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- (73) Patenthaver: **Gallusberg Anstalt, Schlossstrasse 50, 9497 Triesenberg, Liechtenstein**
- (72) Opfinder: **Freilinger, Christian, Donautalweg 10, 4062 Kirchberg-Thening, Østrig**
- (74) Fuldmægtig i Danmark: **Dennemeyer & Associates S.A, P.O. Box 700425, DE-81304 Munich, Tyskland**
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XP055386410, Gefunden im Internet: URL:[https://www.schomburg.com/de/de/dateien/betocrete-c16-7933a3b0-37f8-4107-8448-761c696e04d9/BETOCRETE-C16_\(12\)DE.pdf?dl=1](https://www.schomburg.com/de/de/dateien/betocrete-c16-7933a3b0-37f8-4107-8448-761c696e04d9/BETOCRETE-C16_(12)DE.pdf?dl=1) [gefundet am 2017-06-29]**
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METHOD FOR SETTING A ROAD SURFACE

The present invention relates to a method for preparing and maintaining a ground surface for underground and overground parking garages from a cement-based composition, which contains an additive that improves the water-repellent and water-sealing properties of the cement-based composition or the concrete.

An overground parking garage is to be understood as a one-storey or multi-storey building that has space for parking vehicles inside the building, which building therefore covers the vehicles. For the purposes of this document, a garage, in particular a large garage, also represents a parking garage.

According to the prior art, it is known to construct ground surfaces for underground and overground parking garages from asphalt or mastic asphalt, which has the disadvantage of the dark colour, among other things. It is also known to perform these coverings with surface protection systems (OS systems) which are applied to a concrete surface in the form of polymer-containing layers as protection. The above-mentioned methods are relatively complex and the ground surfaces that are constructed are susceptible to wear. It would be desirable to build a concrete ground surface. However, concrete has the disadvantage that conventional concrete does not meet all of the requirements for chemical resistance, abrasion resistance, water resistance and crack bridging. In particular when installing industrial floors, it is therefore known to subsequently provide a constructed concrete screed with a sealing layer made of a solution containing water glass, which impregnates the concrete up to a few mm below the surface. It is disadvantageous that the impregnated layer is relatively thin, which means that the floor has to be repaired after wear and tear, and that crack healing is not sufficient or continuous when impregnated.

According to the prior art, it is known that buildings, dwellings, bridgeheads, bridge piers, harbour jetties, dams, sewers, tunnels, foundations standing in water or other structures made of concrete where there is moisture on the concrete or even water, can be modified with sealant additives so that moisture cannot penetrate and there is no significant moisture penetration of the hardened concrete.

Among the sealant additives known today, a distinction is mainly made between hydrophobic and crystallising sealant additives.

Hydrophobic sealants contain, for example, alkaline earth metal salts of fatty acids, which reduce the capillary water absorption of the concrete. For example, when using calcium sterates or calcium oleates, the molecules align themselves on the surfaces of the

concrete due to their surfactant structure, i.e. also on the inner surfaces of cracks or capillaries, in such a way that the long non-polar hydrocarbon chains are directed away from the solid surfaces and the polar caboxylate groups attach themselves to the solid surfaces. This significantly reduces the wettability of the concrete surfaces.

In the case of crystallising sealant additives, soluble carbonates and organic acids, such as tartaric acid or fumaric acid, are added to the fresh concrete. These connections lead to the formation of crystal structures in the capillaries of the concrete, as a result of which these are sealed and the penetration of water is thus reduced. In any case, the closing of cracks in the concrete by crystallisation requires the presence of water or moisture, so that this only takes place when it comes into contact with water. This explains that these additives are only intended for concrete that has sufficient contact with water or moisture, such as waterlogging from the ground.

The following documents from Schomburg GmbH disclose concrete additives for crystalline sealing; "Safety data sheet Betocrete C16", 12 May 2016, pages 1-7, XP055386410 and "Betocrete C16, concrete additive for crystalline waterproofing, technical data sheet", 12 May 2016, pages 1-2, XP055386418.

From EP2292568A an improved sealant additive for the production of cement-based compositions or concrete is known, which also ensures a good seal of the structure in the area of hydraulic structures and reduces the risk of the concrete becoming damp, wherein it is described that cracks of up to 0.3 mm are sealed by crystallisation of the sealant additive on contact with water.

JP H02 145469 A describes a fast-curing asphalt concrete.

The object of the invention is to provide a method for preparing a ground surface for underground and overground parking garages, which is formed from concrete and meets the requirements with regard to watertightness, durability and crack bridging.

According to the invention, it is proposed to design the ground surface as a layer of concrete which is thicker compared to the prior art and has a layer thickness of 2 cm to 10 cm, which contains a crystalline sealing agent added to the concrete over the entire layer thickness, wherein the ground surface is applied on an existing concrete intermediate ceiling or a concrete bottom plate and, after drying out, is supplied with sufficient water to ensure lasting crack bridging.

The invention is based on the idea of using concretes that are designed for constant contact with water, for example as a casing for drinking water containers for the ground surface, since these are waterproof, chemical-resistant and hard and therefore wear-resistant. Until the present invention, however, the use of these concretes as a ground

surface for underground and overground parking garages did not appear to be possible, or at least was not undertaken because the required crack bridging did not appear to be possible. This can be explained by the fact that the concretes were developed for use in permanently moist environments and the crack bridging by crystallisation requires a certain amount of moisture or wetness. In the case of floors in underground and overground parking garages, however, this contact with moisture does not exist or is not guaranteed permanently, so that the concrete would form cracks, as a result of which the floor would no longer be sealed against oils and other organic liquids.

The solution according to the invention for this problem of supplying the concrete floor with water “artificially” or in a defined intended way may appear simple in retrospect, but the present invention eliminates a long-standing misconception and creates a new advantageous possibility for the production of ground surfaces.

The advantage of the present invention is the use of conventional concrete as the basis for the ground surface, which is an inexpensive and easy-to-use building material. Concrete has the advantage over asphalt that it can be light to white and can therefore be dyed as desired. The use of the preferably colourless or transparent crystalline sealant does not change or impair the appearance of the concrete. It is also advantageous that crystalline crack bridging takes place over the entire layer thickness of the concrete covering, which means that the entire concrete layer is designed as a wear layer and the covering cannot therefore be repaired after a surface coating that is a few millimetres thick has worn. It is particularly advantageous that the ground surface can be applied as a layer in one operation, which saves time and effort, since sealing in a later step, as with OS systems, is not required.

The concrete additive for the concrete covering according to the invention in any case contains a crystalline sealing agent, which leads to crystallisation on contact with water, wherein the crystallisation results in an increase in volume, which leads to the closing of cavities and cracks.

Standard concrete such as C30/37 is suitable as concrete.

A liquid crystalline waterproofing agent from SCHOMBURG GmbH with the brand name Betocrete® C-Series, in particular Betocrete C16 or Betocrete C21, is particularly preferably used as a concrete additive. It is an aqueous salt solution with metal soaps containing potassium carbonate, sodium carbonate or lithium carbonate.

These crystalline sealants are described, inter alia, in EP 2292568 A, the content of which is summarised in the following paragraphs.

The preferred sealant additive for cement-based compositions accordingly contains at

least one synthetic and/or natural wax in aqueous dispersion or emulsion. In the context of the description of EP 2292568 A, “wax” or “waxing” is understood to mean animal and vegetable waxes, which also include lipids, for example. The main components of such waxes are esters of fatty acids with long-chain, aliphatic, primary alcohols, so-called wax alcohols. Furthermore, “waxes” in the sense of EP 2292568 A are also understood to mean, for example, jojoba oil or similar substances that do not consist of triglycerides and are therefore not fatty oils, but instead are chemically considered liquid waxes. In addition, “waxes” in the sense of EP 2292568 A are also synthetic waxes that are mainly obtained from petroleum and that consist, for example, of paraffin or hard paraffin. Finally, “waxes” in the sense of EP 2292568 A are also natural waxes that have been chemically modified or completely synthesised, such as polyethylenes or copolymers or, for example, soy wax obtained from soy by hydrogenation. The wax or waxes used in the production of the advantageous sealant additive preferably contains at least one ester of higher aliphatic fatty acids, which preferably have C30-C34 alcohols. The advantageous sealant additive also preferably contains at least one water-soluble or water-dispersible metal salt of the C8-C34 fatty acids. The metal salt or salts of the C8-C34 fatty acids are preferably alkali metal, alkaline earth metal and aluminium salts. Particular preference is given to selecting from the group of water-soluble or dispersible metal salts of C8-C34 fatty acids, such as, for example, potassium caprylate, potassium caprylate, calcium laurate, sodium myristate, sodium palmitate, potassium oleate, lithium stearate, sodium stearate, potassium stearate, calcium stearate, magnesium stearate, aluminium di- and tristearate. The advantageous sealant additive preferably also contains water-soluble carbonates in addition to one or all of the above components. The addition of such carbonates achieves the effect of crack healing on contact with water, which has been used to advantage in particular in hydraulic engineering.

The added water-soluble carbonates serve as carbonate sources in hardened concrete, from which carbonate ions dissolve when water enters through cracks or capillaries and diffuse into the cracks and capillaries. There is a carbonation and thus a closure of the cracks or the capillaries.

The water-soluble carbonates and hydrogen carbonates are particularly preferably selected from a group that contains alkali carbonates and ammonium carbonates, such as, for example, sodium carbonate, sodium hydrogen carbonate, potassium carbonate, potassium hydrogen carbonate, lithium carbonate, lithium hydrogen carbonate and ammonium carbonate, ammonium hydrogen carbonate and combinations thereof and the like.

Alkali carbonate is preferably present in the crystalline sealant in a proportion of 10-25% by weight.

The crystalline sealant in liquid form with a mass of 2 to 3%, based on the mass of the cement formulation, is preferably added to the mixed concrete or to the mixing water, but at least 7 kg per m³ of the mixed concrete.

An exemplary particularly preferred method according to the invention for preparing the ground surface is as follows:

If necessary, step 1 consists of pretreating the substrate, which consists of thorough cleaning and roughening of the concrete intermediate ceiling or the concrete bottom plate in order to improve the adhesion of the subsequent concrete covering. The surface is preferably blasted for roughening, in particular by shot blasting. The pretreatment also includes moistening the surface with sufficient water. In experiments, roughening and moistening the substrate has proven to be sufficient to achieve excellent adhesion of the concrete covering according to the invention. However, epoxy resin primers or cement-based primers are also suitable for pretreating the substrate.

Step 2 consists of applying the concrete mixed with the liquid crystalline sealing agent to the substrate with a layer thickness of 2 cm to 10 cm, preferably with a layer thickness of 2.5 cm to 4 cm.

Step 3 consists of smoothing the smoothing wings and possibly fine-tuning the concrete surface.

Step 4 consists of repeatedly pouring the dried concrete covering with water until it is saturated. This is preferably done 2-3 times immediately after the ground has dried out, so that initial protection and hardening of the ground by crystallisation are provided.

Step 5 consists of the recurring supply of water to the ground, which can advantageously be combined with cleaning the ground. The particularly significant supply of water at intervals ensures that water can penetrate into cracks that may have occurred in the meantime and thus initiate crystallisation in them, which leads to the cracks growing. This enables reliable crack bridging for cracks of up to at least 0.4 mm in width.

The period of the irrigation or cleaning intervals depends, among other things, on the layer thickness of the concrete covering and can best be determined by tests, a guideline value is around 6 months.

It is also less preferred to produce an entire floor slab or an entire intermediate ceiling from the material of the concrete covering according to the invention, and indeed already during the concreting work when the structure is erected, so that the floor slab or the intermediate ceiling itself forms the ground covering according to the invention. The

disadvantage of this is the higher costs, since instead of the 2 cm to 10 cm thick ground covering, the entire floor slab or an entire intermediate ceiling would have to be provided with the crystalline sealing agent.

FREMGANGSMÅDE TIL FREMSTILLING AF EN KØREBANE BELÆGNING**Patentkrav**

1. Fremgangsmåde til fremstilling af en kørebanebelægning af beton til en parkeringskælder eller et parkeringshus, hvor der påføres et lag beton, der indeholder et krystallinsk tætningsmiddel, på mindst 2 cm, kendetegnet ved, at der umiddelbart efter udtørringen af betonen i det mindste én gang, fortrinsvis 2 til 3 gange, påføres vand i hvert enkelt tilfælde indtil mætning af betonen, hvorefter påføringen af vand gentages fortløbende i tidsmæssige intervaller.
2. Fremgangsmåde ifølge 1, kendetegnet ved, at kørebanebelægningen påføres på en færdig bundplade eller mellemdæk, hvor kørebanebelægningen påføres med en lagtykkelse på maksimalt 10 cm, fortrinsvis maksimalt 4 cm.
3. Fremgangsmåde ifølge 2, kendetegnet ved, at bundpladen eller mellemdækket er fremstillet af beton og rengøres, rugøres og befugtes som forbehandling.
4. Fremgangsmåde ifølge et af kravene 1 til 3, kendetegnet ved, at det krystallinske tætningsmiddel tilsættes i flydende form, som vandig saltopløsning med metalsæbe, der indeholder en alkalikarbonat, til den flydende beton eller allerede til blandingsvandet til dette.
5. Fremgangsmåde ifølge et af kravene 1 til 4, kendetegnet ved, at kørebanebelægningen af beton glittes og/eller slibes før den første påføring af vand.