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VI). Hydrophobic Impregnations for Concrete Protection

Hydrophobic impregnations for effective concrete protection are generally based on Silanes or Siloxanes, or blends of these materials. Due to their small molecular size and penetrating ability, together with their unique water-repelling or hydrophobic properties, they can penetrate completely into the surface pores and capillaries of concrete and other facade surfaces; thereby creating a water repellent (hydrophobic) surface, but without any significant residual surface film and therefore this is also achieved without changing the surface appearance (as would a protective paint coating or cement based material).

As a result the reinforced concrete façade surface is waterproof; which prevents further water ingress, but it is still open for water vapour diffusion in each direction. This allows any residual moisture, internally generated water vapour or interstitial condensation within the structure, to escape and therefore this also protects and prevents against freeze thaw damage, such as scaling etc. With all types of hydrophobic impregnation the amount of material that is applied and the depth to which it is able to penetrate into the concrete surface, are critical factors in the effectiveness of the treatment, the resulting water-repelling performance and most significantly, the durability of the water-repellancy. In all projects it is therefore important to specify exactly what type of hydrophobic impregnation and preferably exactly which product should be used, together with the amount of material that is to be applied in order to achieve the desired level and durability of performance.

Hydrophobic impregnation products designed to protect concrete surfaces can be supplied many in different formulations, which include:

- **100% Silane impregnations:** - These are very expensive and somewhat volatile, so effective in penetration and performance, but with high wastage and at a very significant cost;
- **Solvent diluted silane and siloxane impregnations** (and blends thereof):– These are less efficient but more cost effective and lower wastage, with the best performance on damp surfaces or in colder conditions, however there are the associated risks associated with solvent containing materials;
- **Water dispersed silane and siloxane impregnations** (and blends thereof):– These are less efficient than solvent diluted impregnation materials and significantly more expensive, however there are no associated solvent risks or excessive wastage factors due to premature evaporation.
- **Gel or Cream formulations of silane and siloxane impregnations** (and blends thereof):– This type of hydrophobic impregnation is a relatively modern development. Gel formulations 'sit on the surface' allowing precise levels of consumption, optimum penetration depth from the longer penetration time

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available (i.e. no run off or evaporation), they are also much easier to control in application and to minimize waste.

In the European Standard EN1504 Part 9 Principle 5 (Physical Resistance), Method 5.2 Impregnation; Principle 6 (Chemical Resistance) Method 6.2 Impregnation; Principle 8 (Increasing Resistivity) Method 8.1 Increasing Resistivity by the Use of Surface Treatments or Coatings – Can all apply as appropriate to the specific structures requirements.

Protective Hydrophobic Impregnations characteristics and performance requirements are also defined in European Standard EN1504 Part 2, with the appropriate product selection then being in accordance with the specific requirements and exposure conditions of the project.

NCC has extensive experience with the wide range of hydrophobic impregnation products available for protecting reinforced concrete surfaces on different types of structures, in different exposures and with different access and performance requirements. Therefore our specialists can advise on the selection, specification and application of the best material for your project. You can call any of our offices for assistance with hydrophobic impregnations.