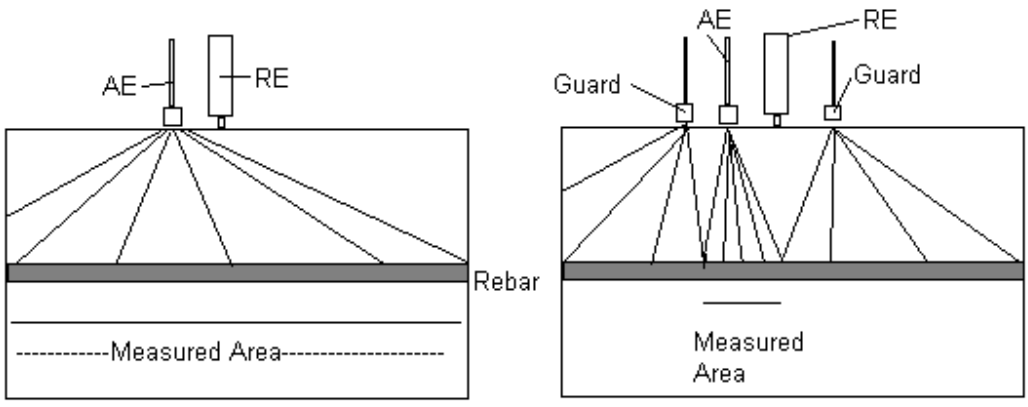
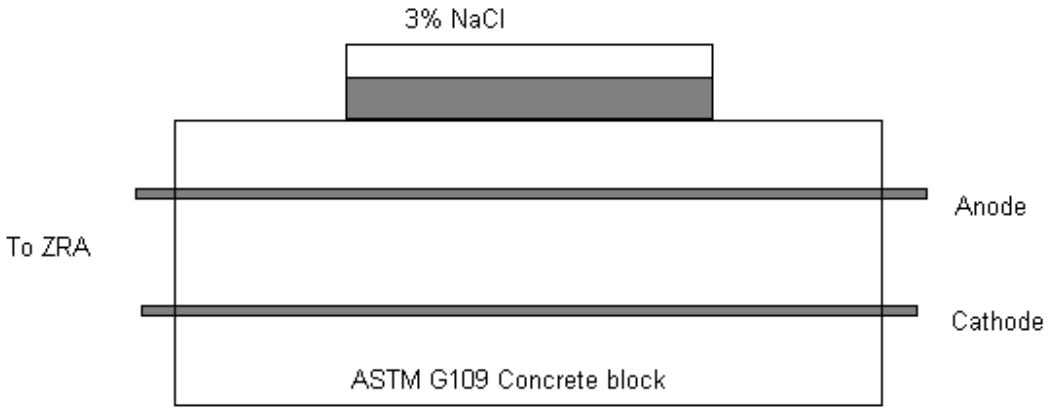
ACM Instruments

Concrete

Steel encased in intact concrete with no chloride carbonation stray currents or cracks should experience a pH of 12.5 and passivate remaining good for centuries. In practice problems do occur and finding the problem deep under the surface is no easy task. Some of the problems faced include; very high resistivity difficult connection to the reinforcing bar and the geometry of the test. Often the auxiliary and reference sit on the surface of the concrete with multiple strands of rebar some distance beneath. Knowing the extent of polarisation is often a matter of experience. The simplest electrochemical test is potential mapping this gives an idea of corrosion activity but does not give corrosion rate data. More sophisticated tests use the Field Machine to determine corrosion rate from LPR IR compensated LPR and AC Impedance. Variants of the Field Machine have been supplied incorporating a guard ring to focus the measurement on a better defined area of rebar.



A test has been devised to measure chloride uptake in the laboratory. It consists of three bars mounted one above the other two in concrete and connected by a ZRA (as in Gill AC's etc). A bath of 3% NaCl is mounted on the top and when the chloride permeates through the top bar becomes and anode with respect to the bottom two as indicated by the current shown from the Gill AC.



This test block can also be used to measure IR compensated LPR and AC Impedance by applying a test frequency from 10000 Hz to 1 mHz mechanistic information of the corrosion processes can be obtained by studying the time constants revealed. Some workers have used a galvanostat (e.g. Gill AC in galvanostat mode) and pulsed the concrete with known amounts of charge the potential change is then recorded and the time constants of the cell calculated.