



Standard Test Method for Determining the Apparent Chloride Diffusion Coefficient of Cementitious Mixtures by Bulk Diffusion¹

This standard is issued under the fixed designation C 1556; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the laboratory determination of the apparent chloride diffusion coefficient for hardened cementitious mixtures.

1.2 The values stated in SI units are to be regarded as the standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 31/C 31M Practice for Making and Curing Concrete Test Specimens in the Field²

C 42/C 42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete²

C 125 Terminology Relating to Concrete and Concrete Aggregates²

C 192/C 192M Practice for Making and Curing Concrete in the Laboratory²

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials²

C 1152/C 1152M Test Method for Acid-Soluble Chloride in Mortar and Concrete²

C 1202 Test Method for Electrical Indication of Concrete's Ability to Resist Chloride-ion Penetration²

2.2 NORDTEST Standards:

NT BUILD 443, Approved 1995-11, Concrete, Hardened: Accelerated Chloride Penetration (in English)³

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology C 125.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *apparent chloride diffusion coefficient, D_a , n* —a chloride transport parameter calculated from acid-soluble chloride profile data obtained from saturated specimens exposed to chloride solutions, without correction for chloride binding, that provides an indication of the ease of chloride penetration into cementitious mixtures.

3.2.2 *chloride binding, v* —the chemical process by which chloride ion is removed from solution and incorporated into cementitious binder hydration products.

3.2.2.1 *Discussion*—Chloride binding is primarily associated with hydration products formed by the aluminate phase of cement and mixtures containing ground granulated blast furnace slag.

3.2.3 *chloride penetration, v* —the ingress of chloride ions due to exposure to external sources.

3.2.4 *exposure liquid, n* —the sodium chloride solution in which test specimens are stored prior to obtaining a chloride profile.

3.2.5 *exposure time, n* —the time that the test specimen is stored in the solution containing chloride ion.

3.2.6 *initial chloride-ion content, C_i , n* —the ratio of the mass of chloride ion to the mass of concrete for a test specimen that has not been exposed to external chloride sources.

3.2.7 *profile grinding, v* —the process of grinding off and collecting a powder sample in thin successive layers from a test specimen using a dry process.

3.2.8 *surface chloride content, C_s , n* —the theoretical ratio of the mass of chloride ion to the mass of concrete at the interface between the exposure liquid and the test specimen.

4. Summary of Test Method

4.1 Obtain a representative sample of the cementitious mixture prior to exposure to chloride ion. Separate each sample into a test specimen and an initial chloride-ion content specimen. Crush the initial chloride-ion content specimen and determine the initial acid-soluble chloride-ion content. Seal all sides of the test specimen, except the finished surface, with a suitable barrier coating. Saturate the sealed specimen in a calcium hydroxide solution, rinse with tap water, and then

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.66 on Concrete's Resistance to Fluid Penetration.

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² *Annual Book of ASTM Standards*, Vol 04.02.

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