ARMCON

Benefits of Admixtures

– *In a Modern Precast Works*

ARMCON
CERTAINTY: IN CONCRETE

CPA
A MEMBER OF THE CEA Construction Equipment Association

Benefits of admixtures in the modern pre-cast works

There is a wide range of admixtures available to the pre-cast industry today but their use is often misunderstood or worse still ignored altogether. The benefits of using admixtures are too good to ignore and this leaflet aims to highlight when and why they should be used.

Careful choice of admixtures will improve quality, strength, profitability and consistency. Used in the correct way they will always be cost positive and show a measurable improvement in profitability.

Here are some of the benefits you can see through the use of admixtures:

- Reduced cement use for cost effective mix designs
- Improved surface finish improves quality
- Brilliant colours
- Reduced breakages
- Quicker mould filling and finishing
- Rapid early strength development
- Early pre-stressing at low temperatures
- Waterproofing
- Self compacting concrete, reduced labour and equipment costs
- Earlier de-mould at low temperatures
- Reduced energy consumption for heating or steam curing
- Reduced blowholes in ornamentals
- Reduced efflorescence

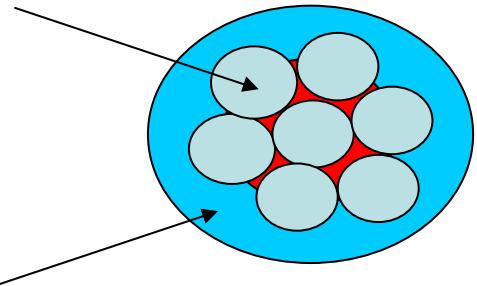
Superplasticiser

Superplasticiser offers a number of significant benefits to the pre-caster.

More effective use of cement results in increased strength allowing a reduction in cement content. Have a look at the following diagrams which illustrate how this works.

Without superplasticiser

Cement Particles

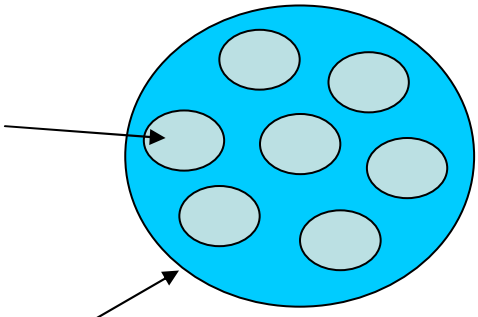


Water

Here we see the cement particles are only partly wetted when they mix with the water. As you can see the red area has no water/cement contact at all and will not fully hydrate the cement.

With superplasticiser

Cement Particles



Water

With the addition of superplasticiser the cement particles are dispersed allowing the water to coat the whole of each particle ensuring complete hydration resulting in increased concrete strength.

The economics speak for themselves:

Say you are using a 300kg/m³ cement content to achieve a 28 day strength of 35 N/mm².

Cement cost £24.60 at £82.00/ton

If you used superplasticiser you could expect a 30% increase in strength giving 45.5N/mm² or an extra 10N/mm² strength.

Typically we need to use 6kgs cement per 1N/mm² strength and so that 10N/mm² we have gained is equivalent to 60kgs cement (6kgs x 10). It follows that we could safely reduce the cement content to say 240kgs/m³

Cement cost £19.68 at £82.00/ton = £4.92 saving in cement.

To do this you would add 0.9 litres per 100kg cement.

The cost of admix is £3.91/m³ to do this making a saving of £1 per m³ concrete.

SUPERPLASTICISER BENEFITS

- Easier mould filling…….*reduced labour costs*

- Better finish…….*higher quality*
- Reduced blowholes……..*higher quality*
- Reduced vibration…….*faster production*
- Brighter colours…….*reduced pigment cost*
- High early strength……..*reduced breakages*
- Reduced bleed water…….*higher quality*
- Increased density……..*improved strength*
- Improved durability…….*higher quality*
- Self compacting concrete…….*reduced production costs*

High quality pre-cast gravel board made with superplasticiser

Superplasticiser really is a must for all pre-cast manufacturers and you will not fail to notice the benefits when you start using it.

Accelerator

Accelerator is a vital tool to assist you in maintaining full production during cold weather.

Many companies add extra cement in the winter when the temperature starts to fall and this is a costly, unnecessary way of keeping production going.

Remember; You need high early strength, **not** higher 28 day strength, accelerator will give the concrete that essential early "kick" to the curing process ensuring you can demould next day without fear of breakages.

Again the cost of the admixture is less than the cost of cement and means you can use the same mix design throughout the year.

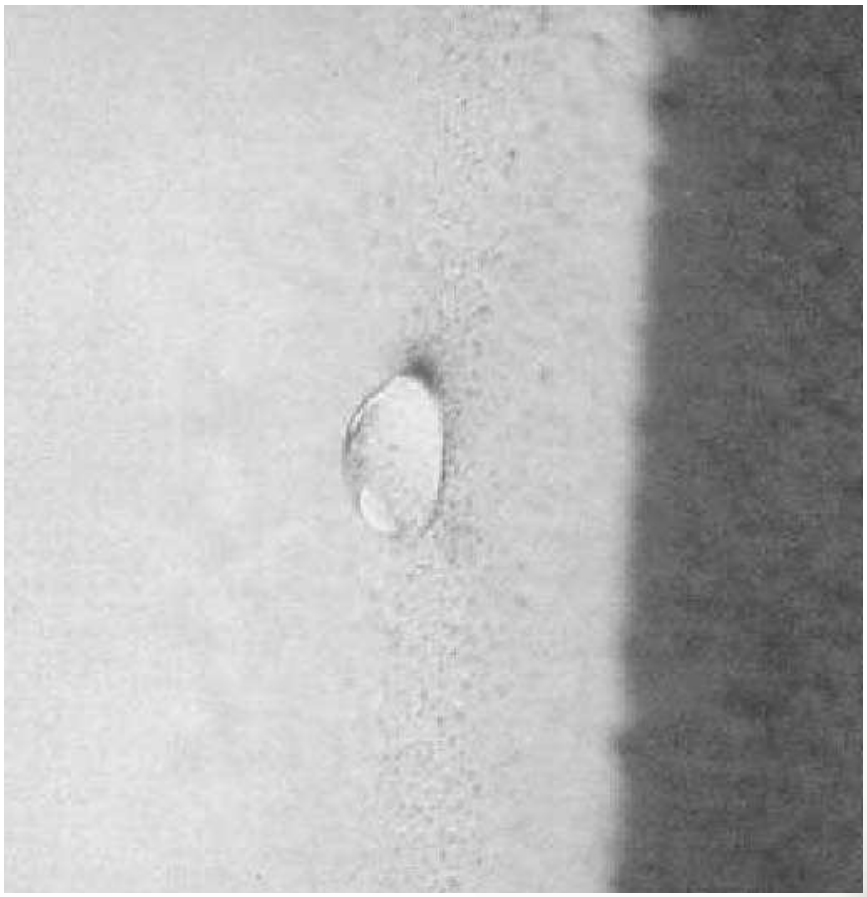
ACCELERATOR BENEFITS

- Maintain production in cold weather…….*Improved profitability*
- Rapid early strength development……..*without extra cement*
- Reduced cycle times……..*maximise mould utilisation*
- Reduction in breakages…….*less waste, more products to market*
- Earlier demoulding guaranteed…….*dependable strengths*
- Reduced heating in pre-stressing beds……*fuel cost savings*
- Double-cast in summer…….*double production*.

Waterproofer

Many architectural pre-cast products are made using a “dry-cast” process and are required to have a waterproofer added to comply with building regulations.

A useful side effect of using waterproofer is easier demoulding of dry-cast products.



Example of a product made with waterproofer demonstrating how water sits on the surface and does not soak into the concrete.

WATERPROOFER BENEFITS

- Reduced permeability'…….*less water penetration*
- Improved durability…….more resistance to frost attack
- Reduces efflorescence effects…….*higher quality*
- Improved colour retention in pigmented mixes…….*higher quality*
- Hardened surface finishes stay cleaner……..*higher quality*
- Reduced aggregate transparency effects…….*product consistency*

TYPICAL APPLICATIONS

- Paving blocks
- Concrete bricks
- Concrete blocks - dense, ash and lightweight
- Cast stone and semi-dry pre-cast concrete
- Semi-dry in-situ concrete work
- Mortars requiring permeability reduction

We hope you have found this information useful and can put some of it to good use in your business.

Do not hesitate to contact us if you want to discuss any of these admixtures and their use in your business, we are only too pleased to help. We have a wealth of experience in the pre-cast concrete industry and understand what matters to you.