Calcium Chloride in Portland Cement Concrete

Still the Most Effective Concrete Accelerator

Contents

Figure 1. Set Time Reduction with $CaCl_2$ Addition[1]

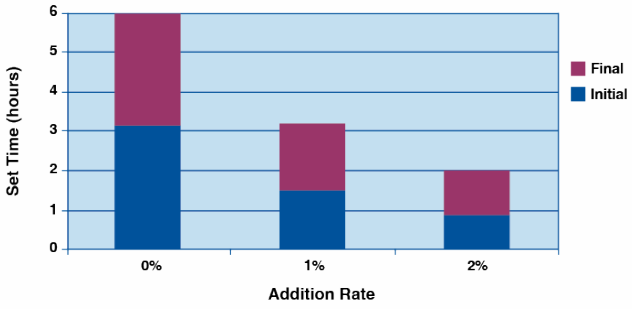
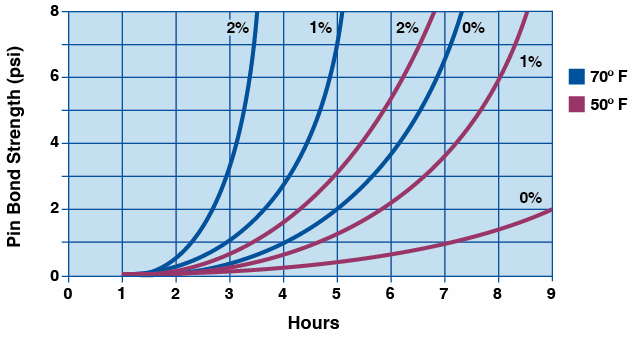


Figure 2. Concrete Hardening Rate with $CaCl_2$ Addition[1]



WHY USE CALCIUM CHLORIDE?

Calcium chloride is one of the most preferred concrete cure accelerators. As shown in Figure 1 and Figure 2, calcium chloride accelerates cement hydration and reduces set time by as much as two-thirds. Calcium chloride is classified as a Type C accelerating chemical admixture for concrete by ASTM C494.

Using calcium chloride provides additional benefits:

- Contributes to protection against freezing when making concrete in cold weather.
- Contributes to the early strength of concrete.
- Improves workability (less water is required to produce a given slump).
- Improves strength of air-entrained concrete.
- Reduces bleeding due to the early stiffening produced by acceleration, allowing for earlier final finishing.

These advantages combine to produce better quality concrete faster. Concrete acceleration with calcium chloride greatly facilitates completing jobs quickly and economically.

Refer to the next page for guidelines on the use of calcium chloride in Portland cement concrete.

For more information, visit our website at www.OxyCalciumChloride.com.

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GUIDELINES FOR USING CALCIUM CHLORIDE IN CONCRETE

Calcium chloride used as an admixture for concrete should meet the requirements of ASTM D98. Safety and disposal precautions are listed in Safety Data Sheets (SDS) available at www.OxyCalciumChloride.com.

The amount of calcium chloride used should not exceed 2% and should never exceed 4% due to flash set probability. Preferably, calcium chloride should be added in solution form to the aggregates in the mixer drum or as a portion of the mixing water, reducing the total mixing water required by the amount of solution being used. A calculator for making solutions from dry calcium chloride is available at www.OxyCalciumChloride.com.

When ready-mixed concrete is used, calcium chloride should be added at the plant site if the concrete is to be discharged within one hour after the start of mixing. Otherwise, it should be added at the job site, mixing for at least three minutes or at 30 revolutions of the mixer, whichever is longer.

If dry calcium chloride is used, it should be added free of lumps to the aggregates in the mixer drum during mixing, or to the mixed concrete just before discharge. Concentrated calcium chloride should not come into direct contact with dry cement as it may cause flash set.

For best results, calcium chloride application rates should vary with temperature. Table 1 contains recommendations for how to vary calcium chloride application rates with temperature, and Table 2 contains application rate guidance for 1% and 2% per cubic yard of concrete.

If corrosion of embedded metals is a concern, it is recommended that the relevant American Concrete Institute committees be consulted for guidance on calcium chloride use under various exposure conditions.

Table 1. Application Rates with Temperature

Temperature	Recommended Application Rate
> 90°F (32°C)	≤ 1%
70°F (21°C) – 90°F (32°C)	1 – 1.5%
< 70°F (21°C)	Up to 2%

Table 2. Application Rates per Cubic Yard of Concrete

Product	5 Bag Mix 470 lbs.		6 Bag Mix 564 lbs.		7 Bag Mix 658 lbs.	
	1%	2%	1%	2%	1%	2%
LIQUIDOW® 29%	1.2 gal	2.3 gal	1.4 gal	2.8 gal	1.6 gal	3.3 gal
LIQUIDOW® 32%	1.0 gal	2.1 gal	1.2 gal	2.5 gal	1.4 gal	2.9 gal
LIQUIDOW® 35%	0.9 gal	1.8 gal	1.1 gal	2.2 gal	1.3 gal	2.6 gal
DOWFLAKE® Xtra 83-87%	4.3 lbs	8.5 lbs	5.1 lbs	10.2 lbs	6.0 lbs	11.9 lbs
PELADOW® 90%	4.0 lbs	8.0 lbs	4.8 lbs	9.7 lbs	5.6 lbs	11.3 lbs
Anhydrous 94-97%	3.9 lbs	7.7 lbs	4.6 lbs	9.2 lbs	5.4 lbs	10.8 lbs

SOURCES OF ADDITIONAL INFORMATION:

American Concrete Institute; ph: 248-848-3700; www.aci-int.org

Portland Cement Association; ph: 847-966-6200; www.cement.org

National Ready Mix Concrete Association; ph: 301-587-1400; www.nrmca.org

[1] "Effect of Calcium Chloride on Portland Cements and Concretes." Paul Rapp, Proceedings, Fourteenth Annual Meeting, Highway Research Board, (1934)

[2] "Measuring the Rate of Hardening of Concrete by Bond Pullout Pins." T.M. Kelly and D.E. Bryant, Proceedings, ASTM, Volume 57, (1957)