

PEM TEST FOR COLD WEATHER: SUPER AIR METER



➤ Why do we need this test?

It is well understood that freeze-thaw durability of concrete is dependent on the size, distribution, and volume of air bubbles entrained in the concrete through the use of air-entraining admixtures (AEAs).

Historically, measurement of the distribution of air voids in fresh concrete has been impossible, forcing specifications to rely on measurement of total air volume. This approach was reasonable when all AEAs were based on a single chemical. However, with an increasing range of products available, the correlation between air volume and bubble spacing is no longer precise.

The super air meter (SAM) was developed to address this shortcoming. Conducting the test during prequalification reassures agencies that the proposed mixture has the potential to be freeze-thaw durable. Testing at the point of delivery confirms that the mixture in the truck complies with the specification.

Reducing the amount of nondurable concrete in place will lead to savings in repairs and maintenance for agency owners.

➤ What does the test tell us?

The SAM number has been correlated to the freeze-thaw resistance of concrete samples tested in accordance with AASHTO T 161, Standard Method of Test for Resistance of Concrete to Rapid Freezing and Thawing. Data has also been collected to correlate the SAM number with the air-void spacing factor reported by hardened air analysis (ASTM C457).

➤ How does the test work?

The device is similar to a conventional air pot, except that the SAM uses two rounds of increasing pressure steps to assess changes in air volume at different pressures, which are then used to calculate a parameter called the SAM number.

➤ What do I need?

- A commercially available SAM



Super air meter indicates air distribution in concrete for freeze-thaw durability

➤ What do the numbers mean?

- At prequalification, mixtures should achieve a SAM number of 0.2 or less.
- In the field, a SAM number of 0.3 or less indicates a concrete with good freeze-thaw durability.

More information?

The SAM method has been standardized as AASHTO TP 118, Provisional Standard Method of Test for Characterization of the Air-Void System of Freshly Mixed Concrete by the Sequential Pressure Method. Additional resources are available at <https://cptechcenter.org/performance-engineered-mixtures-pem/pem-test-methods/>.

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