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Warm Weather

– *Temperature Effects on Concrete Production*

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Temperature Effects on Concrete Production: (Warm Weather)

Top Tips

- Cover any exposed concrete surface during warm conditions to help prevent loss of moisture at the surface (reducing the risk of cracking).
- If the temperature exceeds 35^0C it is not advised to pour concrete unless special precautions have been taken.
- Cover aggregates that are to be used in the concrete to stop them drying out and becoming warm enough to raise the concrete temperature.
- Always double check retarding admixture dosages before using them.
- Try not to have any delay between producing concrete and placing/compacting it.

Overview

Most testing and research regarding concrete is performed in controlled laboratory conditions, where the temperature of the environment is monitored to ensure a temperature of between 18^0C and 21^0C.

In reality, concrete is very rarely mixed, poured, placed and cured in such a stringent environment.

In practice, concrete will usually be exposed to temperatures significantly below and above laboratory conditions, which means that it is essential that anyone who works with concrete knows how to deal with temperature differentials caused by seasonal weather changes.

The most important phase in concrete's lifecycle is the curing phase; this is when the concrete will start to develop properties that will directly affect its ability to perform the task for which it has been designed. During the curing phase, maximum strength and durability are affected by the weather. To ensure that both these properties reach their expected level it is important to maximise the hydration of the cement. How this is done will depend on which temperature extreme is present. (See our booklet for concreting in cold weather).

A properly cured concrete will have several durability characteristics, including:

- Increased wear resistance
- Better frost resistance
- Reduced surface erosion during exposed conditions

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Concreting in hot and cold weather means problems. These can be overcome with the right knowledge. The next page talks about warm weather. If you need our booklet on cold weather concreting go to www.armconprecast.com

Warm Weather Working

Warm weather affects concrete mainly due to higher curing temperature and a loss of water through evaporation.
When the internal temperature of concrete exceeds 20^0C, the hydration reaction (the reaction that causes the concrete to set) increases. This can lead to a premature stiffening and loss of consistence (workability) in the mix. The rise of the internal temperature will make the risk of cracking higher.
Loss of water can also occur due to a higher ambient temperature, low relative humidity, high wind velocity and heat radiation.
A loss of workability will make the concrete difficult to place, compact, increase the risk of cracks forming during big concrete pours and make the concrete difficult to finish.
The exposed surface of the concrete is prone to moisture evaporation and therefore is the most vulnerable part of the concrete.

Remedies

When pouring/producing concrete in warm conditions it is vitally important that there is little or no delay in placing it. If the concrete needs to be transported or is left unplaced it will start to stiffen and suffer a loss of consistence. For example a 30 minute delay in warm conditions can reduce the slump value of a concrete up to 50mm, a reduction in slump is increased as the cement content of the mix is increased.
To stop this rapid hardening and loss of slump use a retarding admixture, but great care should be taken with these admixtures as over dosing them will cause problems like long cure times and possibly segregation. Another way to reduce the effects caused by warm weather is to use a blended Portland Cement that contains GGBS (Ground Granulated Blastfurnace Slag) or PFA (Pulverised Fuel Ash) but both a blended cement and retarding admixtures will reduce the possibility of a quick rate of hydration that leads to thermal cracking.