

## Siloxane Admixtures and Coatings new solution for corrosion protection

Although well known for its durability, concrete is subject to corrosion as a result of the onslaught of humidity and chloride-ion penetration, which is not only have a destructive impact on the concrete itself, but also on the reinforcement steel used to improve the tension of the structure. When rebar corrodes, the rust expands cracking the concrete, and unbonding the rebar from the concrete (See Fig 1 and 2). The water in the pores of the cement is normally alkaline- and in such environment steel is passive and does not corrode. However, the carbon dioxide from the air reacts with the alkaline in the cement and makes the pore water more acidic. The acidity in combination with humidity leads to corrosion of the rebar – and the process is hastened by the presence of chloride ions.



Fig 1



Fig 2



Fig 3



Fig 4

## Traditional solutions using bituminous coatings

All these destructive reactions require water. Hence, keeping the concrete dry is an important feature for concrete protection and maintenance. Water-repellant protection, which leaves the concrete surface breathable (vapor permeable) and reduces (or suppresses) the chloride ion penetration, is required. Broadly used for that purpose are bitumen coatings. However, bitumen coatings are reported to have limited durability and after a while the corrosion process will start due to its nature of a film forming material with limited mechanical ability to protect the surface of the concrete. The material is also prone to adhesion failure and delamination over time due to varying exposed weather conditions.

## Proven effectiveness of Siloxane Emulsions

Siloxane and water-based siloxane emulsions however, have been considered as the latest solution to contain corrosion. Tests conducted on the use of siloxane emulsions on roadwork applications such as tunnels and bridges by independent and authorized institutes in Germany and Sweden, having proved their efficiency. Recent tests for US highway applications according to National Cooperative Highway Research Program Report 244-11 have also confirmed the European results. The main subjects of the tests were water absorption, drying (vapour permeability) and chloride-ion absorption.

## References:

- (1) SP, Swedish National Testing and Research Institute, Boras, Sweden.
- (2) US Highway Research Program, Report 244-11, Maryland, US.