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adhesion-the state in which two surfaces are held together by interfacial effects that may consist of molecular forces, interlocking action, or both.

admixture-a material other than water, aggregates, hydraulic cement, and fiber reinforcement, 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.

agent, release-material used to prevent bonding of concrete to a surface. (See also **bond breaker** and **oil, form**.)

aggregate-granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag, used with a hydraulic cementing medium to produce either concrete or mortar.

bacterial corrosion-see **corrosion, bacterial**.

bar-an element, normally composed of steel, with a nominally uniform cross-sectional area used to reinforce concrete.

bar, coated-a bar on which a coating has been applied, usually to increase resistance to corrosion.

bar, epoxy-coated-a reinforcing bar coated by an epoxyresin system, usually to increase resistance to corrosion.

barrier, moisture-a vapor barrier.

barrier, vapor-membranes located under concrete floor slabs that are placed on grade to retard transmission of water vapor from the subgrade.

bleeding-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.

blistering-the irregular raising of a thin layer at the surface of placed mortar or concrete during or soon after completion of the finishing operation, or in the case of pipe after spinning; also bulging of the finish plaster coat as it separates and draws away from the base coat.

block, concrete-a concrete masonry unit, usually containing hollow cores.

blowholes-see **surface air voids** (preferred term).

bolt, anchor-a metal bolt or stud, headed or threaded, either cast in place, grouted in place, or drilled into finished concrete, used to hold various structural members or embedments in the concrete, and to resist shear, tension, and vibration loadings from various sources, such as wind and machine vibration; also known as a hold-down bolt or a foundation bolt.

bond, chemical-bond between materials that is the result of cohesion and adhesion developed by chemical reaction.

bond, mechanical-

- 1. in general concrete construction, the physical interlock between cement paste and aggregate, or between concrete and reinforcement (specifically, the sliding resistance, not the adhesive resistance, of an embedded bar); and
- 2. in plastering, the physical keying of a plaster coat to: a) another; b) to the plaster base by means of plaster keys to the lath; or c) through interlock with adjacent plaster casts created by means of scratching or cross raking.

bond breaker-a material used to prevent adhesion of newly placed concrete to the substrate. (See also **agent, release**.)

bond strength-see **strength, bond**.

bonding agent-see **agent, bonding**.

broom finish-see **finish, broom**.

bug holes-see **surface air voids** (preferred term).

calcium hydroxide-see **lime, hydrated**.

carbonation-reaction between carbon dioxide and a hydroxide or oxide to form a carbonate, especially in cement paste, mortar, or concrete; the reaction with calcium compounds to produce calcium carbonate.

cast-in-place-referring to a cementitious mixture that is deposited in the place where it is required to harden as part of the structure, as opposed to precast concrete.

cathodic protection-the form of corrosion protection wherein one metal is caused to corrode in preference to another, thereby protecting the latter from corrosion.

caulk-to place a material in a crack or joint with the intent of retarding entry of dirt or water. (See also **joint filler** or **sealant, joint**.)

cavitation damage-see **damage, cavitation**.

cement, hydraulic-a cement that sets and hardens by chemical interaction with water and is capable of doing so underwater, for example, portland cement and ground granulated blast-furnace slag are hydraulic cements.

cement, portland-a hydraulic cement produced by pulverizing portland-cement clinker, usually in combinationwith calcium sulfate.

cement, sulfate-resistant-portland cement, low in tricalcium aluminate, that reduces susceptibility of concrete to attack by dissolved sulfates in water or soils, designated Type V in the U.S.

cementitious-having cementing properties.

chalking-formation of a loose powder resulting from the disintegration of the surface of concrete or of applied coating, such as cement paint.

chamfer-either a beveled edge or corner formed in concrete work by means of a chamfer strip.

checking-development of shallow cracks at closely spaced but irregular intervals on the surface of plaster, cement paste, mortar, or concrete. (See also **cracks** and **crazing**.)

clinker, portland-cement-a partially fused ceramic material consisting primarily of coal ash.

coating, on concrete-material applied to a surface by brushing, dipping, mopping, spraying, troweling, etc., to preserve, protect, decorate, seal, or smooth the substrate.

coefficient of thermal expansion-change in linear dimension per unit length or change in volume per unit volume per degree of temperature change.

compound, curing-a liquid that can be applied as a coating to the surface of newly placed concrete to retard the loss of water or, in the case of pigmented compounds, and also to reflect heat so as to provide an opportunity for the concrete to develop its properties in a favorable temperature and moisture environment. (See also **curing** and **curing, membrane**.)

compound, joint sealing-an impervious material used to fill joints in pavements or structures.

compression test-see **test, compression**.

compressive strength-see **strength, compressive**.

conductivity, thermal-the property (of a homogeneous body) measured by the ratio of the steady-state heat flux (time-rate of heat flow per unit area) to the temperature.

construction joint-see **joint, construction**.

contraction joint-see **joint, contraction**.

control joint-see **joint, contraction** (preferred term)

core test-compression test on a concrete sample cut from hardened concrete by means of a core drill.

corrosion-destruction of metal by a chemical, electrochemical, or electrolytic reaction within its environment.

corrosion, bacterial-destruction of a material by bacterial processes brought about by the activity of certain bacteria that consume the material and produce substances, such as hydrogen sulfide, ammonia, and sulfuric acid.

crack, shrinkage-crack due to restraint of shrinkage.

cracking, map-

- 1. intersecting cracks that extend below the surface of hardened concrete; caused by shrinkage of the drying surface concrete that is restrained by concrete at greater depths where either little or no shrinkage occurs; vary in width from fine and barely visible to open and well-defined; or
- 2. the chief symptom of a chemical reaction between alkalies in cement and mineral constituents in aggregate within hardened concrete; due to differential rate of volume change in different portions of the concrete; cracking is usually random and on a fairly large scale, and in severe instances the cracks may reach a width of 0.50 in. (12.7 mm).

(See also **checking** and **crazing**; also known as pattern cracking.)

cracking, plastic-cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic.

cracking, shrinkage-cracking of a structure or member due to failure in tension caused by external or internal restraints as reduction in moisture content develops, carbonation occurs, or both.

cracks, craze-fine random cracks or fissures in a surface of plaster, cement paste, mortar, or concrete.

cracks, hairline-cracks in an exposed concrete surface having widths so small as to be barely perceptible.

cracks, transverse-cracks that develop across the long dimension of the member.

crazing-the development of craze cracks; the pattern of craze cracks existing in a surface. (See also **checking** and **cracks**.)

curing-action taken to maintain moisture and temperature conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration reaction to occur.

curing, membrane-a process that involves either liquid sealing compound (for example, bituminous and paraffinic emulsions, coal tar cut-backs, pigmented and non pigmented resin suspensions, or suspension of wax and drying oil) or nonliquid protective coating (for example sheet plastics or -waterproof- paper), both of which types function as a film to restrict evaporation of mixing water from concrete surfaces.

concrete-a composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate, usually a combination of fine aggregate and coarse aggregate; in portland-cement concrete, the binder is a mixture of portland cement and water, with or without admixtures.

concrete, epoxy-a mixture of epoxy resin and catalyst (binder), fine aggregate, and coarse aggregate. (See also **concrete, polymer, mortar, epoxy**; and **resins, epoxy**.)

concrete, green-concrete that has set but not hardened appreciably.

concrete, high-early-strength-concrete which, through the use of high-early-strength cement or admixtures, attains a given level of strength earlier than normal concrete does.

concrete, polymer-concrete in which an organic polymer serves as the binder; also known as resin concrete; sometimes erroneously employed to designate hydraulic cement mortars or concretes in which part or all of the mixing water is replaced by an aqueous dispersion of a thermoplastic copolymer. (See also **concrete**.)

concrete, reinforced-structural concrete reinforced with no less than the minimum amount of prestressing tendons or nonprestressed reinforcement as specified by ACI 318.

damage, abrasion-wearing away of a surface by rubbing and friction. (See also **damage, cavitation** and **erosion**.)

damage, cavitation-pitting of concrete caused by implosion, that is, the collapse of vapor bubbles in flowing water which form in areas of low pressure and collapse as they enter areas of higher pressure. (See also **damage, abrasion**, and **erosion**.)

deicer-a chemical, such as sodium or calcium chloride, used to melt ice or snow on slabs and pavements, such melting being due to depression of the freezing point.

delamination-a separation along a plane parallel to a surface, as in the separation of a coating from a substrate or the layers of a coating from each other, or in the case of a concrete slab, a horizontal splitting, cracking, or separation within a slab in a plane roughly parallel to, and generally near, the upper surface; found most frequently in bridge decks and caused by the corrosion of reinforcing steel or freezing and thawing; similar to spalling, scaling, or peeling except that delamination affects large areas and can often only be detected by nondestructive tests, such as tapping or chain dragging.

density, bulk-the mass of a material (including solid particles and any contained water) per unit volume including impermeable and permeable voids in the material. (See also **specific gravity, absolute**.)

edge, feather-a wood or metal tool having a beveled edge and used to straighten re-entrant angles in finish plaster coat; also the edge of a concrete or mortar patch or topping that is beveled at an acute angle.

efflorescence-a deposit of salts, usually white, formed on a surface, the substance having emerged in solution from within either concrete or masonry and subsequently been precipitated by reaction, such as carbonation, or evaporation.

electrolyte-a conducting medium in which the flow of current is accompanied by movement of matter; usually an aqueous solution.

epoxy-a thermosetting polymer that is the reaction product of epoxy resin and an amino hardener.

erosion-progressive disintegration of a solid by abrasion or cavitation of gases, liquids, or solids in motion. (See also **abrasion damage** and **cavitation damage**.)

fin-a narrow linear projection on a formed concrete surface, resulting from mortar flowing into spaces in the formwork; also a type of blade in a concrete mixer drum.

finish-the texture of a surface after consolidating and finishing operations have been performed.

finish, broom-the surface texture obtained by stroking a broom over freshly placed concrete.

finish, trowel-the smooth or textured finish of an unformed concrete surface obtained by troweling.

finishing-leveling, smoothing, consolidating, and otherwise treating surfaces of fresh or recently placed concrete or mortar to produce desired appearance and service. (See also **float** and **trowel**.)

float-a tool, usually of wood, aluminum, or magnesium, used in finishing operations to impart a relatively even but still open texture to an unformed fresh concrete surface.

float, rotary-a motor-driven revolving disc that smooths, flattens, and compacts the surface of concrete floors and floor toppings.

flow, capillary-flow of moisture through a capillary pore system, such as in concrete.

free moisture-see **moisture, free**.

grade-the prepared surface on which a concrete slab is cast; the process of preparing a plane surface of granular material or soil on which to cast a concrete slab.

grout-a mixture of cementitious material and water, with or without aggregate, proportioned to produce a pourable consistency without segregation of the constituents; also a mixture of other composition but of similar consistency. (See also **grout, neat cement** and **grout, sanded**.)

grout, epoxy-a grout that is a mixture of ingredients consisting of an epoxy bonding system, aggregate or fillers, and possibly other materials.

hawk-a tool used by plasterers to hold and carry plaster mortar; generally a flat piece of wood or metal approximately 10 to 12 in. (0.25 to 0.3 m) square, with a wooden handle centered and fixed to the underside. (See also **hod** and **mortar board**.)

heat of hydration-heat evolved by chemical reactions with water, such as that evolved during the setting and hardening of portland cement, or the difference between the heat of solution of dry cement and that of partially hydrated cement. (See also **heat of solution**.)

hod-a V-shaped trough or a tray, supported by a pole handle that is borne on the carrier's shoulder, for carrying small quantities of brick, tile, mortar, or similar load. (See also **hawk** and **mortar board**.)

honeycomb-voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse-aggregate particles.

hydration-formation of a compound by the combining of water with some other substance; in concrete, the chemical reaction between hydraulic cement and water.

hydrochloric acid-a mineral acid sometimes used for cleaning or acid etching concrete or removing efflorescence; also known as muriatic acid, which is a 33% HCl solution.

joint-a physical separation in a concrete system, whether precast or cast-in-place, including cracks if intentionally made to occur at specified locations; also the region where structural members intersect, such as a beam-column joint.

joint, cold-a joint or discontinuity resulting from a delay in placement of sufficient duration to preclude intermingling and bonding of the material in two successive lifts of concrete, mortar, or the like.

joint, construction-the surface where two successive placements of concrete meet, across which it may be desirable to achieve bond and through which reinforcement
may be continuous.

joint, contraction-formed, sawed, or tooled groove in a concrete structure to create a weakened plane to regulate the location of cracking resulting from the dimensional change of different parts of the structure. (See also **joint, isolation**; **joint, expansion**; and **joint, construction**.)

joint, control-see **joint, contraction** (preferred term)

joint, expansion-

- 1. a separation provided between adjoining parts of a structure to allow movement where expansion is likely to exceed contraction; or
- 2. a separation between pavement slabs on grade, filled with a compressible filler material; or
- 3. an isolation joint intended to allow independent movement between adjoining parts.

joint, isolation-a separation between adjoining parts of a concrete structure, usually a vertical plane, at a designed location such as to interfere least with performance of the structure, yet such as to allow relative movement in three directions and avoid formation of cracks elsewhere in the concrete and through which all or part of the bonded reinforcement is interrupted. (See also **joint, contraction** and **joint, expansion**.)

joint, sawed-a joint cut in hardened concrete, generally not to the full depth of the member, by means of special equipment.

laitance-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 internal cavities during placement of concrete underwater.

latex-a water emulsion of a high molecular-weight polymer, used especially in coatings, adhesives, leveling compounds, and patching compounds.

lime, hydrated-calcium hydroxide, a dry powder obtained by treating quicklime with water.

mill scale-the partially adherent layers of oxidation products (heavy oxides) developed on metallic surfaces during either hot fabrication or heat treatment of metals, as on hot-rolled steel reinforcing bars.

mixer-horizontal axis-a concrete mixer of the revolving drum type in which the drum rotates around a horizontal axis.

mortar-a mixture of cement paste and fine aggregate; in fresh concrete, the material occupying the interstices among particles of coarse aggregate; in masonry construction, joint mortar may contain masonry cement, or may contain hydraulic cement with lime (and possibly other admixtures) to afford greater plasticity and workability than are attainable with standard portland cement mortar. (See also **cement, hydraulic**.)

mortar board-a platform or tray for holding freshly mixed mortar. (See also **hawk** and **hod**.)

popout-the breaking away of small portions of a concrete surface due to localized internal pressure that leaves a shallow, typically conical, depression; small popouts leave holes up to 0.4 in (10 mm) in diameter; medium popouts leave holes 0.4 to 2 in. (10 to 50 mm) in diameter; and large popouts leave holes greater than 2 in. (50 mm) in diameter.

porosity-the ratio, usually expressed as a percentage of the volume of voids in a material to the total volume of the material including the voids.

pot life-time interval after preparation during which a liquid or plastic mixture is to be used.

psychrometer, sling- a psychrometer containing independently matched dry- and wet-bulb thermometers, suitably mounted for manually swinging through the ambient air, to simultaneously indicate dry- and wet-bulb temperatures.

reaction, alkali-carbonate rock-the reaction between the alkalies (sodium and potassium) in portland cement and certain carbonate rocks, particularly calcitic dolomite and dolomitic limestones, present in some aggregates; the products of the reaction may cause abnormal expansion and cracking of concrete in service.

rebar-colloquial term for reinforcing bar. (See also **reinforcement**.)

reinforcement-bars, wires, strands, or other slender members that are embedded in concrete in such a manner that they and the concrete act together in resisting forces.

relative humidity-the ratio of the quantity of water vapor actually present to the amount present in a saturated atmosphere at a given temperature; expressed as a percentage.

salamander-a portable source of heat, customarily oilburning, used to heat an enclosure around or over newly placed concrete to prevent the concrete from freezing.

saponification-the alkaline hydrolysis of fats forming a soap; more generally, the hydrolysis of an ester by an alkali with the formation of an alcohol and a salt of the acid portion.

saw cut-a cut in hardened concrete made using abrasive blades or discs.

scaling-local flaking or peeling away of the near-surface portion of hardened concrete or mortar; also peeling or flaking of a layer from metal. (See also **mill scale**, **peeling**, and **spalling**.)

screed guide-firmly established grade strips or side forms for unformed concrete that guide the strikeoff in producing the desired plane or shape.

screeding-the operation of forming a surface by the use of screed guides and a strikeoff. (See also **strikeoff**.)

sealant, joint-compressible material used to exclude water and solid foreign materials from joints.

shelf life-the length of time packaged materials can be stored under specified conditions and remain usable.

shock, thermal-the subjection of newly hardened concrete to a rapid change in temperature that may be expected to have a potentially deleterious effect.

shotcrete-mortar or concrete pneumatically projected at high velocity onto a surface; also known as air-blown mortar, pneumatically applied mortar or concrete, sprayed mortar, and gunned concrete.

slab-a molded layer of plain or reinforced concrete, flat, horizontal (or nearly so), usually of uniform but sometimes of variable thickness, either on the ground or supported by beams, columns, walls, or other framework.

slab-on-grade-a slab, continuously supported by ground, whose total loading when uniformly distributed would impart a pressure to the grade or soil that is less than 50% of the allowable bearing capacity thereof; the slab may be of uniform or variable thickness, and it may include stiffening elements such as ribs or beams; the slab may be plain, reinforced, or prestressed concrete; reinforcement or prestressing steel may be provided to accommodate the effects of shrinkage and temperature or structural loading. (Also referred to as slab-on-ground; slab-on-grade is the preferred term.)

solvent-a liquid in which another substance may be dissolved.

space, capillary-void space in concrete resembling microscopic channels small enough to draw liquid water through them by the molecular attraction of the water adsorbed on their inner surfaces.

spall-a fragment, usually in the shape of a flake, detached from a larger mass by a blow, by the action of weather, by pressure, or by expansion within the larger mass; a small spall involves a roughly circular depression not greater than 20 mm in depth and 150 mm in any dimension; a large spall may be roughly circular or oval or in some cases elongate and is more than 20 mm in depth and 150 mm in greatest dimension.

spalling-the development of spalls.

strength-a generic term for the ability of a material to resist strain or rupture induced by external forces. (See also **strength, compressive**; **strength, flexural**; **strength, shear**; **strength, tensile**)

strength, bond-resistance to the separation of mortar and concrete from reinforcing and other materials with which it is in contact; a collective expression for forces such as adhesion, friction due to shrinkage, and longitudinal shear in the concrete engaged by the bar deformations that resist separation.

strength, compressive-the measured maximum resistance of a concrete or mortar specimen to axial compressive loading; expressed as force per unit crosssectional area; or the specified resistance used in design calculations.

strength, flexural-the property of a material or a structural member that indicates its ability to resist

failure in bending; in concrete flexural members, the stress at which a section reaches its maximum usable bending capacity; for under-reinforced concrete flexural members, the stress at which the compressive strain in the concrete reaches 0.003; for over-reinforced concrete flexural members, the stress at which the compressive stress reaches 85% of the cylinder strength of the concrete; for unreinforced-concrete members, the stress at which the concrete tensile strength reaches the modulus of rupture.

strength, shear-the maximum shearing stress a flexural member can support at a specific location as controlled by the combined effects of shear forces and bending moment.

strength, tensile-maximum unit stress that a material is capable of resisting under axial tensile loading; based on the cross-sectional area of the specimen before loading.

stress, bond-the force of adhesion per unit area of contact between two bonded surfaces, such as concrete and reinforcing steel, or any other material, such as foundation rock; shear stress at the surface of a reinforcing bar, preventing relative movement between the bar and the surrounding concrete when the bar carries tensile force.

strip, chamfer-either a triangular or curved insert placed in an inside form corner to produce either a rounded or flat chamfer or to form a rustication; also called cant strip, fillet, dummy joint, and skew back.

sulfate attack-either a chemical reaction, physical reaction, or both between sulfates usually in soil or ground water and concrete or mortar; the chemical reaction is primarily with calcium aluminate hydrates in the cementpaste matrix, often causing deterioration.

surface air voids-small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation.

temperature, glass-transition-the midpoint of the temperature range over which an amorphous material (such as glass or a high polymer) changes from (or to) a brittle, vitreous state to (or from) a plastic state.

temperature, heat-deflection-the temperature at which a plastic material has an arbitrary deflection when subjected to an arbitrary load and test condition; this is an indication of the glass-transition temperature.

test, compression-test made on a test specimen of mortar or concrete to determine the compressive strength; in the U.S., unless otherwise specified, compression tests of mortars are made on 2 in. (50 mm) cubes and compression tests of concrete are made on cylinders 6 in. (152 mm) in diameter and 12 in. (305 mm) high.

thermal expansion-expansion caused by increase in temperature.

thermoplastic-becoming soft when heated and hard when cooled.

thermosetting-becoming rigid by chemical reaction and not remeltable.

trowel-a flat, broad-blade steel hand tool used in the final stages of finishing operations to impart a relatively smooth surface to concrete floors and other unformed concrete surfaces; also a flat triangular-blade tool used for applying mortar to masonry.

troweling-smoothing and compacting the unformed surface of fresh concrete by strokes of a trowel.

voids, surface-cavities visible on the surface of freshly poured concrete.

water blast-a system of cutting or abrading a surface such as concrete by a stream of water ejected from a nozzle at high velocity.

water-cement ratio-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 and abbreviated as w/c.

waterstop-a thin sheet of metal, rubber, plastic, or other material inserted across a joint to obstruct the seepage of water through the joint.

wearing course-a topping or surface treatment to increase the resistance of a concrete pavement or slab to abrasion.