



U.S. Department of Transportation
Federal Highway Administration

MCTC
MOBILE CONCRETE
TECHNOLOGY CENTER

MCTC FINDINGS

SET-MODIFYING ADMIXTURES – ACCELERATORS

ADMIXTURES ACCELERATORS

Accelerating admixtures (accelerators) speed up the rate of setting and strength gain of concretes. Accelerating admixtures increase the rate of strength development of concrete at an early age, including in cold weather. However, excessive acceleration may result in cracking before finishing and/or saw cutting can be completed.

Designation

Accelerators are specified under AASHTO M 194/ASTM C494 Type C as set-accelerating without affecting water requirements and Type E as set accelerating and water reducing.

IMPORTANT CONSIDERATIONS

Accelerators with Calcium Chloride

- Should be added to the concrete mixture in solution form (with the mixture water). If added in dry form, the particles may not completely dissolve. Undissolved lumps in the mixture can cause popouts and dark spots in hardened concrete.
- Should not be used in reinforced pavements or prestressed concrete because of the risk of corrosion of steel.

Accelerators without Calcium Chloride

- “Non-Chloride Accelerators” (NCA) are accelerators that do not contain calcium chloride as an active ingredient. Commonly, NCAs are based on nitrate or nitrite salts.
- NCAs are safe to use with reinforcing steel.

CAUTIONS

- Excessive dosages can result in placement problems and can cause rapid stiffening, a large increase in drying shrinkage, corrosion of reinforcement, and loss of strength at later ages.
- Accelerators are not anti-freeze agents. Precautions should be taken during cold weather to protect the concrete from freezing prior to achieving sufficient strength.

GENERAL RECOMMENDATIONS

- Compatibility testing should be performed to ensure that the admixture does not negatively affect the properties of the concrete.
- The manufacturer’s recommended dosage should be followed closely to avoid adverse impacts on concrete properties.
- It is wise to work with a supplier who provides technical support and guidance for the use of their product.

- Closely monitor the set time and other concrete properties during the placement and curing process to ensure that they remain within acceptable limits.

CONCLUSIONS

The effects of accelerators on other properties of concrete such as shrinkage and their interaction with cements and other admixtures may not be predictable. Therefore, good practice is to evaluate trial batches with job materials under anticipated job conditions to detect possible side effects.

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

For additional information on accelerators, refer to [TechBrief: Chemical Admixtures for Concrete Paving Mixtures \(dot.gov\)](https://www.techbrief.com/techcontent/article/Chemical-Admixtures-for-Concrete-Paving-Mixtures-dotgov).

