Designation: C 125 – 02

Standard Terminology Relating to Concrete and Concrete Aggregates[1]

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

1. Scope

1.1 The following definitions apply to hydraulic cement concrete, although some of them may have wider application.[2]

2. Referenced Documents

2.1 *ASTM Standards:*

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2–in. or [50–mm] Cube Specimens)[3]

C 143/C 143M Test Method for Slump of Hydraulic Cement Concrete[4]

C 403/C 403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance[4]

C 494/C 494M Specification for Chemical Admixtures for Concrete[4]

C 939 Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)[4]

C 1074 Practice for Estimating Concrete Strength by the Maturity Method[4]

2.2 *American Concrete Institute Publications:* [5]

308 Practice for Curing Concrete

3. Terminology

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.

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.

admixture, *n*—a material other than water, aggregates, hydraulic 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.

accelerating admixture, n—admixture that accelerates the setting and early strength development of concrete. (C 494/C 494M)

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

chemical admixture, n—a nonpozzolanic admixture in the form of a liquid, suspension, or water-soluble solid.

mineral admixture, n—deprecated term.

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," "ground granulated blast-furnace slag," or "finely divided aggregate," as is appropriate.

retarding admixture, n—admixture that retards the setting of concrete. (C 494/C 494M)

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.

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 C 494/C 494M and meeting the other relevant requirements of Specification C 494/C 494M.

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.

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

[1] 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] C 219, Terminology Relating to Hydraulic Cement contains definitions of a number of items in use in standards under the jurisdiction of Committee C09. Definitions of additional terms may be found in *Cement and Concrete Terminology*, 116R American Concrete Institute, P.O. Box 19150, Detroit, MI 48219.

[3] *Annual Book of ASTM Standards*, Vol 04.01.

[4] *Annual Book of ASTM Standards*, Vol 04.02.

[5] Available from the American Concrete Institute, P.O. Box 9094, Farmington Hills, MI 48333-9094.

aggregate retained on the 4.75-mm (No. 4) sieve.

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 (⅜-in.) sieve and almost entirely passing the 4.75-mm (No. 4) sieve and predominantly retained on the 75-μm (No. 200) sieve; or *(2)* that portion of an aggregate passing the 4.75-mm (No. 4) sieve and retained on the 75-μm (No. 200) sieve.

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.

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

low-density aggregate, n—aggregate with bulk density less than 1120 kg/m^3(70 lb/ft^3), 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.

normal-density aggregate, n—aggregate that is neither high nor low density.

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^3(70 lb/ft^3) and 1920 kg/m^3(120 lb/ft^3).

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

air-cooled blast-furnace slag, *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.

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.

air void, *n*—a space in cement paste, mortar, or concrete filled with air; an entrapped air void is characteristically 1 mm or more in width and irregular in shape; an entrained air void is typically between 10 and 1000 μm in diameter and spherical or nearly so.

DISCUSSION—The content of the voids may include atmospheric air incorporated into the concrete during mixing of air or other gases released by chemical or other processes within the fresh concrete.

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.

bleeding, *n*—the autogenous flow of mixing water within, or its emergence from, newly placed concrete or mortar caused by the settlement of the solid materials within the mass, also called water gain.

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).

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

bulk specific gravity, *n*—the ratio of the mass of a volume of a material (including the permeable and impermeable voids in the material, but excluding the voids between particles of the material) at a stated temperature to the mass of an equal volume of distilled water at a stated temperature.

bulk specific gravity *(saturated surface dry)***,** *n*—the ratio of the mass of a volume of a material including the mass of water within the pores in the material (but excluding the voids between particles) at a stated temperature, to the mass of an equal volume of distilled water at a stated temperature.

cellular concrete, *n*—a lightweight hydraulic-cement concrete having a homogeneous void or cell structure attained using gas-forming chemicals or foaming agents.

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.

cementitious mixture, *n*—a mixture (mortar, concrete, or grout) containing hydraulic cement.

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.

consistency, *n—of fresh concrete, mortar, or grout*, the relative mobility or ability to flow.

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 C 143/C 143M is used for concrete, the flow table method described in Test Method C 109/C 109M is used for mortar, and the flow cone method described in Test Method C 939 is used for grout.

crushed gravel, *n*—the product resulting from the artificial crushing of gravel with substantially all fragments having at least one face resulting from fracture.

crushed stone, *n*—the product resulting from the artificial crushing of rocks, boulders, or large cobblestones, substantially all faces of which have resulted from the crushing operation.

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 (see ACI 308).

curing compound, *n*—a liquid that, when applied as a coating to the surface of newly-placed concrete, forms a membrane that retards the evaporation of water and, in the case of white pigmented compounds, reflects heat (see also **curing**).

D-cracking, *n—in concrete*, a series of cracks near to and

roughly parallel to features such as joints, edges, and structural cracks.

density, *n*—mass per unit volume (preferred over deprecated term **unit weight**).

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*)).

entrained air—see **air void.**

entrapped air—see **air void.**

expanded blast-furnace slag, *n*—the lightweight 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.

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

fineness modulus, *n*—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-μm (No. 100), 300-μm (No. 50), 600-μm (No. 30), 1.18-mm (No. 16), 2.36-mm (No. 8), 4.75-mm (No. 4), 9.5-mm (⅜-in.), 19.0-mm (¾-in.), 37.5-mm (1½-in.), 75-mm (3-in.), 150-mm (6-in.).

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*)).

fly ash, *n*—the finely divided residue that results from the combustion of ground or powdered coal and that is transported by flue gases from the combustion zone to the particle removal system.

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

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

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

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

grout, hydraulic–cement, *n*—a grout made with hydraulic cement.

grout (nonshrink), hydraulic-cement, *n*—a hydraulic-cement grout that produces a volume that, when hardened under stipulated test conditions, is greater than or equal to the original installed volume, often used as a transfer medium between load-bearing members.

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

laitance, *n*—a layer of weak material derived from cementitious material and aggregate fines either: 1) carried by bleeding to the surface or to internal cavities of freshly placed concrete, or 2) separated from the concrete and deposited on the concrete surface or in internal cavities during placement of concrete under water.

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

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

DISCUSSION—This term is usually used to describe the extent of relative strength development of concrete. However, the term can also be applied to the evolution of other properties which are dependent on the chemical reactions which occur in the cementitious materials. At any age, maturity is dependent on the curing history.

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

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

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. See Practice C 1074.

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

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

DISCUSSION—Specifications on aggregates usually stipulate a sieve opening through which all of the aggregate may, but need not, pass so that a stated maximum proportion of the aggregate may be retained on that sieve. A sieve opening so designated is the *nominal maximum size* of the aggregate.

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

relative density, *n*—see **specific gravity**

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

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

segregation, *n*—the unintentional separation of the constituents of concrete or particles of an aggregate, causing a lack of uniformity in their distribution.

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.

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

dry–mixture shotcrete, *n*—shotcrete in which most of the mixing water is added at the nozzle.

wet–mix shotcrete, *n*—shotcrete in which most of the ingredients, including water, are mixed prior to introduction into the delivery hose.

specific gravity, *n*—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 a stated temperature.

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.

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 C 403/C 403M 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). (C 403/C 403M).

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). (C 403/C 403M)

unit weight, *n*—*of aggregate*, mass per unit volume. (Deprecated term—use preferred term **bulk density**).

water-cement ratio, *n*—the ratio of the mass of water, exclusive only of that absorbed by the aggregates, to the mass of portland cement in concrete, mortar, or grout, stated as a decimal.

DISCUSSION—This term, abbreviated as *w/c*, is applicable only to cementitious mixtures in which the only cementitious material is portland cement. For cementitious mixtures containing blended hydraulic cement, or a combination of portland cement and separate addition of another cementitious material (such as a pozzolan), use the term **water-cementitious material ratio**.

water-cementitious material ratio, *n*—the ratio of the mass of water, exclusive only of that absorbed by the aggregates, to the mass of cementitious material (*hydraulic*) in concrete, mortar, or grout, stated as a decimal (see also **water-cement ratio**).

DISCUSSION—This term, abbreviated as *w/cm*, is applicable only to cementitious mixtures which contain cementitious material other than just portland cement, such as a blended hydraulic cement, or a combination of portland cement and separate addition of another cementitious material (such as a pozzolan). When portland cement is the only cementitious material contained in the cementitious mixture, use the term **water-cement ratio**.

workability of concrete, *n*—that property determining the effort required to manipulate a freshly mixed quantity of concrete with minimum loss of homogeneity.