

Hard Trowel Finish on Air-entrained Concrete

ASCC Position Statement #1

Some specifications require concrete contractors to hard-trowel air-entrained concrete. The risks associated with this requirement include:

- 1) increased probability of delamination or blistering;
- 2) reduction in surface air content; and
- 3) change in hardened air void parameters.

Under service conditions, most interior slabs don't have a high moisture content or a chance to freeze, so air-entrained concrete isn't needed to ensure a durable floor surface. Unless the building is enclosed and the roof is completed, it's impossible to protect non-air-entrained concrete slabs from external moisture. Thus, specifiers often require interior concrete to be air-entrained if the slabs will be exposed to a cold, wet environment during construction. In addition to requiring entrained air, designers may also specify a lower water-cement ratio and a higher compressive strength that can increase the cost of the concrete.

The specifier should explain the risks and associated consequences to the owner before the project begins:

- Risk of concrete scaling and possible repair cost due to cold-weather exposure;
- Cost of air-entrained versus non-air entrained concrete;
- Increased risk of delamination and blistering, and possible repair cost when the surface is machine troweled; and
- Reduction in surface air content and change in hardened air void parameters when the surface is machine troweled.

The optional requirements checklist of ACI 301-99, "Specifications for Structural Concrete,"

states that intentionally entrained air should not be incorporated in normalweight concrete slabs that require a dense, polished, machine-troweled surface. ACI 302.1R-96, "Guide for Concrete Floor and Slab Construction," states that entrained air is not recommended for concrete to be given a smooth, dense, hard-troweled finish.

ASCC concrete contractors will hard-trowel air-entrained concrete if required by specification, but only with the acknowledgment that the risk associated with delamination or blistering and the changes in hardened air void parameters are entirely the responsibility of the specifier.

If you have any questions, contact your ASCC concrete contractor or the ASCC Technical Hotline at (800) 331-0668.

Update: The ACI 301-10 Optional Requirements Checklist item for section 4.2.2.4 is similar to that in ACI 301-99 except that it no longer limits the warning to normalweight concrete. The revised language is: "Air entrainment should not be used in flatwork to receive a hard steel-troweled finish."

Section 5.7.1 of ACI 302.1R-04 contains the same wording but adds a reason, as follows: "Entrained air is not recommended for concrete to be given a smooth, dense, hard-troweled finish because blistering and delamination may occur."

(08-11 update replaces 01-03 original)



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