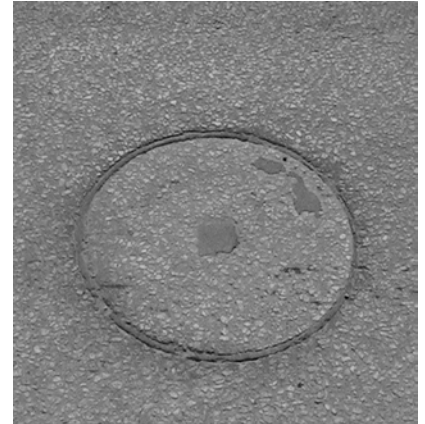


Utilibond Service Bulletin Surface Cracks

The successful adhesive and cohesive bonding performance of Utilibond is due both to the fineness of its granular structure and proprietary additives that contribute to lower surface tension when in liquid form and accelerated strength gain during hydration. When initially mixed, Utilibond has a low viscosity and a low surface tension that allows capillary forces to draw it well into the pore structure of the concrete and fully engage the underlying substrate where its very high density and super-fast strength gain result in a very strong bond capable of supporting 52,600 lbs in less than 30 minutes. When used for reinstatement of cores, these properties result in a waterproof joint that reintegrates the core with the roadway to restore the structural performance of the original roadway as a load bearing system.

Surface Cracks

Small pattern cracks occurring at the surface are associated with early surface drying or cooling, causing the immediate surface to shrink differently than the underlying concrete. They are difficult to prevent and are not uncommon on finished surfaces, especially when high early-strength concrete, like Utilibond, is used. These cracks are typically less than 1/8 to 1/4-inch deep and are generally not structurally significant.



Surface cracks in reinstated roadway.

“Surface cracks do not affect the structural integrity of concrete.”

- National Ready Mixed Concrete Association. Silver Spring, MD

Causes of Surface Cracks

The most common cause of cracks in concrete is the slight shrinkage that occurs as the material dries. As concrete cures, the water that has been mixed with the cement and sand begins to evaporate. This causes the concrete to shrink slightly and surface cracks to appear.

When a cored hole is reinstated with Utilibond, fine surface cracking may sometimes appear as the Utilibond at the surface dries and hydrates more rapidly than the Utilibond deeper in the kerf. These surface cracks are caused by the tensile stresses that build on the surface of the bond as the Utilibond gives up moisture.

Environmental conditions conducive to high temperature evaporation rates, such as low humidity, extremes in ambient temperature, direct sunlight, and drying winds when the concrete is just beginning to gain strength, causes rapid surface drying and can contribute to surface cracking.

This is because water from the surface layer of Utilibond evaporates faster than moisture can migrate from the underlying material to replace it. The resulting differences in moisture content produces tensile stresses that are relieved by surface cracking of the Utilibond at the surface.



Satellite core samples taken through bonded area of reinstated core. The light gray line is Utilibond showing excellent bonding of asphalt-concrete core (central area) and undisturbed pavement (outer layer).

“Surface cracks are very common and are of no structural concern.”

- Concrete Foundations Association of North America. Mount Vernon VA

The chemical hydration process through which all cementitious compounds, like Utilibond, harden and gain strength, also produces heat which can cause concrete material to expand slightly within the kerf.

At the same time, the Utilibond at the surface is exposed to air and sun and loses water through evaporation. Both of these conditions contribute to cooling and shrinking of the concrete at or near the surface and contributes to surface cracking. Keep in mind that a surface crack of itself is not evidence of a failure of Utilibond, but rather the normal behavior of the material as it cures.

Depending on the environmental conditions, drying shrinkage cracking is inevitable. The best way to avoid surface cracking is to prevent rapid loss of surface moisture while the concrete is still plastic through use of spray-applied finishing aids like Utilicure.

This surface cracking or flaking does not in any way affect the structural integrity or strength of the bonded core in the road way. These cracks may appear as blemishes but they are purely cosmetic.

“Most random cracks that appear at an early age... rarely affect the structural integrity or the service life of concrete.”

- National Ready Mixed Concrete Association. Silver Spring MD

How To Prevent Surface Cracking:

To prevent surface cracking begin the curing process as soon as possible and keep the surface moist using a dampened white-wash brush to paint the surface of the core continuously for a minimum of 30 minutes at 70°F while the Utilibond cures. An alternative would be to spray the surface with a liquid-membrane curing compound such as Utilicure.



Keep surface wet to prevent premature hydration.



Utilicure being applied to reinstated valve box.

When high evaporation rates are anticipated, prior to pouring the Utilibond into the hole and reinstating the core, lightly dampen the core surface and the sides of the hole to prevent them from absorbing too much water from the Utilibond.

To avoid these cosmetic surface blemishes it is important to keep the surface of the core wet until the Utilibond has set for 30 minutes, at 70°F. Failing to keep the surface wet may result in premature hydration of the surface Utilibond, resulting in surface cracks. Opening the road to traffic prematurely can result in erosion of the surface of Utilibond.

Make sure Utilibond is completely set before opening the road to traffic.

Utilicor Technologies Inc.

www.utilicor.ca

email: info@utilicor.ca

Tel: 416-391-3901