New rebar standard

EN 10348-2:2018 – Galvanized reinforcing steel products

_Share _Tweet _Save _+1 _Share

The implementation of a new standard for galvanized rebar will greatly enhance the performance of many concrete structures built across the UK and Ireland. The importance of correctly protecting steel reinforcement should not be underestimated.

Steel reinforcement is used in concrete structures to provide tensile strength and shear properties to compliment the compressive strength of concrete. This then means that sufficient protection must be provided to the reinforcement to prevent corrosion that might result in failure of the concrete structure.

One common technology that readily provides a high level of corrosion protection is hot dip galvanizing. Hot dip galvanized steel reinforcement can provide long term corrosion protection and helps to reduce or eliminate rebar corrosion in concrete. In December 2018, a European standard, EN 10348-2:2018 'Steel for the reinforcement of concrete – Galvanized reinforcing steel and steel products' was published. This standard allows for easy specification of hot dip galvanized reinforcement and provides details on the type of reinforcing steel and/or steel product to be galvanized, especially steel within the scope of EN 10080. Coating thickness requirements for galvanized reinforcement supplied to EN 10348-2:2018 are given in table 1.

Galvanized reinforcement often achieves coating thicknesses in excess of those indicated in table 1.

Steel diameter (mm)	Coating mass g/m²	Coating thickness µm
> 6	610	85
≤ 6	505	70

Table 1 | *Specified values of the mass of zinc per unit area and related coating thickness. Table taken from EN 10348-2:2018 'Steel for the reinforcement of concrete – Galvanized reinforcing steel and steel products'.*

Hot dip galvanized steel reinforcement therefore provides a high level of corrosion protection and is recommended due to the practical variations in condition of the concrete, such as: concrete composition, level of concrete coverage, density, permeability of concrete and the environment where a structure is situated.

There are two main ways in which steel reinforcement might be adversely affected and consequently, lead to concrete failure. These are carbonation and chloride attack.

Carbonation – When concrete is first cast it has a very high pH and even uncoated steel reinforcement will passivate itself against attack. The high pH is largely due to the presence of additives such as calcium hydroxide in the concrete. However, over a period of time carbon dioxide may dissolve in moisture to form a carbonic acid which can react with the calcium hydroxide, effectively reducing the concrete pH.

Initially concrete at the surface is affected, but as the reaction continues, concrete deeper in the structure will be affected and if the pH of concrete in contact with uncoated steel reinforcement falls below about 11.5 passivation will cease and corrosion of the reinforcement may occur. Galvanized steel reinforcement is far less susceptible to carbonation as the concrete pH needs to fall to a value of about 9.5 before passivation ceases and there will be any impact on the reinforcement. As a result of this, carbonation will not normally have an impact upon the performance of galvanized steel reinforcement.

Chloride Attack – Chlorides present within concrete either naturally, or due to the service environment (sea spray or de-icing salts) will readily react with uncoated steel reinforcement resulting in corrosion. Uncoated steel reinforcement has a relatively low chloride threshold of about 0.4% or 0.6 kg m-3 above which chloride attack will take place.

Galvanized steel reinforcement is more tolerant of chlorides and has a threshold level of 2-4 times greater than that for uncoated steel reinforcement. In practice structures exist where the chloride content is up to 10 times greater without any impact upon the galvanized reinforcement. As a result, galvanized steel reinforcement will not normally be subject to chloride attack for in excess of 40 years, the exact time being dependent upon the service environment.