

GALVANIZED REBAR ENSURES LONG LIFE!



ZINC MATTERS

2022 ISSUE 4

GALVANIZED REBAR STEEL – ENSURING LONG LIFE TO CONCRETE

Reinforced concrete is an important construction material. Bridges, shopping malls, office complexes and structural columns are examples of reinforced concrete structures. In many cases, the steel reinforcement does not need any external corrosion protection to prevent corrosion. The highly alkaline environment in concrete forms a thin oxide layer on the steel surface which protects or “passivates” the steel against further corrosion. We normally measure the alkaline environment in concrete by means of a pH measurement.

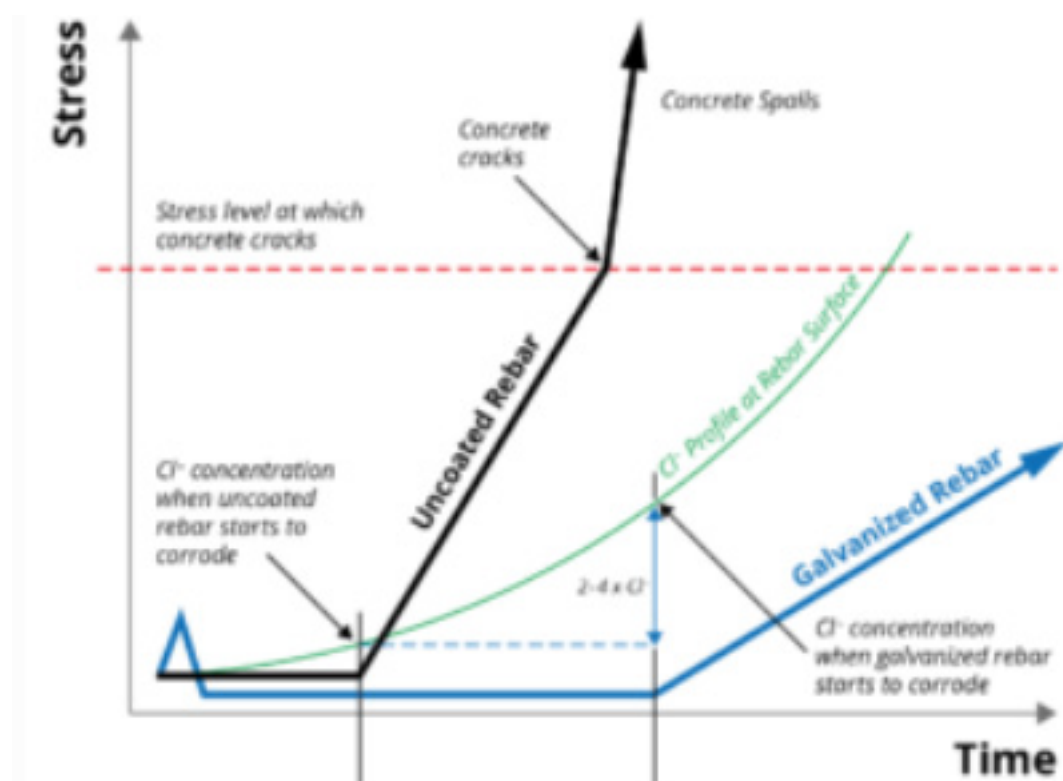
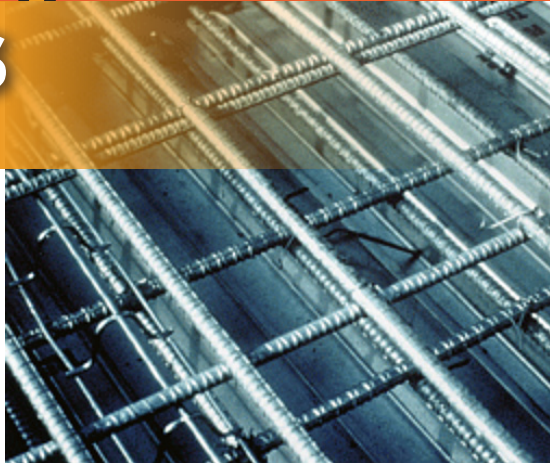
However, in some instances passivation does not work well enough, or not at all. This happens when:

- The concrete has cracks, sand pockets or too little cover (< 50 mm)
- The alkaline environment has been neutralized by carbonation (pH < 9 and lower)
- Chlorides have penetrated the concrete: e.g. near the sea

These situations often occur in the outermost parts of a construction. Defects in different concrete constructions are more common today than previously recognised. Once corrosion of the reinforcing steel has started it is very difficult and expensive to repair. The need to protect reinforcing steel from corrosion is vital in several concrete applications.

Barrier and cathodic protection

Galvanized reinforcing steel (rebar) is bare reinforcing steel coated with a protective layer of zinc which forms a series of iron-zinc alloys with the steel. The zinc alloys act as a barrier to the corrosive elements that the rebar is exposed to when embedded in concrete. In addition to the barrier protection that the zinc provides, it also provides a level of cathodic protection where the zinc will preferentially corrode when in contact with bare steel (e.g. where there a gap or scratch in the galvanizing). Galvanized coatings also possess other favourable corrosion characteristics when embedded in concrete, making them an effective coating material for providing corrosion resistance.



Corrosion Model for rebar courtesy of Nordic Galvanizers

Why galvanized reinforcing steel is so important?

The protection of reinforcing steel with hot dip galvanizing is well documented by case histories in many countries. Many thin constructions use hot dip galvanized reinforcing steel so as to avoid spalling which can result in expensive repair. It is also worth noting that debris from a spalled or cracked concrete structure may cause serious harm if it falls off a building.

Of the available metallic coatings, zinc hot dip galvanizing has been shown to be the most durable and technically suitable. Hot dip galvanizing of reinforcing steel for concrete has been used worldwide for many years. Even in very severe exposure conditions this surface coating on steel has been shown to be a reliable choice.

Various tests and trials worldwide have shown that:

- Accelerated corrosion of galvanized rebar steel only takes place during the first hours after pouring the concrete. After that, the coating is passivated. The loss of zinc coating is low, in the range 2-5 microns.
- Zinc gives cathodic protection to exposed steel surfaces, which is a benefit when cutting or welding the reinforcement or when it is mechanically damaged.
- The adhesion between reinforcement steel and the concrete is good.
- Concrete spalling does not occur as the steel is corrosion protected.
- The risk of discolouration of a concrete facade due to rust is eliminated.
- By galvanizing rebar, it is possible to use reinforced concrete in more aggressive environments.
- Thinner concrete cover can be allowed.

For further technical support please contact:

IZA AFRICA DESK
zinc@iafrica.com Tel: 021 788 9980
www.zinc.org Cell: 082 831 2924



**International
Zinc Association**
Zinc...essential for modern life