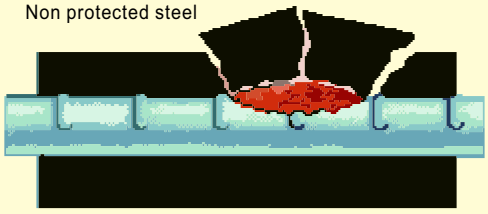
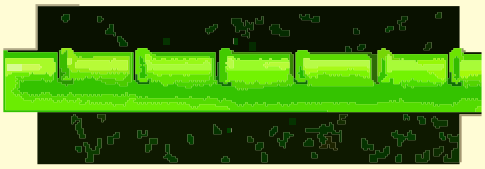
Tec® Conguard

Non protected steel



Steel protected with Tec® Conguard



the corrosion process without Tec® Conguard

At the cathode $(O_2+2H_2O+4e^- \rightarrow 4OH^-)$

At the anode $(Fe \rightarrow Fe^{++}2e^-)$

With Tec® Conguard

Bipolar corrosion inhibiting admixture for fresh concrete

Description

Tec® Conguard is a concentrated liquid admixture, added in the production process of concrete to achieve a better protection of the reinforcement steel against corrosion. Tec® Conguard is not only active in contact with the steel, but also migrates through the concrete porosity to reach the reinforcement to inhibitanodic and cathodic corrosion processes. Tec® Conguard is a superior technical solution to extend the lifetime expectancy of reinforced concrete subjected to aggressive corrosion promoters such as oxygen, humidity, chlorides from de-icing salts or marine environments etc.

Advanatages

Tec® Conguard based on organic components, which do not change the physical or mechanical properties of the concrete or cement based mortars. In the meantime, it shall protect the reinforcement against corrosion, with cathodic or anodic function. The product is highly effective, even in presences of chloride salts.

Field of use

Tec® Conguard is recommended for all structures in reinforced concrete, normal or pre-stressed, in particular in aggressive situations like bridges, viaducts, exposed concrete facades.

Method of use

The Tec® Conguard must be added during the preparation of concrete together with, or slightly after the mixing water. The product can be used also impregnating dry concrete supports, immediately followed by water saturation and application or structural repair mortars.

Dosage

250ml per bag of (50kg)cement

Advanatages

Tec® Conguard is supplied in 1,5,12,60,140,250 LTRs containers.

Sea water | Sea water + 1% of Tec® Conguard

PHYSICAL CHARACTERISTICS

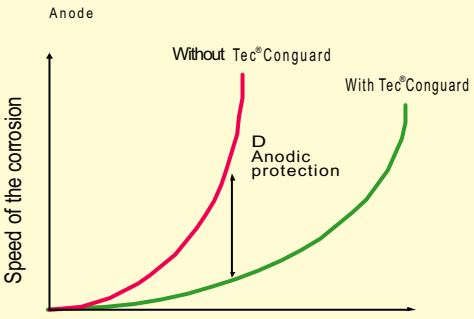
Sl.No.	CHARACTERISTICS	Cement	Cement + Tec® Conguard
1	Compressive strength (N/mm2) [on mortor cubes as per IS 0489 (part 1) : 1991] 3 days	16.00	15.50
	7 days	17.75	19.83
2	28 days compressive strength (N/mm2) (on concrete cubes)	38.7	38.7
3	Tensile strength (N/mm2) [As per IS 269 : 1951.]	1.24	1.25
4	Consistency for 33 mm penetrator [As per Is 269 : 1951.]	0.328	0.290
5	Setting time (minutes) [As per Is 1489 (part 1) : 1991] Initial Setting time (mts)	149	135
	Final Setting time (mts)	345	330

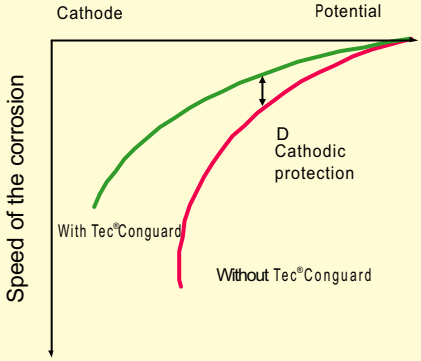
CORROSION RESISTANT PROPERTIES

Sl.No.	Technique	Corrosion parameter	Added Chloride (PPM)	Cement	Cement + Tec® Conguard	Durability Factor
1	Gravimetric	Corrosion rate (mmpy)	10,000	0.0191	0.0029	6.58
2	Impedance	Charge transfer resistance (Rct) (K-Ω-cm²)	10,000	6.278	39.334	6
3	Linear Polarization	Polarization resistance (R_p) (K-Ω-cm²)	10,000	6.996	47.000	6.5
4	Tafel Extrapolation	Corrosion current (μA)	10,000	2.818	0.46	6
5	Peak Potential	Corrosion current (μA)	10,000	110	0.325	300
6	Anodic Polarization (Accelerated test)	Potential (mv) Initial	1,000	+0.750	+1.100	-
		Final		+0.250	+1.100	-

Cathodic and Anodic Protection

Provides anodic and cathodic protection :





Tec® Conguard

TYPICAL MIX DESIGN

Cement OPC 53G	285.0 Kg/m³
Flyash	55.0 Kg/m³
Aggregate 20mm	610.0 Kg/m³
Aggregate 12.5mm	470.0 Kg/m³
Crushes Sand	820.0 Kg/m³
Water	164.0 Kg/m³
Superplasticizer	2.40 Kg/m³
Tec® Conguard	2.40 Kg/m³
Total weight	2408.8Kg/m³
W/C ratio	0.45
Slump/Flow	
Initial	25cm
60 minutes	20cm
120 minutes	16cm
180 minutes	12cm
Compressive strength	
3days	25 Mpa
7days	32 Mpa
28days	42 Mpa
60days	56 Mpa

The degradation of reinforced concrete

Each structure is designed for a life-time expectancy of more than 60 to 80 years. Reinforced concrete does often not meet these requirements and needs often essential and costly repair. It is well known that he most common origin of degradation is caused by the deterioration of the concrete cover by the corrosion of the steel reinforcement. Concrete is a material which creates, thanks to its alkalinity 13), a permanent (PH 12 passivation oxide layer on the surface of the steel. In particular exposure conditions this alkalinity can be destroyed, and in presence of humidity and oxygen, the inevitable corrosion of the steel reinforcement will be started.

1. Carbonation

The Carbondioxide (Co2), contained in the atmosphere, will penetrate in the porosity of the concrete and will react with the calcium hydroxide (Ca(OH2)), generated by the hydratation of the cement, and will form the insoluble Calciumcarbonate.

Ca(OH)2+Co2eCaCO3+?H20 soluble Insoluble High alkalinity low alkalinity Consequentially, the alkalinity of the cementitious matrix will reduce and the protective passivation functions will be destroyed from the external layers of the concrete, but also progressing further in the profundity. Once the carbonated concrete will reach the reinforcement steel, the steel will not be further protected and will inevitably start corroding.

2. Chloride salts

Chloride salts come mostly from seawater (sea air, tidal zone splashes, from sea recuperated terrains) or from deicing salts, used on the motorways in wintertime.

The chlorides can also be contained in the aggregates used for the concrete production or in other contaminated materials. The Clions are very aggressive and provoke the corrosion of the steel already when the concrete is still fresh and very alkaline : in these cases only a concentration of 8000 ppm Chlorides (0.8%) is required to start the corrosion processes. When the concrete is carbonated (pH-9), the quantity chlorides necessary for corroding the steel reinforcement is remarkably less, about 100ppm (0.01%).

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