

Carbonation testing and

Chloride sampling 101

Carbonation Testing:

Carbonation testing is generally carried out on two separate areas of a tank, to ensure that weathering factors are considered. If results indicate a high carbonation percentage, then additional tests in other representative areas can be done whilst onsite.

Carbonation testing involves two separate procedures: steel cover depth assessment and carbonation deterioration depth.

A re-bar detector is run vertically in a side to side pattern down the test area and readings of steel depths (4 to 6 in number) are recorded on the field template. These readings are then averaged out with the shallowest reading recorded as a 'wild card' factor.

A 5mm impact drill bit is then used to check carbonation deterioration depth. An indicator solution of 50% distilled water, 50% methylated spirits, mixed with half a tea spoon of phenolphthalein powder per litre of solution, is sprayed onto the drill tailings to show when good alkaline concrete is reached – the tailings turn purple when alkaline concrete has been detected. The depth readings (4 to 6 in number) are once again recorded on the field template, averaged out and the deepest reading is recorded as a 'wild card'.

A carbonation factor percentage is calculated by placing the carbonation depth over the steel cover depth. Example: a carbonation depth of 25mm with steel cover averages of 50mm would give a carbonation factor of 50%. If the tank was between 40 and 60 years old, this would be an acceptable percentage, as carbonation is an expedient deterioration in concrete.

If the percentages are higher and particularly in newer structures, then remedial actions (such as a water proof external coating) will need to be considered to achieve the expected design life target.

Chloride Sampling:

Concrete dust samples are collected in sterile jars and sent to a laboratory for analysis. This test is generally conducted in one location and consists of drilling a series of 6 holes over a 300mm x 300mm sample area, using a 12mm impact bit.

The drill is 'spudded' in around 5mm initially to remove any surface contaminants, and then the holes are drilled in to a depth of 25mm, with the dust being directed through a SS drilling tube, which in turn is connected to the sample jar. Once the 25mm samples are collected and the jars labelled, the drilling tube is 'blown' clean and the same holes are re-drilled to a depth of 50mm, with the same dust collection method being employed.

The holes are then filled and repaired using a good quality mastic material.