Glossary of Terms- Concrete

A

Abrams' law

The rule stating that with given materials, curing, and testing conditions, concrete strength is inversely related to the ratio of water to cement. A lower water-cement ratio produces a higher strength.

Abrasion

The process of wearing down or rubbing away by means of friction.

Absolute volume

In concrete, the actual volume occupied by the different ingredients determined by dividing the weight of each ingredient pounds, by its specific gravity, times the weight of one cubic foot of water in pounds.

Accelerators

Admixtures that speed us up the rate of hydration, shortens setting time, and increases hardening and strength development rates

Admixture

A material, other than aggregate, cement, or water, used as an ingredient of concrete to control particular characteristics and variables in the mix.

Advanced Cement-Based Materials (ACBM)

A center at NorthwesternUniversity established by the National Science Foundation to create new cement–based materials with improved properties.

Aerated concrete

Concrete formed using gas-forming admixtures such as powdered zinc or aluminum combined with calcium hydroxide or hydrogen peroxide that form hydrogen or oxygen bubbles in the cement mix.

Aggregate

A mixture of sand, rock, crushed stone, expanded materials, or particles that typically compose 75% of concrete by volume improve the formation and flow of cement paste and improve the concrete's structural performance.

Aggregate testing

Any of a number of tests performed to determine the physical and chemical characteristics of an aggregate. Common tests are for abrasion, absorption, specific gravity, and soundness.

Agitating speed

The rate at which a concrete or mortar mixer rotates the drum or blades in order to agitate mixed materials to prevent segregation or setting.

Air content

The total volume of air voids, both entrained and entrapped, in the cement paste, mortar, or concrete.

Air-entraining Admixture

An admixture that creates air in forms of bubbles (usually less than 1mm) during the mixing process.

Air meter

A device for measuring the air content of a concrete or mortar mix.

Air void

An entrapped air bubble or pocket in a concrete mix

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Alkali-Silica Reactivity (ASR)
The production of an expansive gel caused by a reaction between aggregates containing silica and carbonates, and alkali hydroxides in the concrete.
American Association of State Highway and Transportation Officials (AASHTO)
An organization that represents highway and transportation departments in the 50 states, the District of Columbia and Puerto Rico.
American Concrete Institute (ACI)
An international organization dedicated to providing knowledge and information for the best uses of concrete.
American Standard of Testing Materials (ASTM)
An organization that has developed a variety of methods for testing the strength of cement and other building materials to ensure it complies with needed strength requirements.
Angle float (angle trowel)
A trowel with two surfaces meeting at right angles. An angle float is used for finishing plaster or concrete in an inside corner.
Architectural Concrete
Decorative, or "viewed" concrete that is permanently exposed to the human eye and therefore requires special ingredients and finishing techniques to obtain the desired appearances.

B
Batch
The quantity produced as the result of one mixing operation.
Bituminous cement
A class of dark substances composed of intermediate hydrocarbons. Bituminous cement is available in solid, semisolid, or liquid states at normal temperatures.
Bleeding
The flow of mixing water from within a newly placed concrete mixture caused by the settlement of the solid materials in the mix.
Blended hydraulic cement
Cement containing Portland cement, pozzolans, slag, and/or other types of hydraulic cements
Blowout
Term used when the ready-mixed concrete breaks through the forming boards due to insufficient bracing. Also, the localized buckling or breaking up of rigid pavement as a result of excessive longitudinal pressure.
Broom finish
Concrete that has been brushed with a broom when fresh in order to improve its traction or to create a distinctive fine-lined texture.
Bull float
A board of wood, aluminum, or magnesium mounted on a pole and used to spread and smooth freshly placed, horizontal concrete surfaces. After screeding, the first stage in the final finish of concrete, smoothes and levels hills and voids left after screeding. Sometimes substituted for darbying.

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Bulking
An increase in the volume of a quantity of sand when in a moist condition compared to its volume when in a dry state.
Burlap
Material often used to protect newly finished concrete from rain as well as maintaining moisture in a slab.
Butterfly
A hand tool used to trowel finish concrete curb and gutter work.

C
Calcite
The main raw material used in the manufacture of Portland cement. Calcite is a crystallized form of calcium carbonate and is the principal component in limestone, chalk, and marble.
Calcium aluminate cement
A combination of calcium carbonate and aluminates that have been thermally fused or sintered and ground to make cement.
Calcium chloride
An additive used in ready-mix to accelerate the curing, usually used during damp conditions.
Cast-in-place concrete
Concrete that is poured into forms that are erected at the job site. It is the same as the term site casting.
Cement
A material composed of fine ground powders that hardens when mixed with water. Cement is only one component of concrete. The gray powder that is the “glue” in concrete.
Cement-aggregate ratio
The ratio of cement to aggregate in a mixture, as determined by weight or volume.
Cement content / cement factor
A quantity of cement contained in a unit volume of concrete or mortar, ordinarily expressed as pounds, barrels, or bags per cubic yard.
Cement types
Type I Normal is a general purpose cement suitable for practically all uses in residential construction but should not be used where it will be in contact with high sulfate soils or be subject to excessive temperatures during curing. Type II Moderate is used where precaution against moderate sulfate attack is important, as in drainage structures where sulfate concentrations in groundwater’s are higher than normal. Type III High Early Strength is used when high strengths are desired at very early periods, usually a week or less. It is used when it is desirable to remove forms as soon as possible or to put the concrete into service quickly. Type IV Low Heat is a special cement for use where the amount and rate of heat generated during curing must be kept to a minimum. The development of strength is slow and is intended in large masses of concrete such as dams. Type V Sulfate Resisting is a special cement intended for use only in construction exposed to severe sulfate action, such as western states having soils of high alkali content.

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Cementitious
Any material having cementing properties, usually referring to substances like Portland cement and lime.

Clinker
The end product of a Portland cement kiln; raw cementitious material before grinding process

Coarse aggregate
Naturally occurring, processed or manufactured, inorganic particles in prescribed gradation or size range- usually ranging in size from (3/8”-1 1/2”)

Cold joint
A visible line that forms when the placement of concrete is delayed. The concrete in place hardens prior to the next placement of concrete against it.

Compressive strength
The maximum resistance that a concrete, mortar, or grout specimen can sustain when loaded axially in compression and a specified load rate.

Concrete
Concrete is a hardened building material created by combining a mineral (which is usually sand, gravel, or crushed stone) a binding agent (natural or synthetic cement), chemical additives, and water.

Concrete masonry unit (CMU)
A block of hardened concrete, with or without hollow cores, designed to be laid in the same manner as a brick or stone.

Concrete mixture
The percentage of cement content contained in the concrete. A rich mixture contains a high proportion of cement. A lean mixture is a mixture of concrete or mortar with a relatively low cement content. A harsh mixture of concrete is one without mortar or aggregate fines, resulting in an undesirable consistency and workability.

Consolidation
Compaction usually accomplished by vibration of newly placed concrete to minimum practical volume, to mold it within form shapes and around embedded parts and reinforcement, and to eliminate voids other than entrained air.

Construction joint
The contact between the placed concrete and concrete surfaces, against or upon which concrete is to be placed and to which new concrete is to adhere, that has become so rigid that the new concrete cannot be incorporated integrally by vibration with that previously placed. Unformed construction joints are placed horizontally or nearly horizontally.

Control joint
Tooled, straight grooves made on concrete floors to “control” where the concrete should crack.

Curing
The process of maintaining freshly placed concrete, mortar, plaster, or grout at a particular temperature for a period of time so that the desired properties of the mix can develop properly.

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Curing blanket
A layer of straw, burlap, sawdust, or other suitable material placed over fresh concrete and moistened to help maintain humidity and temperature for proper hydration.
Curing compound
A chemical applied to the surface of fresh concrete to minimize the loss of moisture during the first stages of setting and hardening.

D
Darby
A stiff straight edge of wood or metal used to level the surface of wet concrete. A portable machine with large paddles like fan blades used to float and finish concrete floors and slabs. A large power-driven machine mounted on wheels that ride on steel pavement forms and is used to finish concrete pavements.
Density
The ratio of weight of a substance to its volume.
DOT
The acronym for the Department of Transportation.
Dowel
A cylindrical piece of stock inserted into holes in adjacent pieces of material to align and/or attach the two pieces.
Dry pack
A low-slump grout tamped into the space in a connection between pre-cast concrete members.
Dry shake
A concrete surface treatment, such as color, hardening, or antiskid, which is applied to a concrete slab by shaking on a dry, granular material before the concrete has set and then troweling it in.
Drying shrinkage
Contraction caused by the loss of moisture, particularly in concrete, mortar, and plaster.
Durability
Ability of concrete to resist weathering and other harsh conditions.

E
Edger
A tool used to fashion finishing edges or round corners on fresh concrete or plaster.
Entrapped Air
Irregularly shaped, natural (or unintentional) air voids in fresh or hardened concrete. Typically 1mm or larger in size.

F
False set
The rapid development of rigidity in a mixed Portland cement paste, mortar, or concrete without the evolution of much heat.

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Fiber reinforced concrete
A variant of concrete that is produced by adding fibers made of stainless steel, glass or carbon to the mixture.
Fine aggregate
Aggregate passing the 1/2" sieve and almost entirely passing the No. 4 sieve and predominantly retained on the No. 200 sieve.
Fineness modulus (FM)
An index of fineness or coarseness of an aggregate sample. An empirical factor determined by adding total percentages of an aggregate sample retained on each of a specified series of sieves, and dividing the sum by 100.
Finishing
Mechanical operations like leveling, smoothing, compacting, and otherwise treating surfaces of fresh or recently placed concrete or mortar to produce the desired appearance and service.
Flash set
The rapid development of rigidity in a mixed cement paste, mortar or concrete usually with the evolution of considerable heat, which rigidity cannot be dispelled nor can the plasticity be regained by further mixing without addition of water also referred to as quick set or grab set.
Float
A tool (not a darby), usually of wood, aluminum, magnesium, rubber, or sponge, used in concrete or tile finishing operations to impart a relatively even but still open texture to an unformed fresh concrete surface.
Floating
The next-to-last stage in concrete work, when you smooth off the job and bring water to the surface by using a hand float or bull float. The operation of finishing a fresh concrete or mortar surface by use of a float, preceding troweling when that is the final finish.
Fly ash
A byproduct or residue from coal combustion and is used as a pozzolan or supplementary cementitious material in concrete.
Form
A temporary erected structure or mold for the support and containment of concrete during placement and while it is setting and gaining sufficient strength to be self-supporting.
Form release agent or compound
Material used to prevent bonding of concrete to a surface, such as to forms.
Freeze-Thaw Resistance
Ability of concrete to withstand weathering cycles of freezing and thawing

G
Glass Fiber Reinforced Concrete (GFRC)
Material used in wall systems that resembles but generally does not perform as well as concrete. It usually is a thin cementitious material laminated to plywood or other lightweight backing.

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Grading
Size distribution of aggregates
Grout
A high-slump mixture of Portland cement, aggregates, and water which can be poured or pumped into cavities in concrete or masonry for the purpose of embedding reinforcing bars, and/or increasing the amount of load-bearing material in a wall.

H
Hand float
A wooden tool used to lay on and to smooth or texture a finish coat of plaster or concrete.
High Strength Concrete
Concrete with a design strength over 10,000 psi
Heat of hydration
The thermal energy, or heat, resulting from chemical reactions with water, as in the curing of Portland cement, concrete, or gypsum, as it cures.
Honeycomb
When mortar fails to completely surround coarse aggregates in a concrete mix
Hydration
The chemical reaction that occurs when cement is mixed with water.
Initial set
The first degree of the stiffening of a concrete mixture

J
Joint
Position where two or more building materials, components or assemblies are put together, fixed or united, with or without the use of extra jointing products. The location between the touching surfaces of two members or components joined and held together by nails, glue, cement, mortar, or other means.

L
Lightweight Concrete
Low-density concrete

M
Mason
One who builds with brick, stones, concrete masonry units, or concrete.
Masonry
Construction composed of shaped or molded units, usually small enough to be handled by one man and composed of stone, ceramic brick, or tile, concrete, glass, adobe, or the like.

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Mass concrete
Any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat from hydration of the cement and attendant volume change, to minimize cracking.
Maximum size aggregate
Aggregate whose largest particle size is present in sufficient quantity to affect the physical properties of concrete; generally designated by the sieve size on which the maximum amount permitted to be retained is 5 or 10 percent by weight.
Mortar
A mixture of cement (or lime) with sand and water used in masonry work.
Mud
Slang term for cement or mortar.

N
Neat cement-paste
A mixture of water and hydraulic cement, both before and after setting and hardening.
Non-air-entrained concrete
Concrete in which neither an air-entraining admixture nor air-entraining cement has been used.
No-Slump Concrete
Concrete having a slump of less than ¼ “

O
Over-vibration
Excessive use of vibrators during placement of freshly mixed concrete, causing segregation and excessive bleeding.

P
Pea gravel
Portion of concrete aggregate passing the 1/2” sieve and retained on a No. 4 sieve.
Plain concrete
Concrete either without reinforcement, or reinforced only for shrinkage or temperature changes.
Plastic consistency
Condition in which concrete, mortar, or cement paste will sustain deformation continuously in any direction without rupture.
Plasticity
Property of freshly mixed concrete, cement paste or mortar which determines its ease of molding or resistance to deformation.

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Plasticizer
An agent used to increase the fluidity of fresh cement with the same cement/water ratio improving the workability and placement of the cement.
Polyethylene
A thermoplastic widely used in sheet form for vapor retarders, moisture barriers, and temporary construction coverings
Portland cement
A special synthetic blend of limestone and clay used to make concrete which is generally believed to be stronger, more durable, and more consistent than concrete made from natural cement. Portland cement is made by mixing calcareous material, like limestone, with silica, alumina, and iron oxide-containing materials. These materials are burned together and the resulting product, or admixture, is ground up to form Portland cement.
Post-tensioning
A method of pre-stressing reinforced concrete in which tendons are tensioned after the concrete has hardened
Pre-cast concrete
Concrete forms cast into permanent shapes using reusable forms at a plant, then transported as fully cured structural units to the actual construction job site.
Pre-placed concrete
Concrete manufactured by placing clean, graded coarse aggregate in a form and later injecting a Portland cement-sand grout under pressure, to fill the voids.
Pre-stressed concrete
Concrete that has already been subjected to compression increasing its ability to withstand tension and stress without the need for steel reinforcement. Concrete in which internal stresses of such magnitude and distribution are introduced that the tensile stresses resulting from the service loads are counteracted to a desired degree.
Pre-tensioning
The compressing of concrete in a structural member by pouring the concrete for the member around stretched high-strength steel strands, curing the concrete, and releasing the external tensioning force on the strands.
Proportioning
The selection of proportions of material for concrete to make the most economical use of available materials to manufacture concrete of the required strength, placeability, and durability.

R
Reactive aggregate
Aggregate containing substances capable of reacting chemically with the products of solution or hydration of the Portland cement in concrete or mortar, under ordinary conditions of exposure, resulting in harmful expansion, cracking, or staining.

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Ready-mixed concrete
Concrete that is batched or mixed at a central plant before it is delivered to a construction site and delivered ready for placement. It is also known as transit-mixed concrete since it is often transported in an agitator truck.
Rebar
The reinforcing bar-ribbed steel bars installed in foundation concrete walls, footers, and poured in place concrete structures designed to strengthen concrete. Rebar comes in various thickness' and strength grade. The term rebar is short for reinforcing bar.
Reinforced concrete
Concrete reinforced by the addition of steel bars making it more able to tolerate tension and stress.
Release agent
Material used to prevent bonding of concrete to a surface, such as to forms.
Rodding
Compaction of concrete or the like by means of a tamping rod.
Rotary float (power float)
Motor-driven revolving blades that smooth, flatten, and compact the surface of concrete slabs or floor toppings.

S
Sack
A quantity of Portland cement; 94 pounds in the United States, 87.5 pounds in Canada, 112 pounds in the United Kingdom, and 50 kilograms in most other countries. Different weights per bag are commonly used for other types of cement.
Sacking
Removing or alleviating defects on a concrete surface by applying a mixture of sand and cement to the moistened surface and rubbing with a coarse material such as burlap.
Scaling
The breaking away of a hardened concrete surface.
Screed
To level off concrete to the correct elevation during a concrete pour. To strike off concrete lying above the desired plane or shape. A screed is also a tool for striking off the concrete surface, sometimes referred to as a strike off.
Screed bar
The screed bar holder is an "L" shaped device that attaches to the top of a stake and onto which a pipe (screed bar) is attached at the finish grade level. The finishing screed then rides on top of this pipe (screed bar) to prevent the full weight of the screed from being placed on the fresh concrete during the finishing process.
Screeding
The operation of forming a surface by the use of screed guides and a strike off.

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Segregation
he separation of the components of wet concrete caused by excessive handling or vibration. The differential concentration of the components of mixed concrete, aggregate, or the like, resulting in non-uniform proportions in the mass.

Separation
Motor-driven revolving blades that smooth, flatten, and compact the surface of concrete slabs or floor toppings.

Set
The condition reached by a cement paste, mortar, or concrete when it has lost plasticity to an arbitrary degree usually measured in terms of resistance to penetration or deformation. Initial set refers to first stiffening; final set refers to attainment of significant rigidity.

Set retarders
Agents used to delay, slow down, the setting of concrete.

Settlement
Sinking of solid particles in grout, mortar, or fresh concrete, after placement and before initial set.

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.

Slag
Concrete cement that sometimes covers the vertical face of the foundation void material.

Slump
The “wetness” of concrete. A 3 inch slump is dryer and stiffer than a 5 inch slump.

Slump cone
A mold in the form of the lateral surface of the frustum of a cone with a base diameter of 8” (203 mm), top diameter 4” (102 mm), and height 12” (305 mm), used to fabricate a specimen of freshly mixed concrete for the slump test. A cone 6” (152 mm) high issued for tests of freshly mixed mortar and stucco.

Slump loss
The amount by which the slump of freshly mixed concrete changes during a period of time after an initial slump test was made on a sample or samples thereof.

Slump test
This is a test to determine the plasticity of concrete. A sample of wet concrete is placed in a cone-shaped container 12” high. The cone is removed by slowly pulling it upward. If the concrete flattens out into a pile 4” high, it is said to have an 8” slump. This test is done on the job site. If more water is added to the concrete mix, the strength of the concrete decreases and the slump increases.

Spalling
The chipping or flaking of concrete, bricks, or other masonry where improper drainage or venting and freeze/thaw cycling exists Steam curing Curing of concrete or mortar in water vapor at atmospheric or higher pressures and at temperatures between about 100° and 420° F (40° and 215° C).

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Steel trowel
A smooth concrete finish obtained with a steel trowel. It is also a tool used for non-porous smooth finishes of concrete. It is a flat steel tool used to spread and smooth plaster, mortar or concrete. Pointing trowels are small enough to be used in places where larger trowels will not fit. The pointing trowel has a point. The common trowel has a rectangular blade attached to a handle. For a smooth finish, the steel trowel is used when the concrete begins to stiffen.
Steel troweling
A steel hand tool or machine used to create a dense, smooth finish on a concrete surface.
Straightedge
A rigid and straight, piece of wood or metal used to strike off or screed a concrete surface to the proper grade, or to check the flatness of a finished grade.
Strike off
To remove concrete in excess of that which is required to fill the form evenly or bring the surface to grade, performed with a straight-edged piece of wood or metal by means of a forward sawing movement or by a power-operated tool appropriate for this purpose. The name applied to the tool used to fill the form evenly.
Stripping
Removing the formwork from concrete.
Sub-base
Clay or soil material used underneath the stone base.
Superplasticizer
A concrete admixture that makes wet concrete extremely fluid without additional water. These agents perform the same function as a plasticizer, but are composed of different materials.
Surface moisture
Free moisture retained on the surfaces of aggregate particles that becomes part of the mixing water in the concrete mix.

T
Tensile strength
Maximum unit stress which a material is capable of resisting under axial tensile loading, based on the cross sectional area of the specimen before loading.
Tilt-up construction
A method of constructing concrete walls in which the wall panels are cast and cured flat on the floor slab or surrounding area and then tilted up into their final wall positions.
Transit-mixed concrete
Concrete mixed in a drum on the back of a truck as it is transported to the construction site.
Trowel
A thin, flat steel tool, either pointed or rectangular, provided with a handle and held in the hand, used to manipulate concrete, mastic, or mortar create a dense, smooth finish on a concrete surface. It is also a machine whose rotating blades are used to finish concrete slabs.
Troweling
Smoothing and compacting the unformed surface of fresh concrete by strokes of a trowel.

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U

Unit water content

The quantity of water per unit volume of freshly mixed concrete, often expressed as gallons or pounds per cubic yard. This is the quantity of water on which the water cement ratio is based, and does not include water absorbed by the aggregate.

Unreinforced concrete

Concrete made without steel reinforcing bars.

V

Vibrating screed

A machine designed to act as a vibrator while leveling freshly placed concrete.

Vibration

Energetic agitation of freshly mixed concrete during placement by mechanical devices, either pneumatic or electric, that create vibratory impulses of moderately high frequency that assist in evenly distributing and consolidating the concrete in the formwork.

Vicat apparatus

A penetration device used to determine the setting characteristics of hydraulic cements.

W

Water-cement ratio

A numerical index of the relative proportions of water and cement in a concrete mixture. The ratio of the amount of water, exclusive only of that absorbed by the aggregates, to the amount of cement in a concrete or mortar mixture. The ratio is preferably stated as a decimal by weight. For example, the ratio 1:2:4 refers to a mix which consists of 1 cubic foot of cement, 2 cubic feet of sand and 4 cubic feet of gravel. Cement and water are the two chemically active elements in concrete and when combined, form a paste or glue which coats and surrounds the particles of aggregate and upon hardening binds the entire mass together.

Water-reducing agents

A material that either increases workability of freshly mixed mortar or concrete without increasing water content, or maintains workability with a reduced amount of water; the effect being due to factors other than air entrainment.

Water repellant coating

Transparent coating or sealer applied to the surface of concrete and masonry surfaces to repel water.

Wet screeds

Concrete strips placed beforehand at the proper elevation to act as height guides when pouring a concrete slab.

Wetting agent

A substance capable of lowering the surface tension of liquids, facilitating the wetting of solid surfaces and permitting the penetration of liquids into the capillaries.

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Y

Yard (of concrete)

One cubic yard of concrete is 3’ x 3’ x 3’ in volume, or 27 cubic feet. One cubic yard of concrete will pour 80 square feet of 3.5’ sidewalk or basement/garage floor.

Yield

The volume of freshly mixed concrete produced from a known quantity of ingredients. The total weight of ingredients divided by the unit weight of the freshly mixed concrete. The number of product units, such as block, produced per bag of cement or per batch of concrete.

Z

Zero slump concrete

Concrete having a slump of less than ¼ “. AKA No-Slump Concrete