

June 1, 2020

Fine and Coarse Aggregate Qualities

Fine Aggregate - Cemstone utilizes fine aggregates that meet the requirements of ASTM C33, Table 2 “Limits for Deleterious Substances in Fine Aggregate for Concrete”. These fine aggregates are naturally occurring and may contain a small fraction of deleterious material such as clay lumps, lightweight material, coal and/or lignite. In addition, traces of opaline shale from glacial deposits were left throughout the Northern Midwest (Iowa, Minnesota & South Dakota). These opaline shale particles can react with the alkalis (sodium and potassium) in the Portland cement when a high rate of evaporation is present at the surface of the concrete causing pop-outs. This Alkali Silica Reaction (ASR) and subsequent pop-outs are more likely to occur in machine troweled finished slabs. Therefore, the following are our recommendations to minimize the effects of ASR sand pop-outs:

- Placing concrete during the cooler parts of the day minimizes the risk.
- Avoid direct sunlight on the slab as solar radiation increases the potential.
- Do not use chemical hardeners that contain potassium silicate or sodium silicate.
- If a concrete slab placement must be completed during potentially hazardous conditions, **Cemstone strongly recommends the use of Cemstone Cure & Seal Plus “ASR Sand Pop-Out MINIMIZER”** to be applied as a curing compound immediately after final finishing. This product minimizes the ASR sand pop-out frequency.

Additional information about ASR sand pop-outs is available from attached link to the Aggregate & Ready-Mix Association of Minnesota (ARM) “Alkali-Silica Reaction Pop-outs”.

https://www.armofmn.com/images/miscconcreteguides/ASR_Pop-outs_final_11-16-17_1.pdf

Coarse Aggregate - Cemstone utilizes coarse aggregates that meet the requirements of ASTM C33, Table 4 “Limits for Deleterious Substance and Physical Requirements of Coarse Aggregate”. It is required that all coarse aggregate to be used in exterior flatwork comply with the requirements of ASTM C33, class 4S. These aggregates are naturally occurring and can contain a small fraction of deleterious material such as clay lumps, friable particles and lightweight material such as shale, chert, and/or spall particles. The Aggregate and Ready-Mix Association of Minnesota, “Freeze-Thaw Concrete Pop-Outs (Physical)” document has established expectations of the quantity of aggregate pop-outs.

https://www.armofmn.com/images/miscconcreteguides/Pop-outs_final_11-16-17_1.pdf

All Cemstone aggregate sources follow quality control plans and, as such, have procedures in place to minimize the quantity of deleterious material. **Given that, even when aggregates comply with ASTM C33 and regardless of quality control procedures, some minor amount of surface defects due to deleterious aggregate particles can be expected in any concrete placement.** Proper mix design selection, placing techniques, finishing procedures, curing and sealing methods must be followed to minimize surface defects. When surface appearance expectations in regard to concrete aggregates exceed the limits allowed by ASTM or the DOT, please consult your Cemstone account representative for proper material selection.

Sincerely,



Lars Anderson
Cemstone Products Company
Engineering Services Manager