

Bugholes in Formed Concrete

ASCC Position Statement #8

Bugholes, also called surface air voids, are small regular or irregular cavities, usually not exceeding $\frac{3}{8}$ in. (16 mm), resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation. They normally occur in vertical cast-in-place concrete surfaces. The photos show smooth-form-finish concrete with varying numbers and sizes of bugholes.

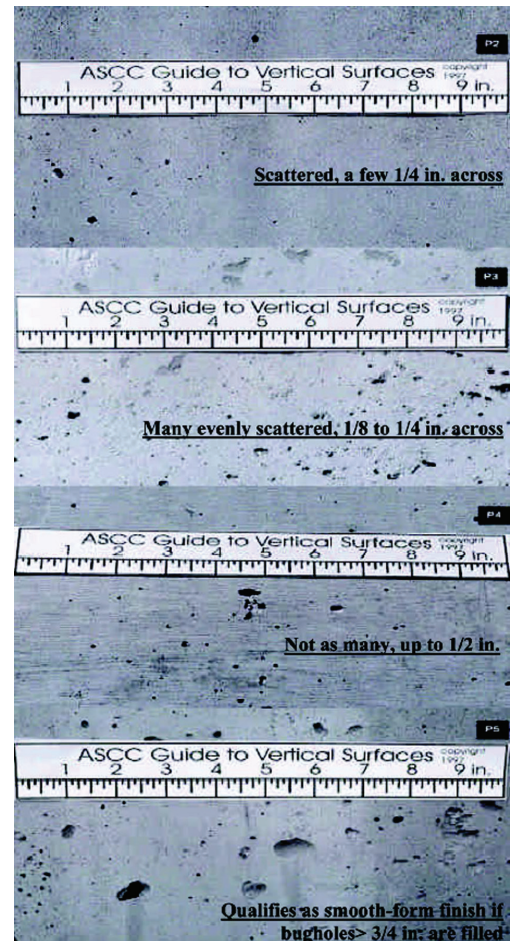
The permissible size or number of bugholes isn't defined for the smooth-form finishes described in ACI 301-99, "Specifications for Structural Concrete." Section 5.3.3.3.b for a smooth-form finish instructs the contractor to patch tie holes and defects. Section 5.3.7.3, Repair of surface defects other than tie holes, instructs the contractor to "Outline honeycombed or otherwise defective concrete with a 1/2 to 3/4-in. deep saw cut and remove such concrete down to sound concrete." If the term "surface defects" included bugholes, a saw cut would be required around each one, which is clearly an unreasonable and literally impossible task. This leads to the conclusion that bugholes aren't surface defects.

If bugholes aren't acceptable—because an architectural finish is desired or because the concrete surface is to receive paint or other coatings—ASCC concrete contractors recommend that the specifier select a rubbed finish as defined in ACI 301-10. The cost for a rubbed surface should be treated as a separate bid item, and is not included in the bid for a smooth-form finish.

For further information, consult "Guide for Surface Finish of Formed Concrete," a publication prepared by the ASCC Education and Training Committee. If you have any questions, contact your ASCC concrete contractor or the ASCC Technical Hotline at (800) 331-0668.

Update: Replace second paragraph with the following:

ACI 301-10 no longer uses the term *rough* and *smooth-form finish*. The document instead describes three surface finish classes. SF-1.0 requires patching voids larger than 1 1/2 in. wide or 1/2 in. deep. SF-2.0 and SF-3.0 both require patching tie holes and voids larger than 3/4 in. wide or 1/2 in. deep. Section 1.2 of ACI 301-10 gives the following definition for surface defects:



"imperfection in concrete surfaces defined in Contract Documents that must be repaired."

This indicates that bugholes no deeper than $\frac{1}{2}$ in. and no wider than 1 1/2 in. for SF-1.0 or $\frac{3}{4}$ in. for SF-2.0 or 3.0 are not considered by ACI 301-10 to be defects, but may still be considered to be defects in some contract documents. Because bugholes are a natural feature of all as-cast vertical concrete structural components it is unrealistic to expect that surfaces will be free of bugholes.

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