

**ARM of Minnesota**

**Exterior  
Concrete  
Standards**

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**AGGREGATE & READY MIX**  
ASSOCIATION OF MINNESOTA

# ARM Exterior Concrete Standards

## Concrete

- Minimum **design strength** 4000 psi at 28 days
- Water Cementitious Ratio 0.45 Maximum. **Mixtures conforming to MN/DOT 3Axx do not meet this requirement.**

Aggregate should conform to ASTM C33 Class 5S minimum. A better specification is MN/DOT 3137. Even then, popouts at an average density of 4 per square yard can be anticipated **for all glacial gravels found in Minnesota.** Aggregate conforming to MN/DOT 3137 Superstructure can reduce popouts to approximately 2 popouts per square yard. Aggregates conforming to MN/DOT 3137 Class A can reduce popouts to low levels.

Some crushed bedrock, such as selected limestones, has a very good performance history. These materials can be used to substitute for Class A aggregate where the performance history is known. A popout is caused by breakdown of individual coarse aggregate particles. For the purpose of this document, a popout is greater than 1/2-inch in every direction at the surface.

## Curing

A cure that provides additional water is preferred. Curing can be accomplished with a membrane forming curing compound applied at a coverage rate (gal/ft<sup>2</sup>) equal to or greater than the manufacturers recommended coverage rate. **Curing Compounds shall comply to ASTM C309.**

## De-icing Chemicals

Common Salt and other manufactured concrete de-icing chemicals should not be used as a de-icing agent on concrete less than 365 days of age. Ammonium Nitrate and Sulfate salts should be avoided at all times.

## Late Season Placement

Concrete placed in the fall, that will not have 30 days to dry prior to exposure to freezing, needs to be protected. After curing, the concrete should be treated with a 50/50 mixture of mineral spirits and boiled linseed oil or a siloxane, to reduce water penetration—in particular if de-icing chemicals are used before the concrete is more than 365 days of age. Scaling may occur in this condition regardless of concrete quality.

**Air Content, achieved at the time and point of placement, shall conform to the following table based on the maximum aggregate size.**

<u>Nominal Maximum Aggregate Size</u>	<u>Air Content (%)</u>
3/8	6-9
1/2	5 1/2-8 1/2
3/4	4 1/2-7 1/2
1	4 1/2-7 1/2

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