Q&A

In February 2013, our sister publication Concrete Construction (CC) *reprinted "Better Garage Floors," a* JLC *feature that originally ran in our May 2011 issue.* CC *received the following question about the recommendation to use air-entrained concrete for a garage floor, which typically has a troweled finish. We've adapted the response, which appeared in* CC*'s April 2013 "Problem Clinic" column.*

Q. Troweling Air-Entrained Concrete

Can't hard-trowelling air-entrained concrete lead to delaminations?

A. *Jerry Holland, chief engineer for Structural Services in Atlanta responds:* The trowel versus air-entrained concrete issue is a tough balancing act. The options are:

1. Light troweling with air-entrainment. If the owner decides to go with a lightly trowelled air-entrained garage slab, even in the northernmost or mountainous locations, I suggest considering a moderate air content (4.5% +/- 1.5%) rather than the more typical 6.0% that is used for an exterior broomed slab in severe freeze-thaw areas. There are a couple of reasons for this. First, the potential for delaminations increases exponentially as the air content increases. And second, even light troweling decreases the moisture and chloride ingress into the top of the slab, thereby making it less likely that the slab will be fully saturated to a significant depth when freeze-thaw cycles occur.

When troweling air-entrained concrete, the contractor should do the following:

- Delay each finishing step as long as possible.
- Keep the surface as "open" as feasible through the finishing steps, and finally close the surface as late as possible.
- When lightly troweling the surface at the end of finishing, "leave some fuzz on the surface," as the finishers say.

2. Light troweling without air-entrainment. If the decision is made not to air-entrain a garage slab in a severe freeze-thaw environment, the surface should be troweled as densely as feasible to minimize moisture and chloride ingress, and a silane sealer should be used.

The contractor should talk with the owner about de-icer usage on the driveway leading up to the garage (de-icer can also be tracked into the garage). For new concrete going through its first season of snow and ice, it's best to use only sand and to avoid de-icers, because they increase the propensity for concrete surface disruptions both outside and inside the garage. However, sand — though it can improve traction — will not act as a de-icer. So if a de-icer appears to be necessary for safety, it should be used very sparingly.

For the second winter, in addition to sand, a sodium chloride de-icer, such as rock salt, may be used (sparingly). Other de-icers tend to attack the concrete.

All of these difficulties and compromises should be discussed with the owner, who should be shown similarly finished garage slabs. Also, the owner should give approval of the finish ahead of the slab construction. (Remember that all important discussions should be followed up in writing.) Another discussion to have with the owner is that the garage slab must be kept as clean and dry as possible in cold weather.

CC*'s response also acknowledges a reader who noted the following from the Portland Cement Association's book* Concrete Floors on Ground: *"... place, strike off, and float the concrete as rapidly as possible without working up an excessive layer of cement paste. Keep the float blades flat in initial floating to avoid densifying the surface too early ... delay further finishing as long as possible by covering the surface with polyethylene or otherwise protecting it from evaporation."*