DATAsheet

JUNE
2005

AVOIDING Early Cracking

Cracks appearing in concrete within the first few hours after placing are either early-age shrinkage cracks, plastic shrinkage cracks or plastic settlement cracks, all of which form in the concrete prior to it gaining its final set.

CCAA Data Sheets on these topics give the reasons behind these forms of cracking. This Data Sheet summarises the recommendations for avoiding early cracking of concrete.

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CEMENT CONCRETE & AGGREGATES AUSTRALIA

Leading Knowledge-Sharing Information

DO	DO NOT	COMMENT
The Concrete		
Order higher slump concrete if higher workability is required.	Do not add water to the concrete on site to improve workability.	Uncontrolled addition of water has undesirable effects on finishing and performance.
In very hot conditions,discuss concrete temperature with supplier and plan the pours appropriately.	Do not leave it to the last minute and delay placement.	High concrete temperature can have undesirable effects eg effects on setting.
Preparation for Placing		
Ensure uniform thickness of slab on ground	Do not place concrete on uneven ground.	Uneveness of the subgrade can be a source of crack initiation.
Use a layer of fine granular material or plastic membrane under slab on ground to reduce friction.	Do not neglect details required to reduce restraint to early age concrete movement.	Restraint by subgrade friction can lead to early cracking.
Dampen subgrade prior to placing concrete.	Do not place concrete on very dry ground.	Excessive moisture loss from concrete is undesirable.
Ensure that formwork is rigid prior to placing concrete.	Do not assume formwork can be adjusted during placing.	Formwork movement can cause settlement cracking.
Check weather conditions for the area.	Do not assume that because it is 'a nice day' the concrete will be unaffected.	To be prepared for likely adverse conditions is important.
Use evaporation charts (eg provided in CCAA Data Sheet on hot weather concreting).	Do not guess the rate of evaporation.	An accurate picture of the rate of evaporation is important.
Assess changes in drying conditions throughout the day.	Do not assume conditions in the afternoon will be the same as in the morning.	A breeze later in the day may be enough to cause cracking.
Placing		
Place concrete as soon as possible.	Do not place concrete more than 1½ hours after batching.	Placing concrete that has started to set may have undesirable effects.
Place concrete where required.	Do not move concrete horizontally using vibrators or drop from heights.	Segregation may occur and can have undesirable effects.
Delay slab placing for integral beam/slab or integral column/slab construction.	Do not pour such elements continuously.	Concrete in the deeper sections needs to settle for a short while before placing the slabs to avoid plastic settlement cracking.
Adequately compact the concrete.	Do not assume that screeding compacts the concrete.	Compaction removes entrapped air and improves the concrete's properties.

Placing continues on page 3

DO	DO NOT	COMMENT
Placing *(continued)*		
Thoroughly compact around inserts.	Do not neglect compaction because it may be difficult.	Anchorage of inserts is critical.
Close any early age cracking by re-compacting the concrete or re-trowelling the surface.	Do not leave re-compaction or re-trowelling too late.	Re-compaction must be prior to setting. Re-trowelling closes surface cracks and reduces risk of penetrating full depth.
Early Protection and Curing		
In windy conditions erect wind breaks or walls.	Do not work in windy conditions without protecting the concrete (although it may not always be practical).	Air movement over the surface can increase the rate of evaporation/ surface drying and risk of cracking.
Apply aliphatic alcohol immediately after screeding and bullfloating.	Do not wait until after the water sheen has gone from the surface.	Use of aliphatic alcohol slows the rate of surface drying In the first few hours.
Re-apply aliphatic alcohol to surfaces after each finishing operation.	Do not apply aliphatic alcohol if the water sheen has gone from the surface.	Finishing operations break up the film formed by the early application so reapplication is necessary.
Apply aliphatic alcohol to low-bleed concrete in all weather conditions.	Do not assume that mild drying conditions will not cause cracking.	Low-bleed concrete is prone to early cracking even in mild conditions.
Spray surfaces with a fog spray of water.	Do not allow the surface to dry. Do not use normal hose (damage to the surface may result).	An alternative method to aliphatic alcohol to slow down the rate of surface drying.
Cure the concrete. **Use**: Water ponding Continuously damp hessian Impervious sheets Membrane forming curing compounds	Do not leave it to 'Air Cure'. Do not let surface dry between applications of water. Do not wait or apply curing compounds the next day.	'Air Curing' is merely drying and must be avoided. Effective curing system must be used. Curing should keep the maximum amount of water in the concrete.
Start the curing early.	Do not leave it until tomorrow; tomorrow is always too late.	Curing should commence as soon as finishing is complete.
Ensure that all joints are in place early. Provide saw-cut joints as soon as the concrete has hardened sufficiently.	Do not delay saw-cut joints.	Joints are necessary to provide crack control as the concrete dries and shrinks.

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FURTHER INFORMATION:

CCAA Datasheets

Plastic Shrinkage Cracking
Plastic Settlement Cracking
Early Age Shrinkage Cracking
Hot Weather Concreting
Download from **www.concrete.net.au**.

CCAA ***Guide to Concrete Construction*** (T41/HB64)
Cement and Concrete Association of Australia and Standards Australia, 2002.

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