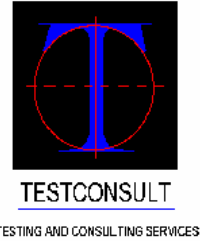


STRUCTURES DATA SHEET 3

Half Cell Testing

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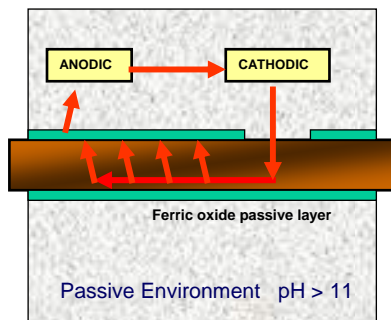


Taking measurements with Copper-Copper Sulphate Half-Cells

Half-Cell testing estimates the electrical half-cell potential of reinforcing steel in concrete structures for the purpose of determining the potential for corrosion activity in the reinforcement bars at the time of testing.

When corrosion occurs, the ferric oxide protective layer surrounding concrete breaks down, allowing an electro-chemical reaction to occur between the steel and concrete. This reaction is accelerated by water, oxygen and contaminants such as salt and also by expansive cracks caused by corrosion.

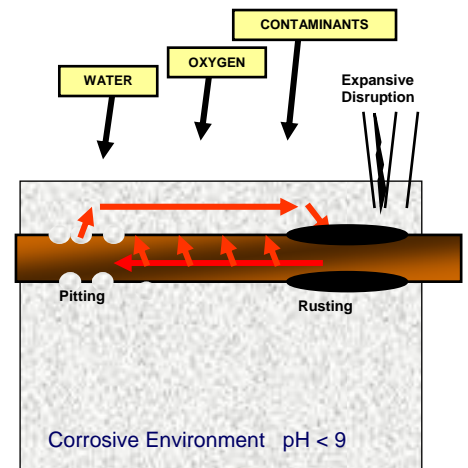
The half-cell potential test measures the degree of corrosion between the embedded steel and its surrounding concrete. This method is described in ASTM C876-80, "Standard Test Method for Half-Cell Potentials of Reinforcing Steel in Concrete". In this method, the electrical potential between a rebar and a reference electrode, normally a copper/copper sulphate cell, in contact with the concrete surface, is measured using a high resistance volt meter.



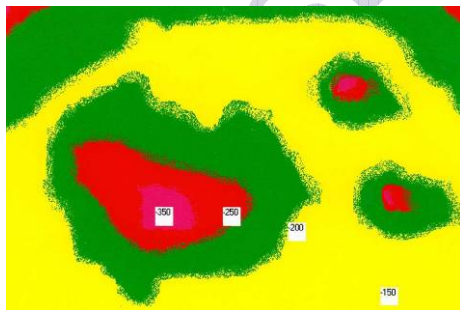
A grid pattern is used to identify locations where the half cell is to be placed to obtain potential measurements. On bridge decks, grids are generally 1mx1m.

Data collected can be plotted on schematic diagrams of the structures as an equipotential contour map. The ASTM standard states that the probability of corrosion is less

than 10% if the potential is greater than -200 mV, whereas potential values lower than -350 mV indicate a high probability (>90%) that corrosion is active. Values between these upper and lower limits indicate areas where the corrosion activity is uncertain.



Test results can also be correlated with resistivity measurements, depth of carbonation and chloride ion test results, to give an overall picture of corrosion of reinforcement in a structure. Testconsult will generally devise a testing programme using a combination of test methods suit the information required and the contract budget.



Contour plot of half cell measurements

Potential Level mV vs CSE	% Chance of reinforcement being corrosively active
350 to -500	95%
-200 to -350	50%
< -200	5%

Table of half cell potential versus corrosion

