

Setting Time of Concrete

The practical use of concrete as a construction material depends upon the fact that it is "plastic"[™] in the freshly mixed state and subsequently becomes hard, with considerable strength. This change in its physical properties is due to the chemical reaction between cement and water, a process known as hydration. Hydration involves chemical changes, not just a drying out of the material. Hydration is irreversible. The reaction is gradual; first causing a stiffening of the concrete, and then development of strength, which continues for a very long time. Under certain ideal conditions it is probable that the concrete to increase in strength indefinitely. Air temperature, ground temperature and weather conditions all play major roles in the rate which cement hydrates. The setting time of concrete decreases with a rise in temperature. At low temperatures setting time is retarded. However, when concrete is being used in times of temperature extremes, i.e. colder weather or in the middle of summer, several admixtures may be used in the concrete mix to aid in the placement of the final product. These admixtures are Accelerators and Retarders.

Accelerators

Accelerators have been designed to significantly boost the early setting times and increase the early age strengths of concrete. Setting times of non accelerated concrete are significantly slower as temperatures get colder. This obviously affects finishing times. The action of the accelerator counters this set retardation and shortens setting times back to what is considered a 'normal' set time.

Retarders

Retarders are designed for use in areas where early setting of concrete is not preferable, ie. high ambient temperatures, long travel times between concrete plant and job site, large slow pours – to prevent formation of cold joints etc. The chemical composition of the retarder is formulated to temporarily stop the action of hydration, delaying the initial set of the concrete. This delay is proportional to the dose of the retarder used. Once the effect of the retarder wears off initial set will take place and hardening will develop at an accelerated rate. The two graphs below demonstrate the effects of accelerators and retarders on the setting time of concrete.

Consult your Allied Concrete representative for specialised information.

0800 4 ALLIED (0800 425 5433)
www.alliedconcrete.co.nz

Allied Concrete have endeavoured to present the best possible information. However, it disclaims any responsibility for the application of the principles discussed.

