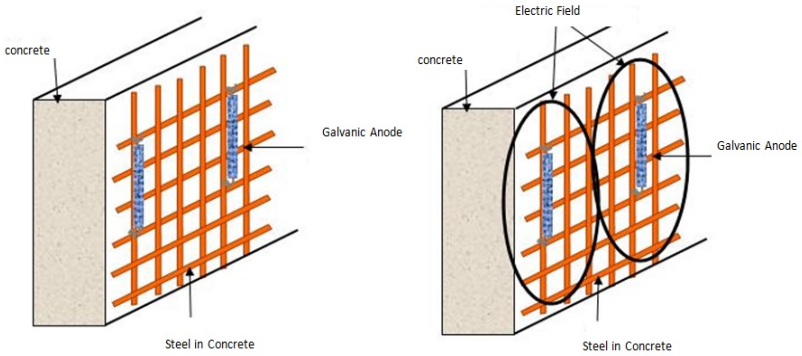
GSC SuperAnode

GALVANIC ANODES FOR STEEL IN CONCRETE

A GACP system utilises anodes which generate a natural DC current to suppress the corrosion of the steel in concrete. GSC Super Anodes are specifically designed to inhibit corrosion of concrete reinforced structures using GACP.
The anodes are typically embedded within the concrete or repair mortar and are electrically connected to the reinforcement by using galvanised ties.
As zinc is less noble than steel it means that the anode has a more electronegative potential than the reinforcement steel. This makes the zinc the anode and the steel reinforcement the cathode. Current will flow from anode to cathode inhibiting rebar corrosion thus avoiding concrete cracking and spalling in the presence of chloride salts within the concrete .

The Zinc anode will generate an electrical field whilst immersed in the electrolyte allowing protective current to be discharged to the steel within the anode area of influence.



This allows a relatively small amount of anodes to be distributed within the structure thereby reducing manpower requirements and costs if desired, performance can be monitored easily by on-site personnel

Application of GSC SuperAnode on new structures

GSC SUPERANODE DESCRIPTION

The GSC SuperAnodes are made of laminated zinc > 99.95% purity covered by two layers of different zinc-anode-activator-paste.
Each anode is vacuum sealed in a plastic bag to avoid contamination during shipping and storing.
Prior to application the packing is removed, and the anode is ready to be installed.
GSC SuperAnodes are supplied in the following sizes:
GSC10/10 ---------- mm 100 x mm 55 x h. mm 12
GSC10/20 ----------mm 100 x mm 55 x h. mm 15
GSC30/10 ----------mm 300 x mm 50 x h. mm 10
GSC30/20 ----------mm 300 x mm 50 x h. mm 12

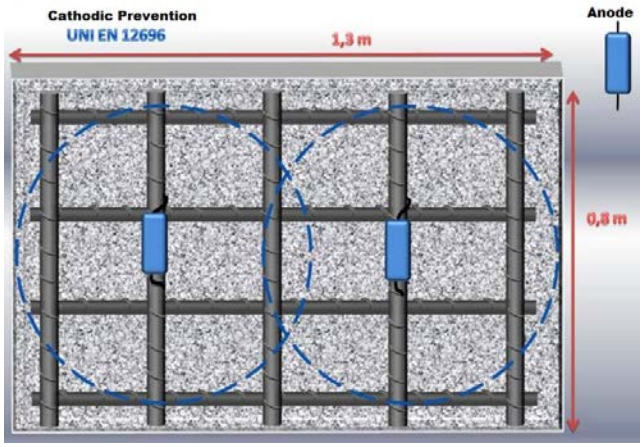
Current density

The current densities required for a typical CP system for new reinforced structures will range between 0.2 to 2 mA/m^2, whilst for older reinforced structures, where the reinforcement is not passive; the CP current density requirement will range between 2 to 20 mA/m^2 (ISO 12696).

1. Steel in concrete, being in a passive state, will require very low current densities to remain in this state, and if galvanic anodes are applied, which have a naturally low current output, will easily achieve the required design life span.
2. When steel is in an active state the initial current density requirement will be relatively high (circa 20 mA/m^2), the current density will then gradually diminish to the lower levels (4-5 mA/m2) when the steel re-passivates which may take up to 6 - 12 months depending on the aggressive nature of the environment and the concrete's chloride content.

Interestingly we see that the current output of these types of anodes adapt themselves naturally which will indirectly increase their life span when the current requirement will reduce over time.

A major advantage is that these types of system are free from maintenance, but if required can be easily monitored by simple



GSC SuperAnode: Electrical Field

NORMAL APPLICATION new structures

GSC SuperAnode 30/10 or 30/20 : 1 piece / m^2 concrete surface area
GSC SuperAnode 10/10 or 10/20 : 2 pieces /m^2 concrete surface area

APPLICATION

A) EXISTING STRUCTURES

In existing reinforced structures, CP is an integral part of the rehabilitation concept and is aimed to decrease the corrosion rate of the steel reinforcement from significant to negligible values.

CP can be used independently irrespective of the chloride concentrations and in fact the electric field will inhibit chloride ion migration towards the steel.

The re-passivation of the steel due to the different electrochemical reactions forced by the electric field will make also positive contribution to the structure's life span.

B) NEW STRUCTURES

New structures within aggressive environments can be provided with a CP system using a small amount of DC current that is applied early in its service life.

This type of protection is called cathodic prevention and can be used for new reinforced concrete structures, or existing structures in which the corrosion process is not yet initiated but corrosion will most probably occur due to progressive ingress of aggressive electrolytes over time.

For new constructions cathodic prevention can be applied in an easy and simple way as the current demand will be relatively low and therefore will be a low cost solution to achieve the design life span of the structure.

ANODE LIFE-SPAN

Our standard anodes have a design service life of 10 years for the GSC 10/10 and GSC 30/10 and 20 years for the GSC 10/20 and 30/20.

The anodes life span is determined by several factors which may alter over time. And in general is based upon standard presumptions that rarely correspond to the actual real life situation.

It should also be considered that the corrosion process of steel in concrete will not immediately be initiated once the anodes have reached their "end of life" and are no longer able to discharge protective current because as the steel in concrete has been re-passivated by the consumed CP system a time period will elapse before corrosion initiates due to the progressive ingress of aggressive species into concrete.

Upon request the anodes can be modified and designed to achieve a life span of 40 years.

The anode size and arrangement depends fully on local environmental parameters, even though all possible effects may be taken into consideration. Therefore life span calculations remain "best estimate" indications.

NORMAL APPLICATION old structures

GSC SuperAnode 30/10 or 30/20 : 2 piece / m^2 concrete surface area
GSC SuperAnode 10/10 or 10/20 : 3 pieces /m^2 concrete surface area

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