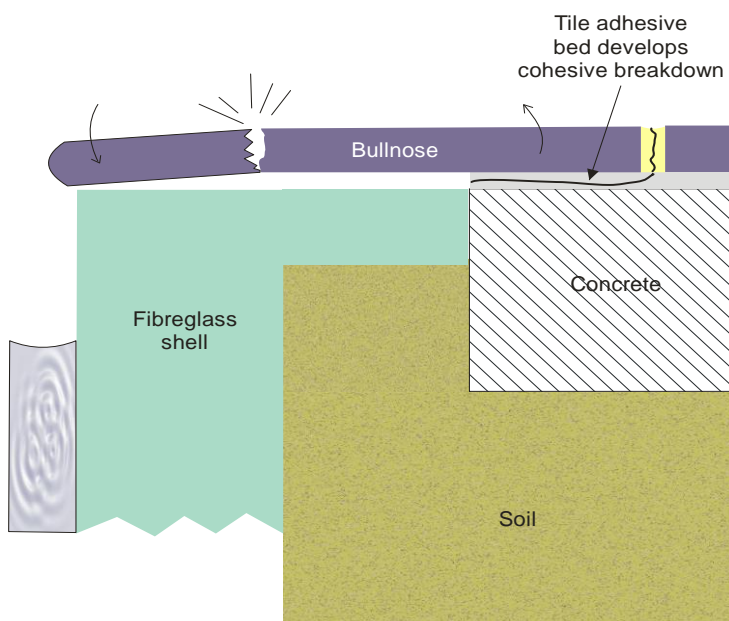
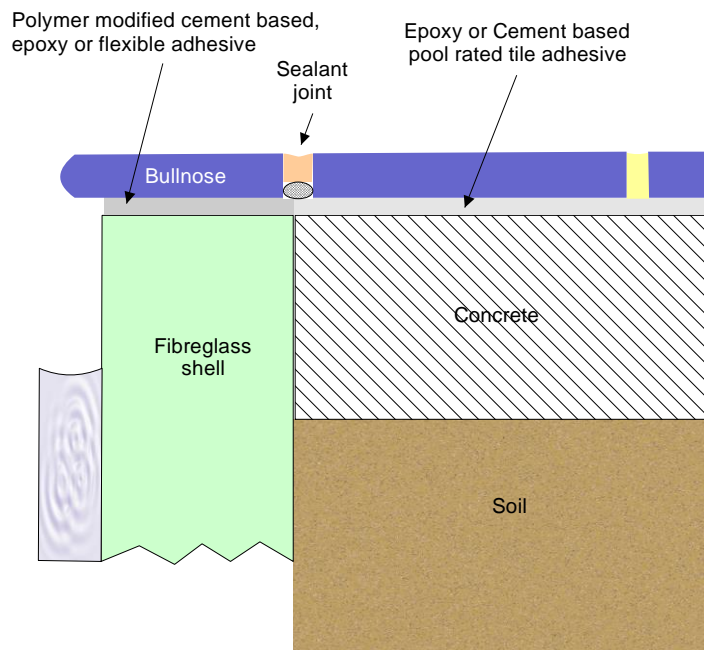
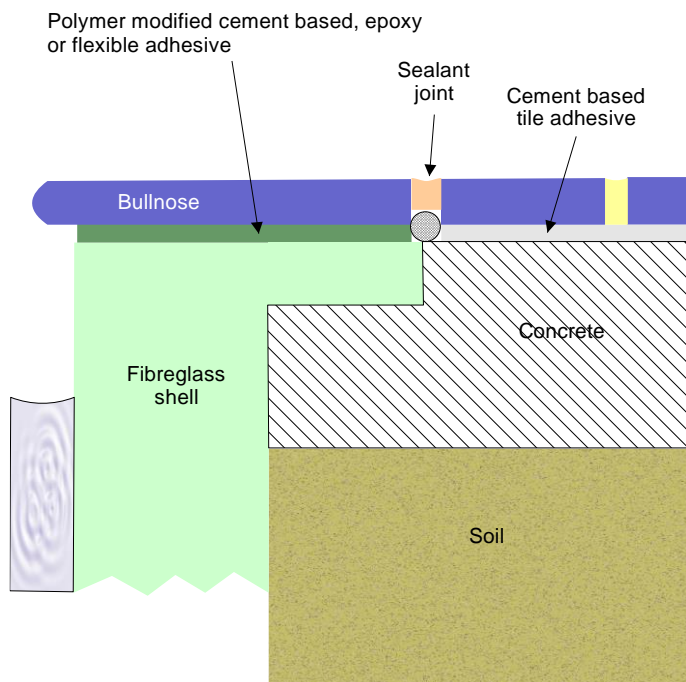


Figure 2. Effect of cantilever tiles subjected to either bending moments from swimmers exiting the pool or compressive flexure from being stood on.

## DESIGN SOLUTIONS

As the standard specifies, the preferred solution is to create a movement joint around the pool's edge corresponding to the shell-surround boundary. The general design is shown in Fig.3a and 3b. The major point with this detail is that it might require cutting the tiles or pavers to create the joint, which adds an extra process but also affects the aesthetics of the finished job.



Figures 3a and 3b. Schematics showing the presence of the movement joint and the cut that may be required in the bull-nose tile (configuration depends on the shape of the pool shell).

Another solution is to bond the tile to the surround side with a modified cement-based tile adhesive and to the pool rim with either a flexible sealant or sealant adhesive. For example, the poolside bond could be performed with a well-spread polyurethane, epoxide, silane-urethane, or even suitable silicone sealants (>75% coverage is required rather than a few thin beads). This design is more difficult to do because it uses two separate products on the same tile but effectively eliminates the flexing of an unsupported tile and allows the system to move because of the low E-modulus of the sealant. It is also necessary to have a strong tile that can handle being adhered with a flexible sealant and not suffer flexural or cantilever failure under loading.

Caution may be required with CFC decks as they may move more than concrete (the framing) and possibly even exceed the capabilities of the sealant. This design is shown in Fig.4 for a concrete surround.

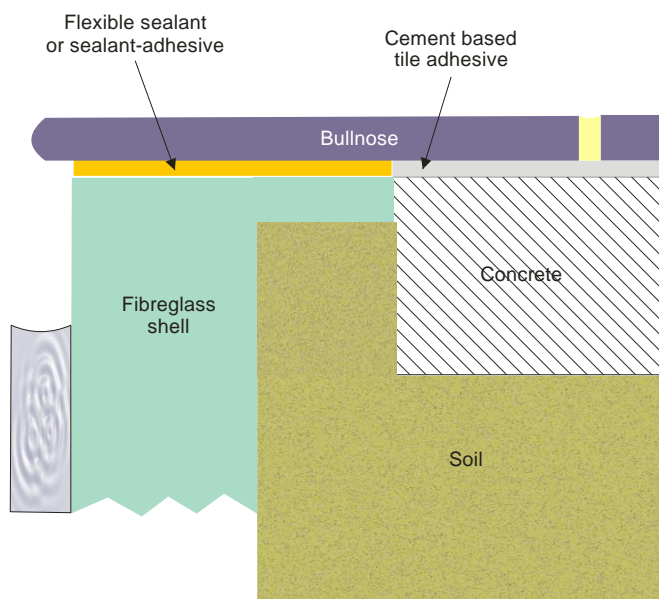


Figure 4. An installation using the sealant/adhesive and normal tile adhesive combination rather than cutting the tile for a visible joint. This is the most difficult type

## A CASE HISTORY

The following pictures show a fibreglass pool installation where the general rules given above were not followed. In this situation, the paving coping tiles were bonded directly across the ring beam joint between the pool shell and the surrounding concrete. A non-approved type of adhesive was used, and poor adhesive application and tile bedding were evident. The pool was installed circa 2007, and the problems were evident between 2012 and 2015. The pavers were loose and unsafe at the time these pictures were taken.

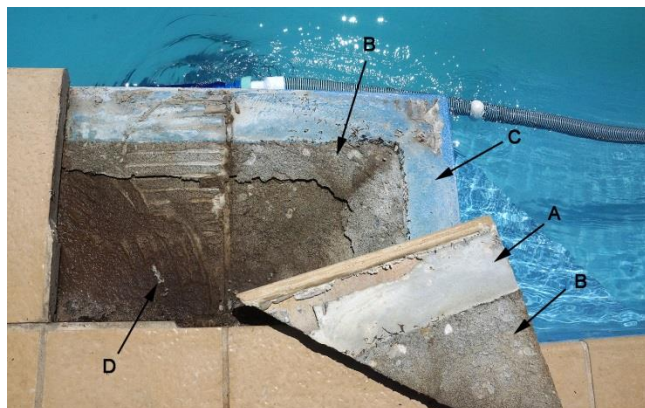


Figure 5.

A – The adhesive that was in contact with the fibreglass shell. As can be seen there was negligible adhesion. B – sheared and water effected rubber modified C class tile adhesive. C – Fibreglass shell, no evidence of preparation. D – Water damaged and sheared rubber modified C class adhesive



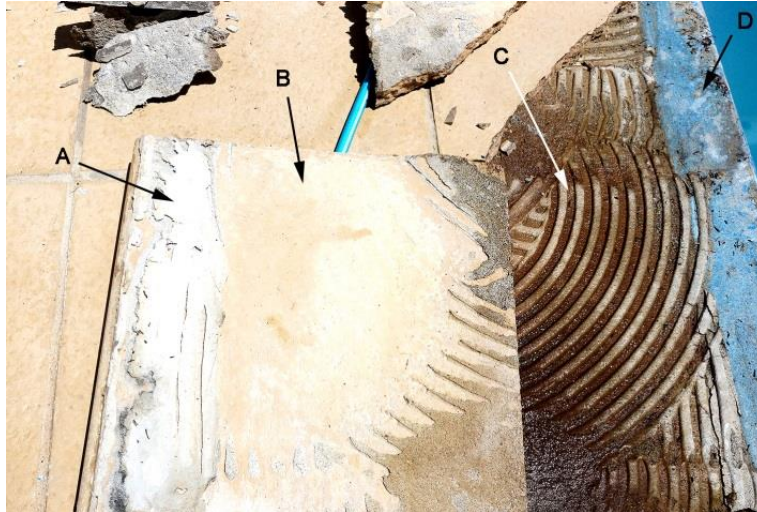


Figure 6.

A – The adhesive that was in contact with the fibreglass shell. B – Rear face of paver tile with no adhering adhesive (the pool shell sat proud of the concrete so the tile was tilted and there was no way it would bed). C – Uncompressed adhesive notch lines, full of water in the voids and water damaged. D - Pool shell.

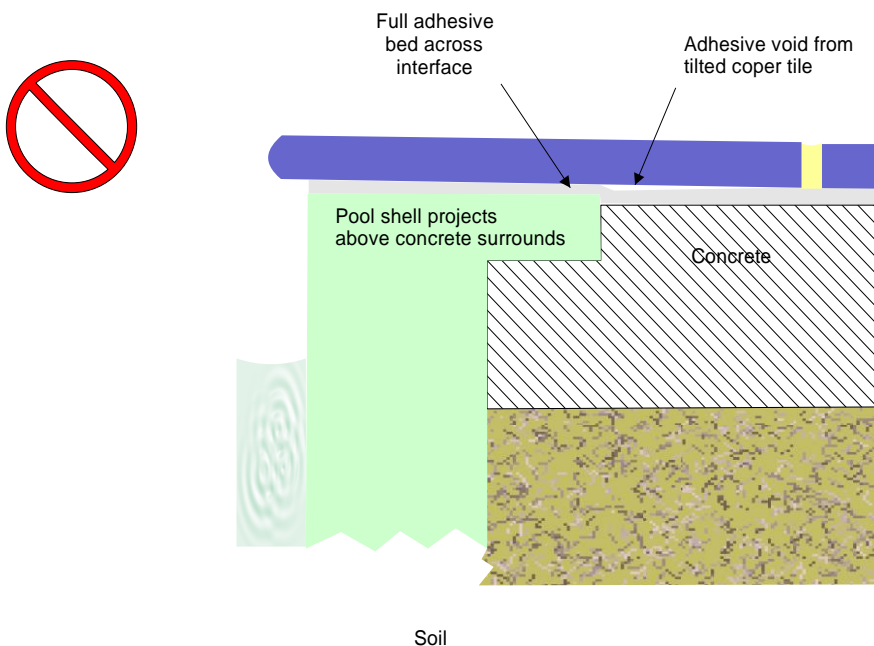


Figure 7.

This is schematic showing the problem in Figures 5/6. The edge of the pool shell projected above the concrete resulting the in paver coping tile being tilted and then not achieving correct adhesive bed contact.

## WATERLINE TILES

The final part of this installation is usually the installation of water line tiles. ARDEX recommends bonding tiles above, on, and just below the waterline for fibreglass pools, but not at depth. There are no such restrictions on concrete pools where the correct adhesive is used for the full pool lining (usually with a membrane system); Figure 8 shows the general arrangement.

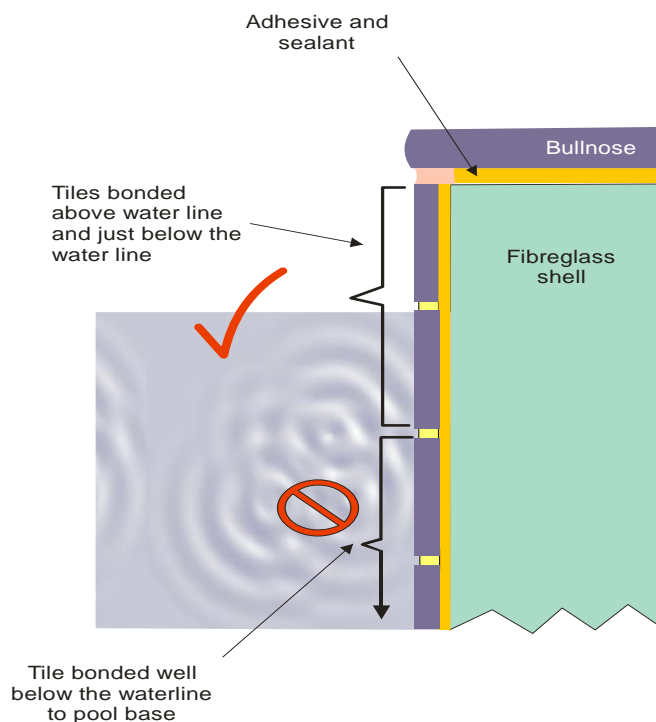


Figure 8. The bonding of tiles to the upper edge of the fiberglass pool liner and to just below the waterline is acceptable, but not at depth below the waterline.

Ensuring the correct adhesive and the pool shell are properly prepared is critical in this situation. Bonding tiles to the fiberglass for waterline tiles: The fiberglass gel coat surface needs to be roughened, which may compromise the liner's integrity if done excessively.

Roughened means that the surface of the fiberglass gel coat shall be mechanically prepared such that 100% of the surface is treated to produce a rough surface finish of equivalent appearance to CSP2 or CSP3 finished concrete (see Fig.9).

The fiberglass fibrils must be visible; however, this preparation process could expose the fiberglass to adhesive attack.

A final note concerning pool tiles, where sheet mosaic tiles are used, must be of a type not affected by water immersion. The tiles must not be fixed to any 'backing' material, such as mesh with a water-softening or soluble adhesive. Also, the tiles must have at least 85% of the back face of the tile available for adhesive contact. Where these conditions are not observed, tiling failures are a significant risk, see Figs.10/11 and ARDEX Technical Papers TP013 and TP002 for more information.

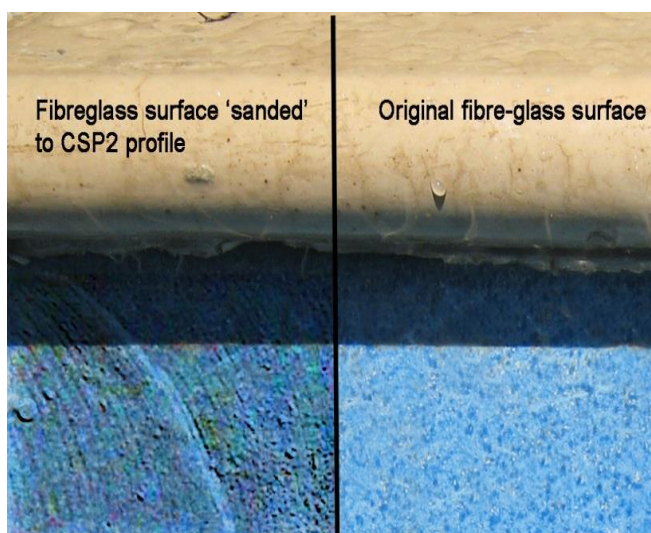


Figure 9. A schematic showing a fibre-glass pool that has been surface prepared to CSP2 profile.

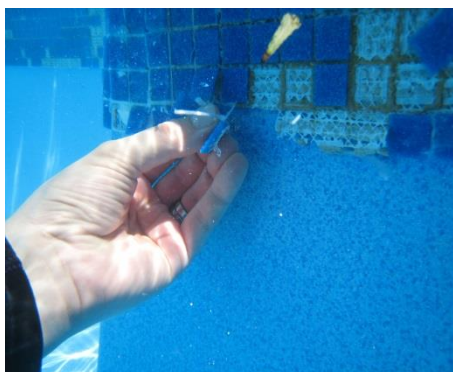


Figure 10. An example of a tiling installation where the pool shell has not been properly prepared prior to the application of 'waterline tiles. The adhesive has not bonded.



Figure 11. An example of mesh mosaic tiles that have failed at the waterline because of an inappropriate adhesive choice for a fibre-glass pool shell, but also because the mesh adhesive was water softening and obstructed the adhesive contact coverage with the tile itself.

## RECOMMENDED ADHESIVE SYSTEMS

The following ARDEX or ABA tiling and accessory products are recommended for this type of installation.

Note: Certain DUNLOP products can be substituted for *performance-equivalent ARDEX products* in cases where *hardware-sourced* products are easier to obtain.

### Tile Adhesives

#### *Cementitious surfaces*

Bonding tiles to the concrete or compressed fibre-cement pool surrounds or inside concrete pools shells (not fibreglass). See ARDEX Technical Bulletin TB088 for information on tiling concrete pool shells.

#### C Class adhesives

- ARDEX X77 ± ARDEX E90
- ARDEX X18 ± ARDEX E90
- ARDEX X68 ± ARDEX E90
- ARDEX X7 + ARDEX E90
- ARDEX Optima
- ABA Powerstik Plus ± ARDEX E90
- DUNLOP Universal Tile Adhesive
- DUNLOP Tile All Tile Adhesive

#### R Class adhesives

- ARDEX WA epoxy
- ARDEX WA100 epoxy



### *Polymer surfaces*

Bonding tiles to the fibreglass for waterline tiles – the fibreglass polyester gel coat surface needs to be roughened, which may compromise the liner's integrity if done excessively. The best performance on this pool shell type is obtained with an epoxy adhesive.

ARDEX WA epoxy

ARDEX WA100 epoxy

ARDEX Optima or DUNLOP Tile All (after preparation, an initial skim coat 1mm thick is applied with a flat-bladed trowel and allowed to cure for 4 hrs. Then, the main adhesive bed is applied with an appropriate notch trowel for the tile size defined in AS3958 before the tiles are applied).

Spot repair and tile replacement can be done with ARDEX RA88 epoxy adhesive (supplied in tubes).

### **Sealant/Adhesives**

Sealant/adhesive suitable for bonding to the fibreglass top edge under the coping tiles.

ARDEX CA20-P (white - *not under the water*)

ARDEX ST silicone (several colours - can be immersed)

ARDEX RA030 or ARDEX 040 polyurethane/polyether sealants (grey)

DUNLOP Tile All Plus Adhesive/Sealant (*white - not under the water*)

DUNLOP Roof, Gutter, and Pond Repair (*grey - not under the water*)

### **Grouts**

#### **C Class**

ARDEX FG8 plus ARDEX Grout Booster

ARDEX WJ50 plus ARDEX Grout Booster

ARDEX FSDD plus ARDEX Grout Booster

DUNLOP Coloured Grout with DUNLOP Primer and Additive

R Class - preferred for waterline tiles on fibreglass shells

ARDEX EG15 epoxy grout (has a wider range of stable colours)

ARDEX WA epoxy

DUNLOP Easy Clean Epoxy Grout (has a wider range of stable colours)

Only white or off-white colours are strongly recommended for cement-based grouts to avoid bleaching the colorants with chlorine in the pool water.





## GLOSSARY

**Automatic pool cleaners** – These are pseudo-robotic pool cleaners that move around the internal surface of the pool using suction to remove dirt and solid material. The suction created and will dislodge poorly bonded mosaic and other small-size tiles.

**CFC**—This is the shorthand used for compressed fibre cement sheeting. In this application, it is a minimum of 15mm thick.

**Coping tile**—The tile placed around the top edge of the pool. It usually has a rounded bull nose.

**Fibreglass**—This is used in two ways. In the general industry sense, it refers to the pool shell's polyester resin and glass fibre matt construction. In the strict sense it refers to the reinforcing matting used with the resin. **Fibrils** refer to individual glass fibers.

**Gel coat**—This is a resin-based coating on the surface of the pool shell in contact with the water. The gel coat is applied to the mould first, followed by the main fiberglass and resin construction. The gel coat is commonly filler-rich and may have a different, more chemically resistant polyester resin composition than the main shell body.

**Low e-modulus**—This is a way of describing highly flexible and elastic sealant compounds. It refers to the deflection under strain or stress that the material can stand before failure.

**Seiche or seiching**—Waves created in the water by movements. It can be from things dropping into the water, wind movement, or earthquakes. Waves create low-level but continue to be a source of impact on tiles. Seiching and surging from the water jet exhausts for the pool filtration system can dislodge poorly bonded tiles.

**Waterline**—The splash zone is the transition between the subaqueous part of the pool (underwater) and the subaerial environment above the water. Depending on the pool water level, this area can be fully exposed or fully immersed (i.e., low when the pool is vacuumed, or water evaporates and high after high rainfall). The transition is a severe environment of wet-dry cycling, rapid temperature changes, and moving water waves. This is a very challenging application for pool tile adhesives.

### **IMPORTANT**

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition, specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations, contact your nearest Ardex Australia Office.

### **DISCLAIMER**

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

### **REASON FOR REVISION-ISSUER**

Content review, change of company slogan and address

### **DOCUMENT REVIEW REQUIRED**

**24 months or whenever third-party suppliers change their recommendations.**

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