



Designation: C125 – 19

## Standard Terminology Relating to Concrete and Concrete Aggregates<sup>1</sup>

This standard is issued under the fixed designation C125; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

### 1. Scope\*

1.1 This standard is a compilation of definitions of terms as they are used in standards under the jurisdiction of Committee C09.

1.2 Other terminology under the jurisdiction of Committee C09 is included in two specialized standards. Terms relating to constituents of concrete aggregates are defined in Descriptive Nomenclature C294. Terms relating to constituents of aggregates for radiation-shielding concrete are defined in Descriptive Nomenclature C638.

1.3 Related terminology for hydraulic cement is included in Terminology C219. In the event of conflict between definitions in Terminology C125 and definitions in Terminology C219, definitions in Terminology C125 shall govern for Committee C09 standards.

1.4 When a term is used in an ASTM standard for which Committee C09 is responsible, it is included herein only if used in more than one Committee C09 standard.

NOTE 1—The subcommittee responsible for this standard will review definitions on a five-year basis to determine if the definition is still appropriate as stated. Revisions will be made when determined necessary. The year shown in parentheses at the end of a definition indicates the year the definition or revision to the definition was approved. A letter R and a year indicate when the definition was reviewed. No date indicates the term has not yet been reviewed.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.91 on Terminology.

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### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

- C94/C94M Specification for Ready-Mixed Concrete
- C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
- C219 Terminology Relating to Hydraulic Cement
- C294 Descriptive Nomenclature for Constituents of Concrete Aggregates
- C403/C403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
- C494/C494M Specification for Chemical Admixtures for Concrete
- C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- C638 Descriptive Nomenclature of Constituents of Aggregates for Radiation-Shielding Concrete
- C939 Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
- C1074 Practice for Estimating Concrete Strength by the Maturity Method
- C1077 Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
- C1240 Specification for Silica Fume Used in Cementitious Mixtures
- C1437 Test Method for Flow of Hydraulic Cement Mortar
- C1610/C1610M Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique
- C1611/C1611M Test Method for Slump Flow of Self-Consolidating Concrete
- E135 Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

\*A Summary of Changes section appears at the end of this standard

### 3. Terms and Their Definitions

**absorption, *n***—the process by which a liquid is drawn into and tends to fill permeable pores in a porous solid body; also, the increase in mass of a porous solid body resulting from the penetration of a liquid into its permeable pores. (R2008)

DISCUSSION—In the case of concrete and concrete aggregates, unless otherwise stated, the liquid involved is water, the increase in mass is that which does not include water adhering to the outside surface, the increase in mass is expressed as a percentage of the dry mass of the body and the body is considered to be “dry” when it has been treated by an appropriate process to remove uncombined water, such as drying to constant mass at a temperature between 100 and 110°C.

**accreditation, *n***—of testing agency, a process by which an evaluation authority attests that a testing agency has demonstrated the competency to perform specific tasks in accordance with a standard. (2011)

**admixture, *n***—a material other than water, aggregates, cementitious material, and fiber reinforcement that is used as an ingredient of a cementitious mixture to modify its freshly mixed, setting, or hardened properties and that is added to the batch before or during its mixing. (R2015)

*accelerating admixture, *n**—an admixture that increases the rate of reaction of cementitious materials thus reducing time of setting and increasing early strength development of a cementitious mixture. (2015)

*air-entraining admixture, *n**—admixture that causes the development of a system of microscopic air bubbles in concrete or mortar during mixing. (R2008)

*chemical admixture, *n**—an admixture in the form of a liquid, suspension, or water-soluble solid. (2014)

*extended set-control admixture, *n**—an admixture that can predictably reduce the hydration rate of cement for applications requiring extended time of setting followed by normal strength development. (2019)

DISCUSSION—Depending on dosage rate, this admixture can be used to manage the setting time of returned concrete, reduce the hydration of cement in wash water from concrete production, permit extended delivery times of ready mixed concrete, or function as an ordinary retarding admixture. Also referred to as a *hydration controlling admixture* or a *hydration stabilizing admixture*.

*mineral admixture, *n**—deprecated term. (R2008)

DISCUSSION—This term has been used to refer to different types of water insoluble, finely divided materials such as pozzolanic materials, cementitious materials, and aggregate. These materials are not similar, and it is not useful to group them under a single term. The name of the specific material should be used, for example, use “pozzolan,” “slag cement,” or “finely divided aggregate,” as is appropriate.

*retarding admixture, *n**—an admixture that decreases the rate of reaction of cementitious materials thus increasing time of setting of a cementitious mixture. (2015)

*water-reducing admixture, *n**—admixture that either increases the slump of freshly mixed mortar or concrete without increasing the water content or that maintains the slump with a reduced amount of water due to factors other than air entrainment. (R2008)

*water-reducing admixture, high-range, *n**—a water-reducing admixture capable of producing at least 12 % reduction of

water content when tested in accordance with Specification C494/C494M and meeting the other relevant requirements of Specification C494/C494M. (R2008)

**age, equivalent, *n***—the number of days or hours of curing of a concrete mixture at a specified temperature required to produce a maturity equal to the maturity achieved by a given curing period at concrete temperatures different from the specified temperature. (2015)

DISCUSSION—The specified temperature is taken typically as the temperature used for standard laboratory curing. For example, a concrete cured for three days at an elevated temperature may have an equivalent age of seven days of curing at the standard laboratory temperature.

**aggregate, *n***—granular material, such as sand, gravel, crushed stone, or iron blast-furnace slag, used with a cementing medium to form hydraulic-cement concrete or mortar. (R2008)

*coarse aggregate, *n**—(1) aggregate predominantly retained on the 4.75-mm (No. 4) sieve; or (2) that portion of an aggregate retained on the 4.75-mm (No. 4) sieve. (R2008)

DISCUSSION—The definitions are alternatives to be applied under differing circumstances. Definition (1) is applied to an entire aggregate either in a natural condition or after processing. Definition (2) is applied to a portion of an aggregate. Requirements for properties and grading should be stated in the specification.

*fine aggregate, *n**—(1) aggregate passing the 9.5-mm (3/8-in.) sieve and almost entirely passing the 4.75-mm (No. 4) sieve and predominantly retained on the 75- $\mu$ m (No. 200) sieve; or (2) that portion of an aggregate passing the 4.75-mm (No. 4) sieve and retained on the 75- $\mu$ m (No. 200) sieve. (R2008)

DISCUSSION—The definitions are alternatives to be applied under differing circumstances. Definition (1) is applied to an entire aggregate either in a natural condition or after processing. Definition (2) is applied to a portion of an aggregate. Requirements for properties and grading should be stated in the specifications.

*heavyweight aggregate, *n**—see *high-density aggregate*.

*high-density aggregate, *n**—aggregate with relative density greater than 3.3, such as: barite, magnetite, limonite, ilmenite, iron, or steel. (R2008)

*lightweight aggregate, *n**—see *low-density aggregate*.

*low-density aggregate, *n**—aggregate with bulk density less than 1120 kg/m<sup>3</sup> [70 lb/ft<sup>3</sup>], such as: pumice, scoria, volcanic cinders, tuff, and diatomite; expanded or sintered clay, shale, slate, diatomaceous shale, perlite, vermiculite, or slag; and end products of coal or coke combustion. (R2008)

*normal-density aggregate, *n**—aggregate that is neither high nor low density. (R2008)

DISCUSSION—This term refers to aggregate with relative density typically ranging between 2.4 and 3.0, or with bulk density typically ranging between 1120 kg/m<sup>3</sup> [70 lb/ft<sup>3</sup>] and 1920 kg/m<sup>3</sup> [120 lb/ft<sup>3</sup>].

*normalweight aggregate, *n**—see *normal-density aggregate*.

**air content, *n***—the volume of air voids in cement paste, mortar, or concrete, exclusive of pore space in aggregate particles, usually expressed as a percentage of total volume of the paste, mortar, or concrete. (R2008)

*air-cooled blast-furnace slag*—see **blast-furnace slag, air-cooled**.

**air, entrained**, *n*—air voids, typically between 10 and 1000  $\mu\text{m}$  (1 mm) in diameter and spherical or nearly so, that are incorporated intentionally into a cementitious mixture during mixing by use of an air entraining admixture. (2012)

DISCUSSION—Entrained air is used primarily to increase the durability of cementitious mixtures exposed to cycles of freezing and thawing in wet environments. Entrained air may affect workability and strength of a hardened cementitious mixture.

**air, entrapped**, *n*—air voids, typically 1 mm or larger in size and mainly irregular in shape, that are incorporated unintentionally into a cementitious mixture during mixing and handling. (2012)

*air void*—see **void, air**.

**authority, evaluation**, *n*—an independent entity, apart from the testing agency being evaluated, that has the capability to provide an unbiased evaluation of the technical activities of concrete and concrete aggregates testing agencies. (2011)

DISCUSSION—Two acceptable methods of evaluation are inspection and accreditation, and these services are offered by various evaluation authorities.

**blast-furnace slag**, *n*—the nonmetallic product, consisting essentially of silicates and aluminosilicates of calcium and other bases, that is developed in a molten condition simultaneously with iron in a blast furnace. (R2008)

**blast-furnace slag, air-cooled**, *n*—the material resulting from solidification of molten blast-furnace slag under atmospheric conditions; subsequent cooling may be accelerated by application of water to the solidified surface. (R2008)

**blast-furnace slag, expanded**, *n*—the low density cellular material obtained by controlled processing of molten blast-furnace slag with water or water and other agents, such as steam or compressed air or both. (R2011)

**blast-furnace slag, granulated**, *n*—the glassy, granular material formed when molten blast-furnace slag is rapidly chilled, as by immersion in water. (R2008)

**bleeding**, *n*—the autogenous flow of mixing water within, or its emergence from, a newly placed cementitious mixture caused by the settlement of the solid materials within the mass. (R2013)

**bulk density**, *n*—of *aggregate*, the mass of a unit volume of bulk aggregate material (the unit volume includes the volume of the individual particles and the volume of the voids between the particles). (R2008)

DISCUSSION—This term replaces the deprecated term **unit weight**—of *aggregate*.

**calcined**, *adj*—heated to a temperature less than the melting point so as to bring about a decomposition, phase transition, or removal of a volatile fraction of a solid material. (2012)

**calibration**, *n*—of *measuring instrument*, a process that, under specified conditions and following a standard procedure, establishes metrological traceability by determining: (1) the relationship between the quantity values provided by measurement standards or certified reference materials and the corresponding indications from a measuring instrument or

system; and (2) the estimated uncertainty of measurements made subsequently with the instrument or system. (2011)

DISCUSSION—Calibration takes into account systematic error (or bias) of the measuring instrument or system as well as random error that is associated with the use of the measurement instrument or system and error associated with the measurement standards or certified reference materials. Calibration should not be confused with an adjustment of a measuring instrument or with verification of a measuring instrument. Sometimes the first step alone is mistakenly called calibration, but performing only the first step is the process of **standardization**. In tests of concrete and concrete aggregates, standardization of measuring instruments or systems is often sufficient.

*cellular concrete*—see **concrete, cellular**.

**cement, hydraulic**, *n*—a cement that sets and hardens by chemical reaction with water and is capable of doing so under water. (R2015)

**cement, slag**, *n*—granulated blast-furnace slag that has been ground to cement fineness, with or without additions, and that is a hydraulic cement. (R2015)

**cementitious material (hydraulic)**, *n*—an inorganic material or a mixture of inorganic materials that sets and develops strength by chemical reaction with water by formation of hydrates and is capable of doing so under water. (R2015)

**cementitious material, supplementary, (SCM)**, *n*—an inorganic material that contributes to the properties of a cementitious mixture through hydraulic or pozzolanic activity, or both. (R2015)

DISCUSSION—Some examples of supplementary cementitious materials are fly ash, silica fume, slag cement, rice husk ash, and natural pozzolans. In practice, these materials are used in combination with portland cement.

**cementitious mixture**, *n*—any mixture containing cementitious material and water. (2016)

DISCUSSION—Paste, grout, mortar, and concrete are examples of cementitious mixtures.

**certification**, *n*—of *technician*, a procedure to determine and attest in writing that an individual is qualified to perform specific test methods or practices. (R2015)

**compound, curing**, *n*—a liquid that, when applied to the surface of freshly-placed concrete, forms a membrane that impedes the evaporation of water. (2018)

DISCUSSION—White pigmented curing compounds reflect solar radiation and reduce surface heating.

**concrete**, *n*—a composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate; in hydraulic-cement concrete, the binder is formed from a mixture of hydraulic cement and water. (R2015)

**concrete, cellular**, *n*—a low-density cementitious mixture having a homogeneous void or cell structure attained using gas-forming chemicals or foaming agents. (2016)

**concrete, fresh**, *n*—concrete that possesses enough of its original workability so that it can be placed and consolidated by the intended methods. (2016)

**concrete, hardened, *n***—concrete that has developed sufficient strength to serve some defined purpose or resist a stipulated loading without failure. (R2015)

**concrete, pervious, *n***—hydraulic-cement concrete proportioned with sufficient, distributed, interconnected macroscopic voids that allow water to flow through the material under the action of gravity alone. (2015)

**concrete, roller-compacted, RCC, *n***—concrete compacted while fresh by a roller, often a vibratory roller. (R2015)

**concrete, self-consolidating, SCC, *n***—concrete that can flow around reinforcement and consolidate under its own weight without additional effort and without exceeding specified limits of segregation. (R2015)

DISCUSSION—Project specifications shall indicate the acceptable segregation based upon a specified test method. Test Method C1610/C1610M provides a procedure for determining the degree of aggregate segregation under static conditions and the Appendix of Test Method C1611/C1611M describes a non-mandatory technique for assessing the degree of segregation under flowing conditions.

**consistency, *n***—of a fresh cementitious mixture, the relative mobility or ability to flow. (R2015)

DISCUSSION—This characteristic of fresh cementitious mixtures is difficult to quantify and empirical test methods have been adopted to provide indicators of consistency. For example, the slump test described in Test Method C143/C143M is used for concrete, the flow table method described in Test Method C1437 is used for mortar, and the flow cone method described in Test Method C939 is used for grout.

**consolidation, *n***—of cementitious mixtures, the process of increasing the density of a fresh cementitious mixture in a form, mold, or container by reducing the volume of voids. (R2015)

DISCUSSION—Except for self-consolidating concrete, consolidation is accomplished by inputting mechanical energy, typically by rodding, tamping, tapping, vibration, or some combination of these actions. Specific apparatus and methods for consolidation are defined in the relevant C09 Standards.

*crushed gravel*—see **gravel, crushed.**

*crushed stone*—see **stone, crushed.**

**curing, *n***—action taken to maintain moisture and temperature conditions in a freshly-placed cementitious mixture to allow hydraulic cement hydration and (if applicable) pozzolanic reactions to occur so that the potential properties of the mixture may develop. (R2015)

*curing compound*—see **compound, curing.**

**density, *n***—mass per unit volume of a material (preferred over term **unit weight**). (2013)

DISCUSSION—For materials with pores that can become filled with water, such as aggregate, different modifiers are applied to the term **density** depending on which portions of the material are included in defining the volume. The modifiers shown on the right are used:

Included in the Volume	Modifier
Solid portion of material	<b>absolute</b>
Solid portion of material plus impermeable pores	<b>apparent</b>
Solid portion of material plus permeable and impermeable pores	No modifier is used

For example, the term **apparent density** would be the mass of the solid material divided by the volume of solid material plus imper-

meable pores.

If permeable pores are included in the volume, a delimiting term (or an abbreviation) is used in parentheses to define the moisture condition of the permeable pores when mass is measured. These delimiting terms are *oven-dry (OD)* and *saturated-surface-dry (SSD)*. For example, the term **density (SSD)** would be the density of a porous material in its SSD condition. The delimiting term is not used with **absolute density** or **apparent density**, because permeable pores are not included in the defining volume.

**density, relative, *n***—the ratio of the density of material at a stated temperature to the density of distilled water at that stated temperature; if a temperature is not stated, it is assumed to be 23°C [73.5°F]. (2013)

DISCUSSION—As discussed for the term **density**, for a porous material (such as aggregate), different modifiers and delimiting terms are used for **relative density** depending on which density of the material is used in calculating the ratio. For example, **apparent relative density** refers to the ratio of **apparent density** to the density of water and **relative density (SSD)** refers to the ratio of **density (SSD)** to the density of water.

**duration, impact, *n***—the time that the impactor used to generate stress waves is in contact with the test surface; also referred to as **contact time**. (2015)

**elongated piece (of aggregate), *n***—a particle of aggregate for which the ratio of the length to width of its circumscribing rectangular prism is greater than a specified value (see also **flat piece (of aggregate)**). (R2015)

**engineer, licensed professional, *n***—an individual who is licensed to practice engineering as defined by the statutory requirements of the professional licensing laws of the governing jurisdiction; also referred to as *registered professional engineer*. (R2015)

*entrained air*—see **air, entrapped.**

*entrapped air*—see **air, entrained.**

**examiner, *n***—(1) an individual with the requisite technical qualifications to conduct and score impartially an examination of a person’s ability to perform specific test methods or practices; (2) an individual designated by a certification body to conduct and score certification examinations. (R2015)

DISCUSSION—An individual who only supervises a multiple-choice type of written examination but does not evaluate the competence of the candidates to perform specific procedures is not considered an examiner. The examiner requires requisite technical qualifications to exercise judgment in scoring a candidate’s ability to perform a specific procedure.

**factor, temperature-time, *n***—the maturity index computed as the area between the concrete temperature and the datum temperature from the plot of measured concrete temperature versus time, expressed in units of degree-days or degree-hours. (2015)

**fibers, *n***—slender filaments, which may be discrete or in the form of bundles, networks, or strands of natural or manufactured materials that can be distributed uniformly throughout a fresh cementitious mixture. (2018)

**fineness modulus, *n***—of aggregate, a factor obtained by adding the percentages of material in the sample that is

coarser than each of the following sieves (cumulative percentages retained), and dividing the sum by 100: 150- $\mu\text{m}$  (No. 100), 300- $\mu\text{m}$  (No. 50), 600- $\mu\text{m}$  (No. 30), 1.18-mm (No. 16), 2.36-mm (No. 8), 4.75-mm (No. 4), 9.5-mm ( $\frac{3}{8}$ -in.), 19.0-mm ( $\frac{3}{4}$ -in.), 37.5-mm ( $1\frac{1}{2}$ -in.), 75-mm (3-in.), 150-mm (6-in.). (R2016)

**flat piece** (*of aggregate*), *n*—a particle of aggregate for which the ratio of the width to thickness of its circumscribing rectangular prism is greater than a specified value (see also **elongated piece** (*of aggregate*)). (R2016)

**fly ash**, *n*—finely divided residue that results from the process of combustion of ground or powdered coal and that is transported by flue gases. (R2016)

DISCUSSION—This definition of fly ash does not include, among other things, the residue resulting from: (1) fluidized bed combustion, (2) the burning of municipal solid waste or any other refuse with coal, or (3) the burning of industrial or municipal solid waste in incinerators.

**fog room**, *n*—a moist room in which the humidity is controlled by atomization of water. (see **moist room**) (R2016)

**frequency, sampling**, *n*—as applied to digital data acquisition instruments, the rate at which the points that comprise the waveform are recorded; the inverse of the sampling interval, expressed in Hz or samples/s; also referred to as **sampling rate**. (R2016)

*fresh concrete*—see **concrete, fresh**.

*granulated blast-furnace slag*—see **blast-furnace slag, granulated**.

**gravel**, *n*—coarse aggregate resulting from natural disintegration and abrasion of rock or processing of weakly bound conglomerate. (see **aggregate**) (R2016)

**gravel, crushed**, *n*—the product resulting from the use of mechanical devices to break gravel particles into smaller fragments. (R2016)

**grout**, *n*—a cementitious mixture, with or without aggregate or admixtures, that is used primarily to fill voids. (2018)

DISCUSSION—For standards under the jurisdiction of Committee C09 that include grout in their scope, fine aggregate is included as a constituent.

**grout (nonshrink), hydraulic-cement**, *n*—a grout containing hydraulic-cement that, under unrestrained conditions, has a hardened volume greater than or equal to the original installed volume. (2018)

DISCUSSION—This type of grout is often used as a transfer medium between load-bearing members. Unrestrained conditions means the grout is free to expand during hardening.

*hardened concrete*—see **concrete, hardened**.

**hardening**, *n*—gain of strength and other properties of a cementitious mixture after final setting. (2018)

*hydraulic cement*—see **cement, hydraulic**.

**inspection, laboratory**, *n*—a comprehensive evaluation of a testing agency that includes: (1) an examination of testing

equipment for conformance to applicable tolerances; (2) an evaluation of the performance of test procedures for each standard submitted by the testing agency for review; (3) a review of the agency's quality system based on criteria listed in Practice **C1077**; and (4) a summary report that lists deviations from the standards under review. (R2016)

**interval, sampling**, *n*—as applied to digital data acquisition instruments, the time difference between any two adjacent points in a waveform. (R2016)

**laitance**, *n*—a layer of weak material derived from cementitious materials and aggregate fines carried to the surface of a cementitious mixture by bleeding. (R2016)

**lime-saturated water**, *n*—for curing test specimens, water containing calcium hydroxide at saturation level and in contact with solid calcium hydroxide so that saturation is maintained. (R2016)

*manufactured sand*—see **sand, manufactured**.

**material, certified reference**, *n*—a material, accompanied by a certificate, one or more of whose property values are certified by a procedure that establishes traceability to an accurate realization of the unit in which property values are expressed, and for which each certified property value is accompanied by an uncertainty at a stated level of confidence. (**E135**) (R2016)

DISCUSSION—The certificate provides traceable values and associated uncertainties of the properties of the material and must be retained with the material.

**material, consensus reference**, *n*—a material whose properties are based on average values obtained in an interlaboratory study or proficiency testing program that involves the use of standardized measurement systems. (R2016)

DISCUSSION—Consensus reference materials can be used internally by laboratories for periodic verification of measuring instruments or measurement processes.

**material, reference**, *n*—material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties. (**VIM**<sup>3</sup>) (R2016)

**maturity**, *n*—the extent of the development of a property of a cementitious mixture. (2018)

DISCUSSION—This term is commonly used to describe the extent of relative strength development of concrete. However, the term can also be applied to the evolution of other properties that depend on the chemical reactions occurring in the cementitious materials. At any age, maturity depends on the curing history.

**maturity function**, *n*—a mathematical expression that uses the measured temperature history of a cementitious mixture during a curing period to calculate an index that is indicative of the maturity at the end of that period. (2018)

<sup>3</sup> International Vocabulary of Metrology—Basic and General Concepts and Associated Terms (VIM), 3<sup>rd</sup> Ed., 2008. Developed by Joint Committee for Guides in Metrology, [www.iso.org/sites/JCGM/JCGM-Introduction.htm](http://www.iso.org/sites/JCGM/JCGM-Introduction.htm).

**maturity index, *n***—an indicator of maturity calculated from the temperature history of the cementitious mixture by using a maturity function. (2018)

DISCUSSION—The calculated index is indicative of maturity provided there has been a sufficient supply of water for hydration or pozzolanic reaction of the cementitious materials during the time interval used in the calculation. Two widely used maturity indexes are the **temperature-time factor** and the **equivalent age**.

**maximum size, *n***—of aggregate, in specifications for aggregate, the smallest sieve opening through which the entire amount of aggregate is required to pass. (2019)

**method, impact-echo, *n***—nondestructive test method based on the use of a short-duration mechanical impact to generate transient stress waves and the use of a broadband receiving transducer placed adjacent to the impact point. (R2018)

**mixture, reference, *n***—a cementitious mixture made using defined materials and proportions, without the constituent to be evaluated, used as the basis for evaluating the performance of a specific constituent. (2019)

**mixture, test, *n***—a cementitious mixture made using defined materials and proportions containing the constituent being evaluated. (2019).

DISCUSSION—The terms "test mixture" and "reference mixture" are often used in specifications for materials used to make cementitious mixtures. The required properties of the test mixture are expressed relative to the properties of the reference mixture. In some standards, "control mixture" is used instead of "reference mixture," but the preferred term in Committee C09 standards is "reference mixture." The term "mixture" is often replaced with "concrete," "mortar" or "grout," depending on the scope of the specification. For example, Specification C494/C494M refers to the "test concrete" and the "reference concrete." Such usage is acceptable.

**moist room, *n***—an enclosed room for storing and curing specimens of cementitious mixtures in which temperature and relative humidity can be controlled within specified limits. (see Specification C511) (2018)

**nominal maximum size, *n***—of aggregate, in specifications for aggregate, the smallest sieve opening through which the entire amount of the aggregate is permitted but not required to pass. (2019)

DISCUSSION—Specifications on aggregates usually stipulate a sieve opening through which all of the aggregate may, but is not required to, pass so that a stated small percentage of the aggregate is permitted to be retained on that sieve. A sieve opening so designated is the *nominal maximum size* of the aggregate. For example, the grading requirements in Specification C33/C33M for a No. 67 aggregate state that 100 % of the aggregate has to pass the 25.0-mm (1-in.) sieve, and 90 to 100 % of the aggregate has to pass the 19.0 mm (¾-in.) sieve. This means that 0 to 10 % of the aggregate may be retained on the 19.0-mm (¾-in.) sieve. Therefore, the maximum size is 25.0 mm (1 in.) and the nominal maximum size is 19.0 mm (¾ in.).

**oven-dry, *adj***—the condition that results when a specimen is dried by heating in an oven at  $110 \pm 5^\circ\text{C}$  [ $230 \pm 10^\circ\text{F}$ ] for sufficient time to reach constant mass as defined by the test method. (R2018)

**paste, cement, *n***—a fresh or hardened mixture of hydraulic cement, hydration products, and water, with or without any of the following: supplementary cementitious materials,

admixtures, and mineral fines with particles finer than the 75  $\mu\text{m}$  (No. 200) sieve. (R2018)

DISCUSSION—In the production of concrete, air voids introduced during mixing are often considered to be part of the cement paste. In the analysis of fresh and hardened concrete, however, air voids are not considered to be part of the cement paste. Water in hardened paste includes chemically bound water and water in capillaries.

**period, sampling, *n***—the duration of the waveform, which equals the number of points in the waveform multiplied by the sampling interval; also referred to as **record length**. (R2018)

**plate, *n***—as applied to stress-wave testing, any prismatic structure where the lateral dimensions are at least six times the thickness. (R2018)

**pores, impermeable, *n***—those spaces in a specimen that do not become filled with water when the specimen is submerged for a prescribed time. (R2018)

DISCUSSION—For a material composed of particles, such as aggregate, the term pores refers to the spaces within particles. The spaces between particles are called voids. See **bulk density of aggregate**.

**pores, permeable, *n***—those spaces in a specimen that become filled with water when the specimen is submerged for a prescribed time. (R2018)

**pozzolan, *n***—a siliceous or siliceous and aluminous material that in itself possesses little or no cementitious value but will, in finely divided form and in the presence of water, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties. (R2018)

**pozzolan, natural, *n***—a raw or calcined naturally occurring material that behaves as a pozzolan. (R2018)

DISCUSSION—Examples of natural pozzolans include volcanic ash, tuff, pumicite, opaline chert, opaline shale, metakaolin, and diatomaceous earth.

**rate, sampling, *n***—see **frequency, sampling**.

**rodding, *n***—consolidation of a fresh cementitious mixture or sample of aggregate by repeated insertion of a prescribed rod. (2019)

**roller-compacted concrete, RCC**—see **concrete, roller-compacted**.

**sand, *n***—fine aggregate resulting from natural disintegration and abrasion of rock or processing of completely friable sandstone. (R2018)

**sand, manufactured, *n***—fine aggregate produced by crushing rock, gravel, iron blast-furnace slag, or hydraulic-cement concrete. (R2018)

**saturated-lime water, *n***—see **lime-saturated water**.

**saturated-surface-dry (SSD), *adj***—the condition in which the permeable pores of a specimen are filled with water to the extent achieved by submerging the specimen for a prescribed time, but without free water on the surface. (R2018)

**segregation, *n***—the unintentional separation of the constituents of a cementitious mixture, or particles of an aggregate, causing a lack of uniformity in their distribution. (R2019)

*self-consolidating concrete, SCC*—see **concrete, self-consolidating**.

**setting, *n***—the process, due to chemical reactions, occurring after the addition of mixing water, that results in a gradual development of rigidity of a cementitious mixture. (R2018)

**shotcrete, *n***—a mortar or concrete that is projected pneumatically at high velocity onto a surface. (R2018)

*shotcrete, dry-mix, *n**—shotcrete in which most of the mixing water is added at the nozzle. (R2018)

*shotcrete, wet-mix, *n**—shotcrete in which most of the ingredients, including water, are mixed before introduction into the delivery hose. (R2018)

**shrinkage, chemical, *n***—the reduction in volume of cementitious paste that occurs during hydration because the reaction products occupy less volume occupied originally by the water and unreacted cementitious materials. (R2018)

*shrinkage, autogenous, *n**—the reduction in bulk volume that occurs during hydration due to chemical shrinkage within a sealed cementitious mixture, not subjected to external forces and under constant temperature, measured typically from the time of final setting. (R2018)

DISCUSSION—The word "sealed" means that exterior water is not able to travel to the interior and fill the empty pores resulting from chemical shrinkage. The formation of partially water-filled internal pores (see **self-desiccation**) results in menisci that give rise to internal tensile stresses that cause the bulk shrinkage. While autogenous shrinkage results from chemical shrinkage, the magnitude of autogenous shrinkage is less than the chemical shrinkage after setting occurs because the aggregate particles and the hydrated cement paste network restrain the shrinkage. The restraint may, in turn, lead to cracking.

*self-desiccation, *n**—the reduction in the internal relative humidity of a sealed cementitious mixture, due to chemical shrinkage, that may reduce the rate of hydration or stop hydration. (R2018)

**silica fume, *n***—very fine pozzolanic material, composed mostly of amorphous silica produced by electric arc furnaces as a by-product of the production of elemental silicon or ferro-silicon alloys (also known as condensed silica fume or microsilica). (C1240) (R2018)

*slag cement*—see **cement, slag**.

**slump flow, *n***—the average diameter of the spread concrete mass, obtained from two measurements perpendicular to each other, after a self-consolidating concrete has ceased to flow during a slump-flow test. (R2018)

DISCUSSION—Slump flow of self-consolidating concrete is measured using Test Method C1611/C1611M.

**specific gravity, *n***—see preferred term, **density, relative**. (R2018)

DISCUSSION—The term **specific gravity** has been defined as the ratio of mass of a volume of a material at a stated temperature to the mass of the same volume of distilled water at that stated temperature. This dimensionless quantity is the same as **relative density**. The term

**relative density** is preferred because it is more descriptive of its meaning. Some C09 standards use the terminology **relative density (specific gravity)** to assist in the transition to the preferred term.

**spectrum, amplitude, *n***—a plot of relative amplitude versus frequency that is obtained from the waveform or time-domain data using a Fourier transform technique. (R2018)

DISCUSSION—The peaks in the amplitude spectrum correspond to the dominant frequencies in the time-domain data.

**stability, *n***—of *self-consolidating concrete (SCC)*, the ability of self-consolidating concrete to resist separation of the paste from the aggregates. (R2018)

**standard, measurement, *n***—a measuring system, material measure, or certified reference material providing embodiment of the definition of a measurement unit, with stated quantity value and its measurement uncertainty. (2011)

DISCUSSION—A measurement standard is used frequently as a reference to assign measurement results to other quantities, thereby establishing metrological traceability through calibration of other measurement standards, instruments, or systems.

**standard, reference**—an object or device for which properties are sufficiently well established to be used for standardization of an apparatus or for assessment of a measurement method. (2011)

**standardization, *n***—of *measuring instrument*, a process that, under specified conditions and following a standard procedure, establishes: (1) the relationship between the quantity values provided by reference standards or reference materials and the corresponding indications from a measuring instrument or system; or (2) the adjustment to be applied to test equipment when its performance is compared to that of an accepted standard or process. (2011)

DISCUSSION—Standardization in case (1) is a simplified form of calibration that accounts for systematic error (bias) but does not evaluate random error. Standardization, therefore, does not address all of the elements of uncertainty of measurement and does not lead to traceable measurements. An example of case (2) standardization is adjusting the number of blows of a mechanically-operated hammer so it applies the same energy as a specified number of blows of a manually-operated hammer.

**stone, crushed, *n***—the product resulting from the use of mechanical devices to break rocks, boulders, or large cobbles into smaller fragments. (2014)

*supplementary cementitious material, (SCM)*—see **cementitious material, supplementary, (SCM)**.

**tamping, *n***—consolidation of a fresh cementitious mixture by repeated blows to the surface of the mixture with a specified tool. (2013)

**tapping, *n***—striking the side of a mold to close voids in a fresh cementitious mixture created by rodding or an internal vibrator. (2009)

**temperature, datum, *n***—the temperature value that is used for calculating the temperature-time factor. (2015)

DISCUSSION—Historically, a value of -10 °C has been used for the datum temperature. The best value to use, however, depends on the particular concrete mixture. Practice C1074 suggests a value of 0 °C for concretes made with Type I portland cement, with no admixtures, and

curing temperatures between 0 and 40 °C. The best value for a particular mixture may be established experimentally as described in Practice **C1074**

**test, acceptance, *n***—a test performed to determine whether an individual lot of a product conforms to specified requirements. (2011)

**test, check, *n***—a test performed on a new specimen for comparison against a previous test result. (2014)

DISCUSSION—Standards may require a new sample be obtained to prepare the specimen for the check test, or they may permit the new specimen to be made from the same sample. For example, Specification **C94/C94M** permits a check test on a new sample for comparison against a preliminary test result obtained from a sample taken near the start of discharge.

**testing, proficiency, *n***—a process in which an organization distributes homogenous samples of a material for testing by participating testing agencies for the purpose of comparing, on an anonymous basis, the relative testing performance of the testing agencies. (2011)

**time of setting, *n***—the elapsed time from the addition of mixing water to a cementitious mixture until the mixture reaches a specified degree of rigidity as measured by a specific procedure. (R2012)

DISCUSSION—Development of rigidity during setting is a gradual and continuous process, and the time of setting is defined arbitrarily in terms of a given test method. For cementitious mixtures, time of setting is usually defined as the elapsed time to attain a specified level of resistance to penetration by a probe. For example, the time of initial setting of concrete is determined by Test Method **C403/C403M** and is defined as the elapsed time, after initial contact of cement and water, for the mortar sieved from the concrete to reach a penetration resistance of 500 psi [3.5 MPa].

*time of final setting (of concrete), *n**—the elapsed time, after initial contact of cement and water, required for the mortar sieved from the concrete to reach a penetration resistance of 4000 psi [27.6 MPa]. (**C403/C403M**). (R2012)

*time of initial setting (of concrete), *n**—the elapsed time, after initial contact of cement and water, required for the mortar sieved from the concrete to reach a penetration resistance of 500 psi [3.5 MPa]. (**C403/C403M**). (R2012)

**traceability, metrological, *n***—property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty. (VIM<sup>3</sup>) (2011)

**transform, Fourier, *n***—a numerical technique used to convert digital data from the time domain to the frequency domain and used in stress-wave or chemical spectroscopy methods. (2015)

**unit weight, *n***—*of aggregate*, deprecated term—use preferred term **bulk density**—*of aggregate*. (2013)

**verification, *n***—*of measuring instrument*, the process of obtaining objective evidence to confirm that values indicated by a measuring instrument or system are within a specified range of known values of a reference standard. (2013)

**vibration, *n***—agitation of a fresh cementitious mixture by an internal or external vibrating device to assist in consolidating the mixture in a form, mold, or container. (2009)

**void, air, *n***—a space in a cementitious mixture that is filled with air (see **air, entrained** and **air, entrapped**). (2012)

**water-cement ratio, *n***—the ratio of the mass of water, excluding water absorbed by the aggregates, to the mass of portland cement in a cementitious mixture, stated as a decimal (see also **water-cementitious material ratio**). (2015)

DISCUSSION—This term, abbreviated as *w/c*, is applicable to cementitious mixtures that contain only portland cement as the cementitious material. For cementitious mixtures containing blended hydraulic cement, or a combination of portland cement and separate addition of supplementary cementitious materials, use the term **water-cementitious material ratio**.

**water-cementitious material ratio, *n***—the ratio of the mass of water, excluding water absorbed by the aggregates, to the mass of cementitious material (hydraulic) in a cementitious mixture, stated as a decimal (see also **water-cement ratio**). (2015)

DISCUSSION—This term, abbreviated as *w/cm*, is applicable to cementitious mixtures that contain cementitious material other than only portland cement, such as a blended hydraulic cement, or a combination of portland cement and separate addition of other supplementary cementitious materials. If portland cement is the only cementitious material contained in the cementitious mixture, use the term **water-cement ratio**.

**waveform, *n***—a recorded digital signal from a transducer that is a plot of voltage versus time. (2015)

**workability, *n***—*of concrete*, that property of freshly mixed concrete that affects the ease with which it can be mixed, placed, consolidated, and struck off. (2014)

#### 4. Keywords

4.1 aggregates; concrete; definitions; terminology

**SUMMARY OF CHANGES**

Committee C09 has identified the location of selected changes to this standard since the last issue (C125 – 18b) that may impact the use of this standard. (Approved January 1, 2019)

(1) Revised **1.3**.

(2) Added new terms **extended set-control admixture; mixture, reference; and mixture, test**.

(3) Revised the definitions for **maximum size, of aggregate; nominal maximum size, of aggregate; rodding; and segregation**.

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