



U.S. Department of Transportation
Federal Highway Administration

MCTC
MOBILE CONCRETE
TECHNOLOGY CENTER

MCTC FINDINGS

SET-MODIFYING ADMIXTURES – RETARDERS

RETARDING ADMIXTURES

Retarding admixtures slow the rate of concrete setting and strength gain; they are often used during hot-weather concrete placements. Retarders are often used when high concrete temperatures cause an increased rate of stiffening that makes placing and finishing difficult. Retarders chemically slow cement hydration, consequently reducing the peak temperature.

Designation

Specified under AASHTO M 194/ASTM C494 Type B as set-retarding without affecting water requirements and Type D as set-retarding and water-reducing. Some retarders can provide retardation and high-range water reduction, these are classified under AASHTO M194/ASTM C494 as a Type G admixture.

IMPORTANT CONSIDERATIONS

Retarders

- May increase air content in the mixture.
- Delay setting of a mixture may increase the risk of plastic shrinkage cracking and may interfere with the saw-cutting window.
- May result in some reduction in strength at early ages (one to three days); later strengths will likely be higher.
- Increase the rate of bleeding and bleeding capacity.

- Many retarders can also act as water reducers; they are frequently called water-reducing retarders.
- Set-retarding admixtures are useful in extending setting times of concrete, but not all are effective at elevated temperatures.

Extended Set Retarders

Extended set retarders are a type of set retarder that delay the setting of concrete for an even longer, but manageable, period of time. This allows more time for placement, finishing, and compaction, as well as for transportation over longer distances. They are typically used for large scale construction projects, where the concrete needs to remain workable for several hours. These products are labelled as “Hydration Stabilizers.”

- Adjust the mix design to account for the addition of the admixture.
- The timing of the admixture application is critical to achieving the desired results.
- Temperature and humidity can affect admixture performance.
- It is important to ensure that the admixture is compatible with other admixtures.
- Follow the manufacturer’s recommendations for the admixture dosage, mixing instructions, and curing procedures.

CONCLUSION

The effects of retarders on other properties of concrete and their interaction with other admixtures and material sources may not be predictable. Temperature can have a significant influence on the behavior of retarders. Therefore, good practice is to evaluate laboratory trial batches with job materials under anticipated job conditions (expected temperature ranges over the duration of the project) to detect possible side effects.

A semi-adiabatic calorimeter ([Monitoring Concrete Consistency Using Semi-Adiabatic Calorimetry \(dot.gov\)](https://www.fhwa.dot.gov/construction/monitoring-concrete-consistency-using-semi-adiabatic-calorimetry/)) is a very good tool to evaluate the effect of retarders on a given mixture.

For additional information on retarders, refer to [TechBrief: Chemical Admixtures for Concrete Paving Mixtures \(dot.gov\)](https://www.fhwa.dot.gov/construction/techbrief-chemical-admixtures-for-concrete-paving-mixtures/).

