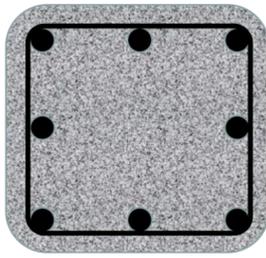


Understanding how the materials, mix design, and curing can influence the transport properties and durability of concrete



To delay the onset of corrosion and enhance the durability of structures, the rate of ingress or transport of the chlorides, CO₂, oxygen, and moisture through cover concrete (covercrete) should be reduced.

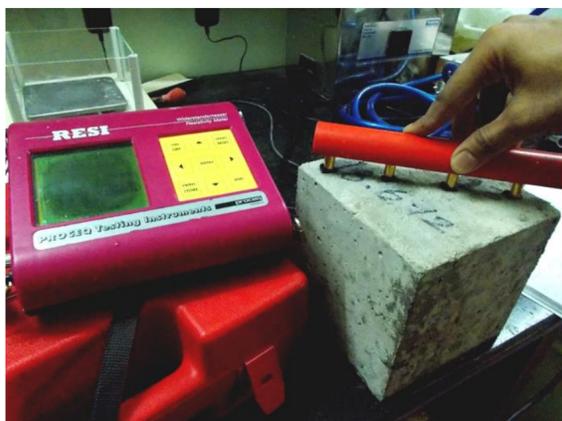


Potential durability can be estimated or assessed using the transport properties of the cover concrete. Field/Lab tests are available to check if the concrete can meet the relevant performance requirements.

An example combination of pre-qualification tests recommended in a chloride laden environment

Service condition	Transport Mechanisms	Compressive strength (MPa)	Parameters reflecting the durability/transport properties			
			Surface Resistivity (kΩ.cm)	Charge passed (Coulombs)	Sorptivity index (mm/√hr)	Depth of water penetration (mm)
XS1 (Exposed to airborne salt but not in direct contact with sea water)	Diffusion, Sorption, Physical degradation	40	>20	<2000	6-10	---
XS2 (Permanently submerged)	Diffusion, Permeation	35	>20	<2000	---	<30
XS3 (Tidal, splash and spray zones)	Diffusion, Sorption, Wick action, Permeation, Physical degradation	50	>50	<1000	<6	<30

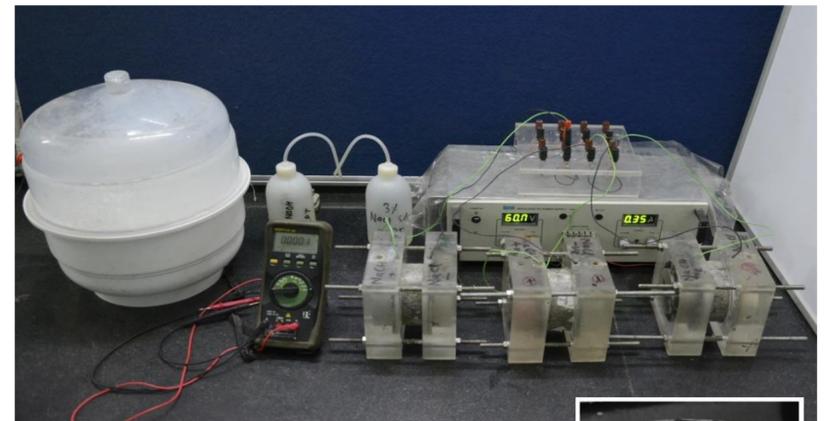
Concrete performance indicators for the field and laboratory concrete can be tested as follows...



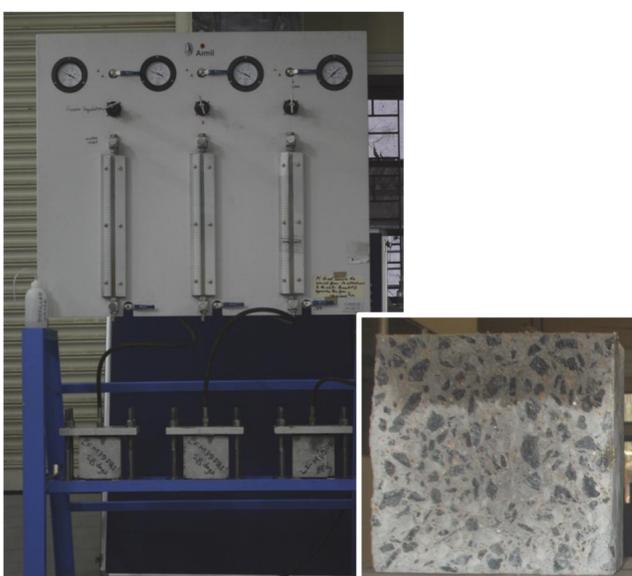
Test: Wenner 4-probe Resistivity
Parameter : Surface Resistivity
Duration: 2 minutes



Test: Water Sorptivity
Parameter : Sorptivity index
Duration: 30 minutes



Test: Rapid Chloride Permeability
Parameter : Charge passed
Duration: 6 hours



Test: Water Permeability
Parameter : Water penetration depth
Duration: 3 days



Test: Accelerated carbonation
Parameter : Carbonation rate
Duration: 3 months



Test: Oxygen Permeability
Parameter : Oxygen Permeability Index
Duration: 6 hours

Even for M30-M50 grade concretes, appropriate mixture proportioning using fly ash and/or slag, and good construction practices can give desired/enhanced durability.