

NDTitans in action

Case 2.3 Carbonation depth with Rainbow Indicator and Deep Purple, Poland



Severe cases of carbonation damage



Incl. "pitting" from Cl



For new structures the reinforcement is protected by a film caused by the alkalinity of the cement paste (pH = 13) preventing corrosion of the rebars. When Carbon Dioxide (CO₂) from the air diffuse into the concrete, it reacts with the Calcium Hydroxide (CaOH₂) forming Calcium Carbonate (CaCO₃).
By this process the pH of the concrete decrease below its normal value at around 13, the reinforcement will

lose its protective film at around a pH of 9, and will start corroding. To measure the pH of the concrete the Rainbow Indicator or the Deep Purple is available to be sprayed on a fresh broken piece of concrete or a core or a freshly broken CAPO-TEST failure surface.

Deep Purple

RainbowIndicator
pH 5 7 9 11 13

Example

Rainbow Indicator and **Deep Purple** for depth of carbonation on a bridge girder



The Deep Purple and the Rainbow Indicator produced the same depth of carbonation, from the inside of the girder 54 mm and from the outside 25 mm. The reason for the different depth is that the outside is subjected to rain, slowing down the carbonation process, while the inside is relative dry.

Carb. depth 54 mm
Inside of Girder

Carb. dept 25 mm
Outside of Girder



Rainbow Indicator
Deep Purple

Reinforcement 40 mm deep

As part of bridge investigations in Poland the depth of carbonation was tested, both with the Rainbow Indicator and the Deep Purple indicator used, sprayed on freshly cut cores.

With the depth of the reinforcement 40 mm, misleading information concerning the protectiveness of the reinforcement could be given if testing was only made from the outside of the girder.

The reinforcement positioned at the inside of the girder had in fact started corroding, while reinforcement at the outside had no signs of corrosion.

Alternatively, spraying may be done on a CAPO-TEST cone hole to measure the depth of carbonation.

Testing made by **NDTitan Andrzej Moczek**