Corrosion Sensor „ANODE LADDER“

Corrosion sensor consisting of single steel anodes at different depths for the monitoring of the time-dependent chloride ingress or carbonation progress into the concrete.

1 Fields of application

The Anode Ladder is used for corrosion monitoring of structural elements of bridges, tunnels and parking structures exposed to deicing salts or marine structures in the tidal/splash zone. It was developed both for the installation into newly built and existing structures.

2 Description

Since 1990, the Anode Ladder has been used for corrosion monitoring of reinforced and prestressed concrete structures all over the world. It consists of six single steel anodes which are placed at different depths between outer reinforcement and concrete surface inside a stainless steel frame, a titanium oxide cathode bar and a pT1000 temperature sensor. The position of the anodes can be adjusted to the individual concrete covers. To make sure that the Anode Ladder can be used for long-term monitoring applications, Teflon coated cables are being used and the cabling is carried out redundantly.

3 Measuring principle

The corrosion of the single steel anodes can be detected by measuring the corrosion potential and the corrosion current between the anodes and the titanium oxide cathode. By means of periodic measurements, the ingress of the depassivation front into concrete can be monitored and the expected point of time of reinforcement depassivation can be extrapolated. Electrolytic resistivity measurements between neighbouring anodes allow for a determination of the moisture distribution inside the concrete.

4 Measurement parameters

Measurement of the open circuit potential of every single anode against the titanium oxide cathode, measurement of the short-circuit corrosion current between every single anode and the titanium oxide cathode, measurement of the electrolytic resistivity of two neighbouring anodes (two-electrode AC measurement), measurement of the concrete temperature, optionally measurement of reinforcement potential and corrosion current between reinforcement and titanium oxide cathode.

5 Dimensions

length: 310 mm  
width: 160 mm  
height: 30 – 80 mm

6 Measuring devices

The Anode Ladder can be measured with the measuring devices CANIN LTM or KMSE-HMG or can be integrated into existing measuring systems.