

Construction



Sika® Fast Track Concrete Construction Systems



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Background

There is an increasing demand for structures to be built faster and handed over to clients earlier for reasons of cost and towards the industry drive for greater efficiencies.

Construction times can be affected as the site has to wait until concrete gains sufficient strength to allow the next construction phase to proceed. The insitu concrete strength is usually evaluated from a standard concrete test cube, which quite often is stored beside the structure until testing.

For a given concrete mix design the early rate of gain of strength is directly related to the internal temperature of the concrete. Heat evolves as the concrete hydrates and the higher the internal temperature then the faster the strength gain. The temperature of the concrete is affected both by the ambient temperature and the sample size. As the concrete cube is very small in size compared to the insitu element the test result nearly always underestimates and always varies from the actual insitu concrete strength. Valuable construction time is therefore wasted until the test cubes attain the specified strength and unnecessary risks can be taken.

Sika® Rapid Cure System

This system eliminates the differences in temperature by monitoring the temperature within the structure and replicating it within the test cubes.

Thermocouples are positioned within the structure. These constantly measure the internal temperature, which is then displayed on a continuous graph on the **Sika® Rapid Cure** screen. Test cubes are made in standard moulds and linked to the Rapid Cure machine by thermocouple cables. The cube moulds are encased in heating elements.

The Rapid Cure tracks the temperature of the insitu concrete and relays it to the test cubes. The heating elements automatically heat the cubes to the same temperature, which is also displayed on the temperature graph on the screen.

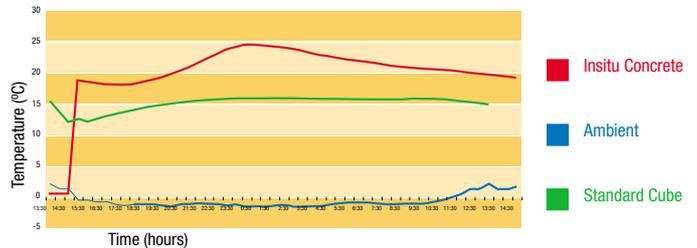


Figure 1- Highlights the difference in internal concrete temperature between the test cube and an insitu slab 300mm deep over the first 24 hours



Connecting the Thermocouples to the Rapid Cure System monitor

Sika® Rapid Hardening Accelerator

The addition of **Sikament®** or **Viscocrete®** admixtures will accelerate the setting time and increase the concrete strength within 24 hours of casting. Combined with the **Sika®** Rapid Cure machine specified strengths can be achieved in hours, rather than days.

- ▲ Strengths in excess of 35N/mm² can be achieved within 24 hours
- ▲ Quicker formwork stripping times
- ▲ Earlier trafficking
- ▲ Earlier loading times
- ▲ Earlier prestressing transfer times

Sikament® or **Viscocrete®** admixtures will significantly enhance the early strength while the **Sika®** Rapid Cure System gives the exact strength in the structure and allows the fastest stripping of formwork or commissioning.

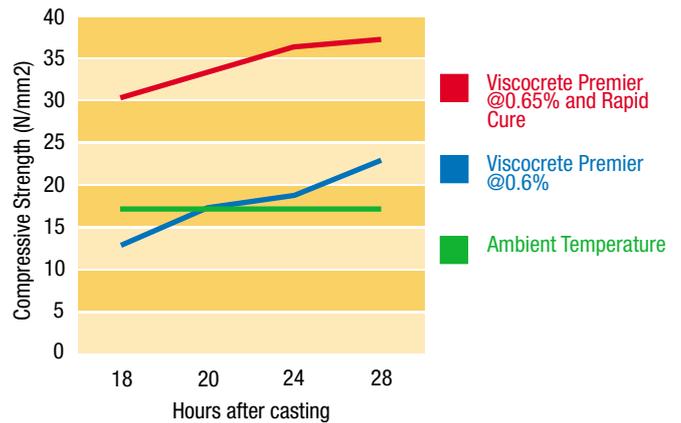


FIGURE 2- Results from laboratory trial on a 300mm slab. Shows how standard cubes (red line) significantly underestimate the actual insitu strength (blue line).

Case Study 1

Project Kingston Bridge, Glasgow

Main Contractor

Makers Limited

Problem Multiple passes required by the gantry to construct a new parapet on an in-service motorway bridge

Solution

Fast Track concrete placed on a single gantry pass. The concrete supplied by RMC contained **Sika Viscocrete Premier®** and air entrainment. Monitoring was done with the **Sika®** Rapid Cure System



Case Study 2

Project Scrabster Harbour Development

Main Contractor

Mowlem CE

Problem **Fast Track** concrete construction programme in a limited time and weather window

Solution

Sika's® Viscocrete® polycarboxylate technology and the **Sika®** Rapid Cure System monitor. Supply and testing was provided by Bardon concrete to ensure the contractor could meet the demands of this **Fast Track** programme.



Case Study 3

Project Manchester Freetrade Hall

Main Contractor
Laing O'Rourke

Problem To maintain workability to enable concrete to be pumped fifteen stories, but to allow stripping of shutter at 15-18 hours

Solution **Sikament® CW** superplasticiser gave excellent workability retention for up to 2 hours. When combined with **Sika® Rapid Cure** the contractor was able to strip shutters confidently knowing the actual insitu concrete strength within 18 hours.



Admixture Selection Criteria

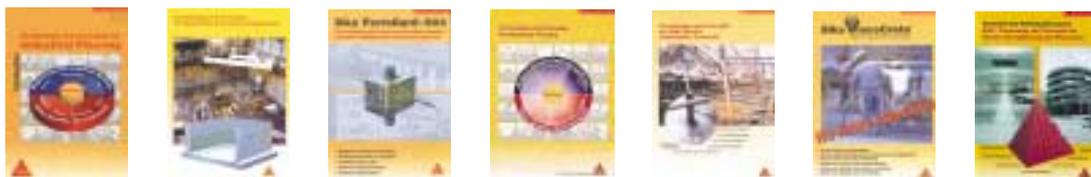
Viscocrete® Premier Fastest setting time and highest strength gain from 12 hours.

Sikament® Ultra High strength gain from 15 hours. Setting time longer than Premier

Sikament® CW Excellent workability retention up to 2 hours. High strength gain from 15 hours

Sikament® He 200 A blend of **Sika's Rapid®** accelerator range and **Sikament® Ultra** technology

Also available from Sika®



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