



Wrinkling of Liners

 **AlkorPlan**



Rely on it.

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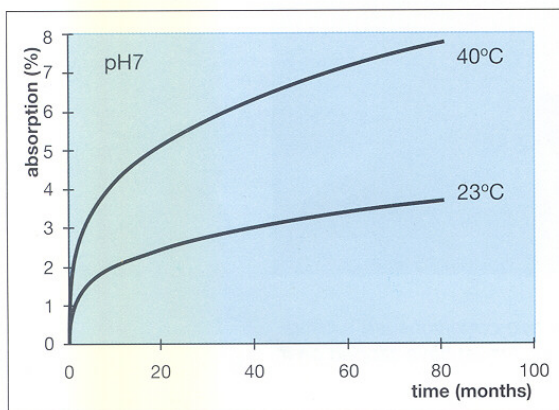
Wrinkling of Liners 2

A Liner made from plasticised PVC will form folds or wrinkles when two conditions are fulfilled: The liner must have expanded considerably and will also have moved on the pool floor or wall.

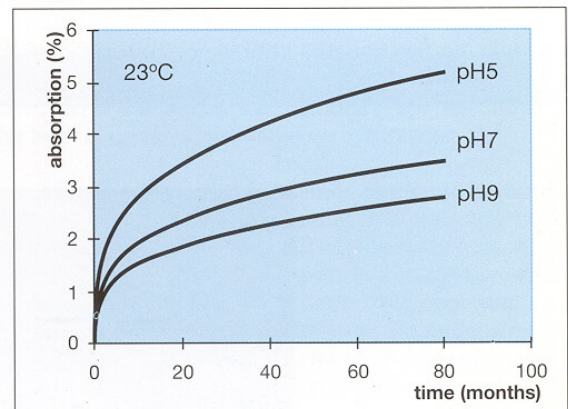
Absorption

PVC absorbs moisture and water treatment chemicals. With normal swimming pool conditions, absorption will not exceed 5% of the original weight of the liner. However, with high temperatures and low pH the level of absorption could be much greater.

Tests have been carried out in water containing 1-2 PPM of chlorine and 30-50 PPM of stabiliser



This diagram shows higher levels of water absorption at lower levels of pH



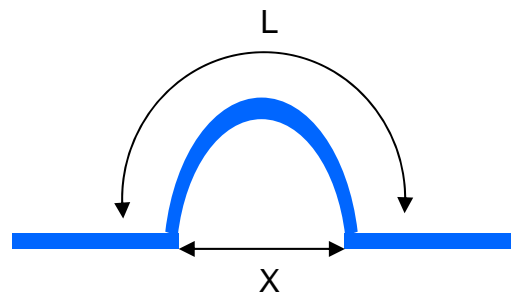
This diagram shows higher levels of water absorption at higher temperatures

Pollution and water treatment chemicals will also influence absorption. In salt water, absorption will be lower than in water containing fewer minerals, while high chlorine levels increase absorption, especially when combined with low pH.

Movement

In normal conditions, this moisture absorption leads to nothing more than an increase of the thickness of the liner sheet. However, if there is low friction between the liner and its support, the liner may slip and form creases.

Examination of a fold shows that the length L is at least 50% greater than the original length X . To achieve this level of growth the folded area would have to have absorbed some 130% of its original weight. As this is physically impossible, the liner on either side of the fold must have slipped towards the fold



Wrinkling of Liners 3

A liner will slip on the pool surface when there is abnormal growth in the liner and the coefficient of friction between liner and substrate is greater than the pressure of pool water pressing upon the liner.

The main cause for low friction between the liner and the pool structure, is the presence of water between them. This water can be condensation water (in the case of heated pools and/or cold structures) or it can come from the infiltration of groundwater.

In a normal situation, the weight of water pressing the liner against the pool structure will be too great to allow movement.

The effect will occur more readily when the pool is lined with smooth plastic or metal panels or with heavier bathing loads. Obviously shallow areas of the pool will have lower weight of water than deep areas. Hopper slopes will also be more susceptible to liner slippage than flat areas of the pool.

In the picture on the right, the presence of large folds indicates that significant quantities of water are present behind the liner. In effect, the liner is “floating”. There may be leaks at the joints between liner and water inlets or outlets, or maybe there is a ground-water problem.



Wrinkling of Liners 4

On the picture below, sharp creases are visible. These are a feature of a temporary ground water problem. There had been some kind of water infiltration behind the liner, which has lead to liner displacement and the formation of folds; as the ground water soaks away, the folds are flat and sharp.

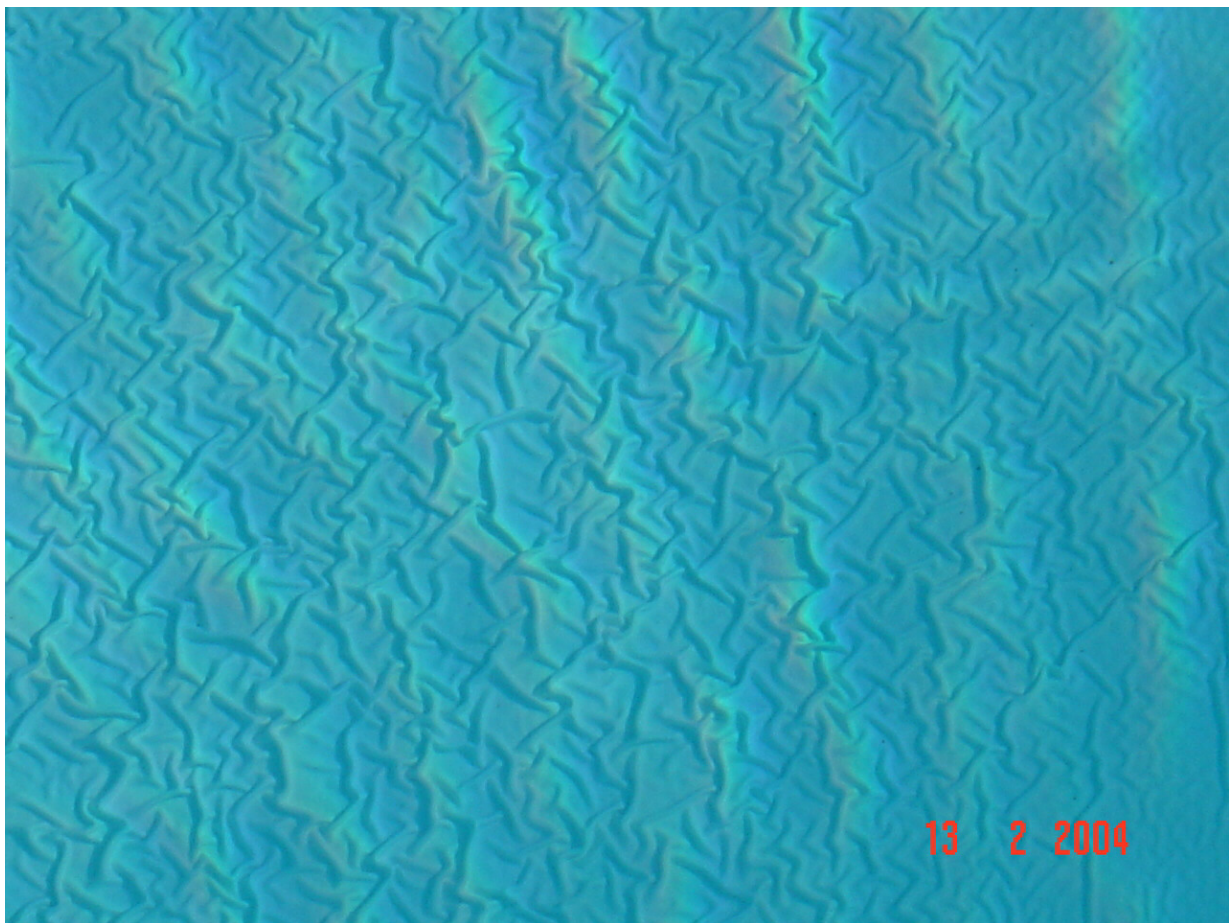
Such creases may appear after heavy rain showers. When the immediate area around the pool is flooded, there can be water infiltration between the liner and the pool structure creating a fold. A couple of days later, all this water will have disappeared. The weight of pool water on the liner does not allow the membrane to move back to its original position and without the water behind it the fold collapses leaving a creased liner.



Wrinkling of Liners 5

Large folds 30cm or more apart, indicate liner displacement with the presence of water behind the liner. Alternatively, situations, such as the illustration below, can occur where a number of small creases develop much closer together. This indicates that abnormally high moisture absorption has occurred, without excessive movement of the liner.

As already stated, a high degree of swelling of the membrane can be caused by high water temperature and/or high levels of chemicals in the pool water. Direct contact between chemicals and the liner is particularly likely to cause this kind of problem.



Wrinkling of Liners 6

A flexible PVC liner is a poor gas barrier. Moisture vapour can migrate through the liner. If the supporting structure is made of concrete or masonry, these small quantities of humidity will easily be absorbed within the structure.

If however the supporting structure is very smooth and waterproof (e.g. plastic or metallic wall panels), this small quantity of humidity will form a slippery film between the liner and the pool structure.

In the picture on the right one can see that the liner material close to the water level (where there is less water pressure) has been able to slip and form vertical folds.

