



## ASTM C457

### Standard Test Method for Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete

#### What is an Air Void Parameters Determination?

An air-void parameters determination is performed to assess the volume percent air in hardened concrete and assess how well the air is distributed throughout the concrete.

#### How are Air Void Parameters Evaluated?

A hardened concrete sample is cut and polished (Figure 1). The flat, polished surface is placed under a microscope and the air voids are counted in a systematic fashion (Figures 2 and 3). The volume percent air, specific surface (a way to assess void size) and spacing factor (a way to assess void spacing) are calculated.

#### What are the concerns about hardened air content on durability and serviceability?

The major concerns with respect to durability are impact on compressive strength and the potential for freeze-thaw distress. An elevated air content can result in lower-than-expected compressive strength. Inadequate air content, specific surface value and spacing factor value can leave the concrete susceptible to freeze-thaw distress.

#### Where should I be concerned about Air-Void Parameters?

The hardened air content is a concern for virtually all concrete applications. In geographic areas where freeze-thaw distress is a concern, adequate air-void parameters help protect the concrete from scaling.

#### How is this standard used in the industry?

This test method is used to provide the hardened air content, specific surface and spacing factor. The designed air content depends upon the specific application and mix design. For freeze-thaw durability, industry guidelines recommend a specific surface of 600-in.-1 or greater and spacing factor of 0.008-inches or less. For concrete that contains a high-range water-reducing admixture, a spacing factor of 0.010-inches and larger has been shown to be freeze-thaw durable.

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