ARMCON

Air Entrained Concrete

– An Overview

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Air Entrained Concrete:

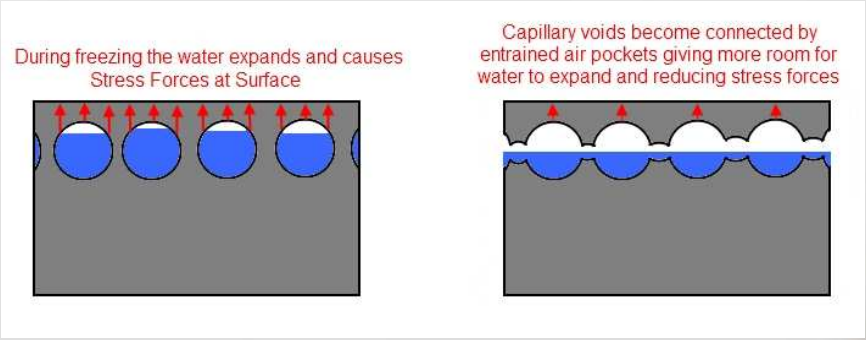
Top Tips

- Air entrained concrete behaves like an over-sanded mix and for this reason the amount of sand should be reduced slightly.
- When making either PAV 1 or PAV 2 BS 8500-1:2006 should be consulted.
- It is possible to compact air entrained concrete so that entrapped air can be released but care should be taken not to release the entrained air.
- With the lubrication effect of the entrained air it is possible to reduce the water content to help offset the loss of final target strength.
- Always ensure that the correct size of coarse aggregate is used with the correct amount of entrained air content.

Overview

Air Entrained concrete is concrete that has had small, stable air bubbles introduced into the cement paste during the mixing stage via a chemical addition process. The most common reason for the introduction of these air bubbles are to help protect the fully cured concrete against the harmful effects of the freeze-thaw weathering that occurs during the winter months.

The way air entrainment works is by connecting the capillary voids that exist in the concrete and lie near the top surface of the concrete. Usually the capillary voids remain unconnected and during winter conditions they fill with water, which will then freeze and expand due to temperature drop. This expansion of the frozen water applies a stress force to the top surface of the concrete and during a winter season the concrete will experience a freezing and thawing action many times, this action eventually weakens the top surface of the concrete which causes it to crack and break up.



Air entrained concrete should be used for any concrete paving, pathway or driveway that will be exposed to the freeze-thaw effect. Guidance on suitable mix designs for pathways can be found in the British Standards, which also advises on the addition of air entrainer by stating the minimum level

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of air content contained in the mix.

Minimum Air Content (%) For Both the PAV 1 and PAV 2 mixes ***(BS8500-1:2006)***	
Coarse Aggregate Size (mm)	% air content
40	3.0
20	3.5
10	5.5

Benefits of Air Entrained Concrete

Besides the enhanced protect against the freeze thaw effect that has already been discussed in this booklet, air entraining admixtures also have other beneficial factors. The mix can also benefit from extra cohesion which in turn means that the concrete will be more durable and produced a good final strength.

When pouring and placing air-entrained concrete is also possible to slightly reduce the water content as the air entrainer has a ***'ball bearing'*** or ***'lubrication'*** effect on the concrete which increases the workability of the mixture, making the concrete easier to move about and place.

Air entrained concrete will also have a reduced chance of risk from plastic settlement, plastic shrinkage cracks and bleed water.

Besides all the benefits from using air entraining admixtures it should be noted that there is also a side affect that requires careful consideration. The addition of the air into the concrete will weaken the final strength of the concrete; the relationship for this is that, for every 1% of entrained air added there is a 5% reduction in the target strength of the concrete. With this relationship in mind any concrete (not PAV 1 & PAV 2) being produced should be corrected to allow for this loss in strength.