TECHNICAL PROPOSITION OF PERMANENT WATERPROOFING OF EXISTING UNDERGROUND REINFORCED CONCRETE WALLS WITH PENETRON® SYSTEM – ACTIVE CRYSTAL FORMATION WITH PENETRATING ACTION ABOVE ONE METER IN DEPTH



Surface preparation, repair and waterproofing existing surface of reinforced with the PENETRON® system. Application on the internal side (negative)

1. System application on the walls

Depending on the working procedures, concrete surface can be treated and cleaned by a high pressure jet waterblasting (300-500 bar), for better visual contact with faulty areas.

Then, the water leaking cracks can be sealed with the rapid-setting crystalline waterproofing plug PENEPLUG® (mix with minimum water until the texture is as dry-earth). For a better application of PENEPLUG®, cracks should be routed out with mechanical means, up to 2 – 3 cm in width, in a conical shape, for better anchoring of the rapid-setting plug, during the application. Cold joints can be treated in a similar way, by cutting on both sides of the joint with mechanical means and creating a wedge, 3 cm in width. Next, rapid-setting plug PENEPLUG® is applied.

In some cases, depending on the work schedule, PENEPLUG® can be used as a waterplug, prior to waterblasting, but only after PENEPLUG® has reached its mechanical strength. It must be pointed out, that 1 – 2 layers of the integral crystalline waterproofing coating PENETRON®, at a mixing ratio of 5 parts PENETRON® powder to 3-3.5 parts water (by volume), must be applied on PENEPLUG®, by brush, while the latter is still “tacky” and the total consumption of PENETRON® mixture is 1.5 kg/m^2 in total for 2 layers (depending on the surfaces, the indicative consumption should be between 1.1 to 1,6 kg / m^2).





2. Repairing and waterproofing of honeycombed and spalled areas, according to the following procedures





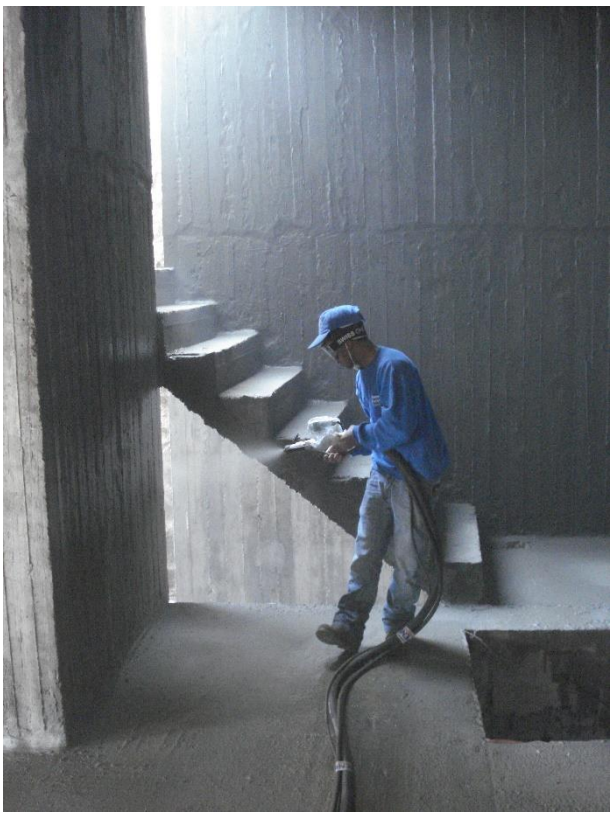
Cracks, honeycombed and spalled areas, of new or existing concreting, should be routed out with mechanical means, to remove dirt, loose materials and aggregates. Clean honeycombed areas with excess water, to remove loose materials and moisten the surface to a dull dampness, which is prerequisite for the application of PENETRON® integral crystalline waterproofing system. When the concrete is damp, with no wet sheen on the surface, apply a slurry coat of PENETRON®, at a mixing ratio of 5 parts PENETRON® powder to 3-3.5 parts of water (by volume), on the areas to be patched or repaired and 2/5" (10 mm) around them. While PENETRON® coating is still "green" (tacky), mix PENECRETE MORTAR® with adequate amount of water, until the desired consistency is achieved [usual mixing ratio is 4.5 parts of PENECRETE MORTAR® to 1 part of water (by volume)] and filling the cracks and spalled areas. When PENECRETE MORTAR® has set, but is still moistened, apply a second layer of PENETRON® slurry coat, at a mixing ratio of 5 part PENETRON® powder to 3-3.5 parts of water (by volume), on the repaired areas. At this stage, if waterproofing of the total construction is required, apply a slurry coat of PENETRON® on the whole surface, in two layers, while the first layer is still "green" (approx. half to one hour later).

In lots of applications, to save time, the first layer of PENETRON® is applied post to surface preparation and dampening and approx. half an hour later, while the product is still "green", the repairing mortar PENECRETE MORTAR™ is applied. Approx. half to one hour later, and while PENECRETE MORTAR® is still "green", the second layer of PENETRON® slurry coat is applied. The total consumption of the two layers of PENETRON® is 1.5 kg/m^2 (depending on the surfaces, the indicative consumption should be between 1.1 to 1,6 kg / m^2).

3. Repairing and waterproofing of tie holes and pointing applications, according to the following procedures

Tie holes must be repaired, as mentioned below. Areas should be chiseled back to sound concrete, by mechanical means and the area of 1.4'' (35 mm) around them and metal formworks must be removed or, at least, sawcut and routed out at a reverse wedge of 1.2''x1.2''x1.6'' (30 x 30 x 40 mm). Clean areas with excess water, to remove loose materials and moisten the surface to a dull dampness, as mentioned above. When the concrete is damp, with no wet sheen on the surface, apply a slurry coat of the integral crystalline waterproofing coating PENETRON®, on the areas to be patched or repaired and 2/5" (10 mm) around them, at a mixing ratio of 5 parts PENETRON® powder to 3-3.5 parts of water (by volume).

While PENETRON® coating is still "green" (tacky), mix the integral crystalline repairing mortar PENECRETE MORTAR® with adequate amount of water, until the desired consistency is achieved [usual mixing ratio is 4.5 parts of PENECRETE MORTAR® to 1 part of water (by volume)] and filling the cracks and spalled areas. As mentioned above, when PENECRETE MORTAR® has set, but is still moistened, apply a second layer of PENETRON® slurry coat, at a mixing ratio of 5 parts PENETRON® powder to 3-3.5 parts of water (by volume), on the repaired areas. At this stage, if waterproofing of the total construction is required, apply a slurry coat of PENETRON® on the whole surface, in two layers, while the first layer is still "green" (approx. half to one hour later).



In lots of applications, to save time, the first layer of PENETRON® is applied post to surface preparation and dampening and approx. half an hour later, while the product is still "green", the repairing mortar PENECRETE MORTAR® is applied. Approx. half to an hour later, and while PENECRETE MORTAR® is still "green", the second layer of PENETRON® slurry coat is applied. The total consumption of the two layers of PENETRON® is 1.5 kg/m^2 (depending on the surfaces, the indicative consumption should be between 1.1 to 1,6 kg / m^2).

4. PENETRON® System General Guidelines

It must be pointed out, that in lots of applications, thorough surface treatment for opening the porosity of the surface is required, especially in applications, where smooth wooden or metal formworks have been used.

Also, in surfaces with a wide range of wear and aggregates in depth, the non-ferrous non-shrinking grout, PENETRON® GROUT, with 1% (by weight) waterproofing crystalline admixture PENETRON ADMIX®, can be used. Perimetrically on the formed openings on the vertical surfaces, where PENETRON® GROUT will be applied, the water expanding strips PENEBAR® SW can be used, to ensure better waterproofing results.

In lots of applications, waterproof shotcrete, with 1% (by weight) waterproofing crystalline admixture PENETRON ADMIX®, can be used, instead of PENETRON® GROUT, to fill the formed openings. Also, the crystalline water cut-

off injection grout PENETRON® INJECT, can be used in cracks, even under hydrostatic pressure. The system is applied by an injection pump.

The PENETRON® system can be applied on reinforced concrete floorings, after having made the necessary preparations, as above.

Important: In case of concrete tanks, walls or floors that will be exposed to water or corrosive liquids (water tanks, swimming pools, wells, tanks and wastewater treatments, etc.) PENETRON® should be cured sufficiently. According to general directives for cement curing, PENETRON® system should cure for 10-12 days, prior to water exposure. In case of hot water or corrosive liquids, curing time is estimated to 18 days.

The process of proper curing is very important as it could decrease PENETRON® system's performance and properties (waterproofing, mechanical strength, chemical resistance, etc.).

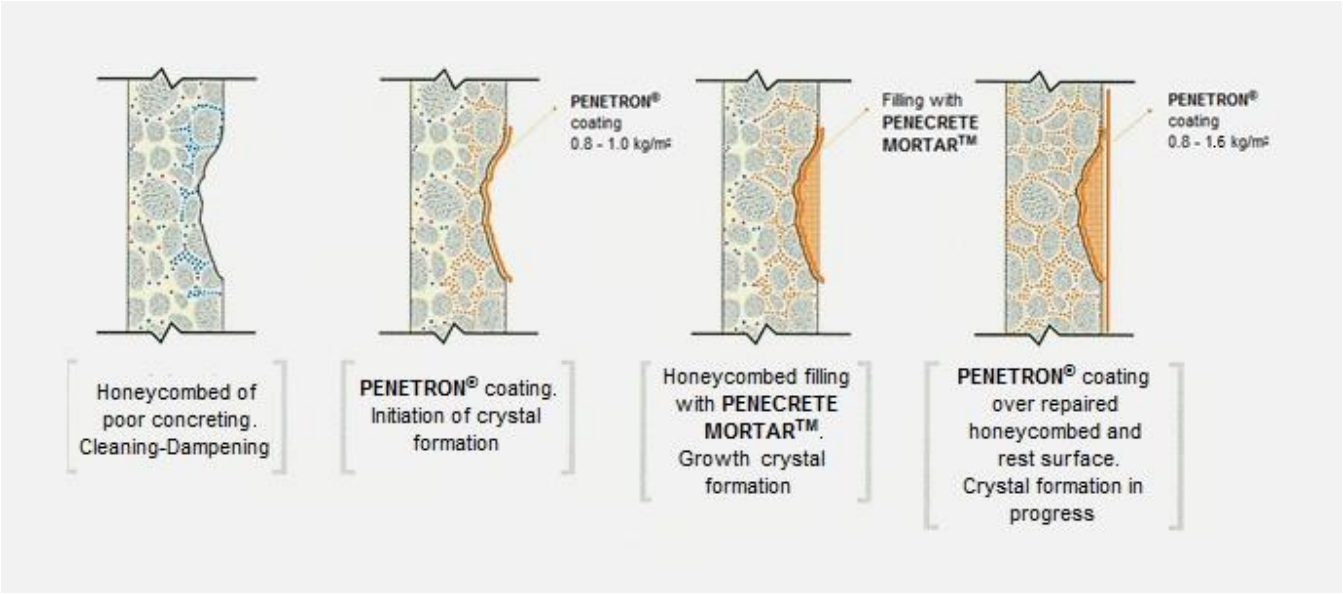
5. Neutralization

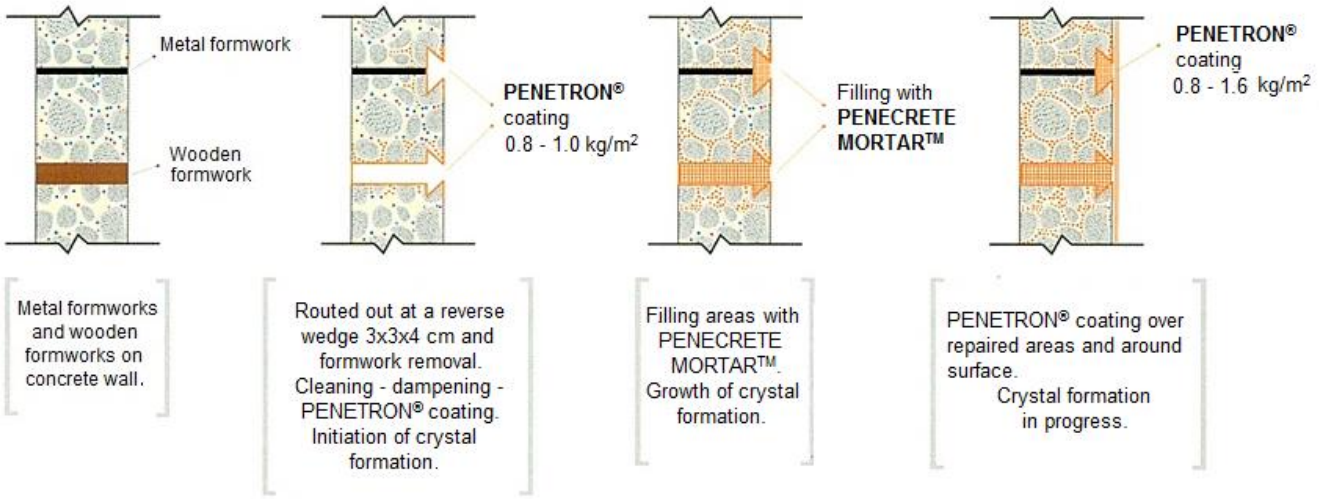


As the application of PENETRON® products on the concrete surface cause the formation of silicic salts, not only in the concrete matrix, but most of the times on the surface of application as well, (usually after the first 48 hours since application), there is a technical issue, regarding the reduced adhesion of decorative coatings or paints. The problem is treated with the "neutralization" procedure. Neutralization is actually the good "wash" of the surface, approx. after 3 weeks, since the application of PENETRON® products (adequate time for the PENETRON® to act), with a low acidity "aggression" hydrochloric acid (HCl) aqueous solution 3-8% in content or a vinegar solution in water (at a mixing ration 1:3 to 1:10, depending on the vinegar acidity).

During the application, after the surface in cleaned with a vacuum cleaner, use a brush and a plastic pail, containing the solution for the neutralization, "wash" the surface with the solution and after a few minutes, wash the surface with excess water. Then, the surface, after it is dry, can be coated or painted. Alternatively, for the use of decorative screeds, they can be applied within the first 48 hours and before the formation of the silicic acids on the surface. In that case, the time for the coating application is minimized, but the drawback is the inability to control the correct application and operating of the system. Also, in that case, there is always a small possibility for a percent of the formed crystals to penetrate the coatings or screeds and appear on the surface.

A schematic description of repaired services with PENETRON® integral crystalline waterproofing system of PENETRON INTERNATIONAL LTD is depicted below:





The description texts mentioned above are not subject of a case study, but technical propositions, according to our best of knowledge and based on our experience and knowledge up to date. For more information, regarding the safe use, treatment and storage of our products, contact PENETRON HELLAS and refer to the *Product Data Sheet* and *Material Safety Data Sheet* of every product you use.

PENETRON HELLAS S.A.
G.E.M.H. No: 07278001000
Athens Headquarters - Greece
50, Thrakomakedonon Ave.
136 79 Acharnes, Greece
Call Center: +30 210 2448250
info@penetron.gr, www.penetron.gr