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# Oxford



## **DICTIONARY OF**

Construction, Surveying & Civil Engineering



CHRISTOPHER GORSE, DAVID JOHNSTON, AND MARTIN PRITCHARD

A Dictionary of

## Construction, Surveying and Civil Engineering





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A Dictionary of

## Construction, Surveying and Civil Engineering

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#### SEE WEB LINKS

Many entries in this dictionary have recommended web links. When you see the above symbol at the end of an entry go to the dictionary's web page at http://www.oup.com/uk/reference/resources/construction, click on **Web links** in the Resources section and locate the entry in the alphabetical list, then click straight through to the relevant websites. Additional web links are available in an appendix.

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#### **Preface**

This Dictionary aims to provide a comprehensive and up-to-date reference of construction, surveying, and civil engineering terms within one publication. The entries address the needs of those studying on built environment courses or engaged in professional practice as well as providing much useful information for those with a general interest in architecture or construction. Builders, trade suppliers, and contractors will find the dictionary a useful desktop manual that can be easily and quickly used to check unfamiliar terminology.

Due to the size and nature of the industry, it is difficult for even the most knowledgeable professionals to stay abreast of emerging issues and retain an encyclopedia of construction terms at the front of their mind. In such cases, the book acts as a reminder, giving reassurance of meanings and confidence in communication. Built environment professionals, including architects, building surveyors, building services engineers, construction managers, civil engineers, electrical engineers, facilities managers, mechanical engineers, and quantity surveyors should find the Dictionary useful. It offers a quick and easy guide to terms and information that underpin the environment in which we live, both built and natural. In covering these terms, the authors have delved into the areas of building physics and science, and their application to design, structures, materials, and practices that inform construction and engineering. Issues associated with geology, geography, climate, and the natural environment within which buildings and structures are accommodated are also covered. The policy and legal frameworks that provide governance and procedure to the built environment are included, as well as the issues related to the professional organizations that hold influential positions within the industry.

The importance of the sustainability agenda and the related fields of building, engineering, and surveying mean that more people are taking an interest in construction and need to familiarize themselves quickly with the language and terminology used. The dictionary offers a good point of reference for those operating within the field and those just interested in learning more about the built environment and engineering. As a major consumer of the world's natural resources, the built environment and the impact that it has on the environment is high on the government agenda, with all policy makers ensuring that it is given due consideration. It is expected that the book, terms, and references will continue to grow and be in greater demand as the degree of importance associated with the built environment increases.

### Acknowledgements

Our understanding of construction, surveying, and civil engineering has developed over many years, benefitting from the experience and knowledge of many experts and professionals. Some have made direct contributions to the publication, while others have been influential in our understanding of the topic and the field. While we cannot thank all that have contributed to this pool of knowledge, their help is very much appreciated. However, the authors are grateful to and would specifically like to thank the following professionals who have been influential in the work developed for this publication:

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**abandonment of work** To leave site and refuse to continue work. Must entail a complete stoppage of work with a clear intention not to continue or complete the work. The term is often used in arbitration and adjudication and marks a point where reference to legal proceedings can commence.

**abatement of action** An interruption of legal proceedings. A party, normally the defendant, serves an application of abatement giving reasons why proceedings should not continue.

**abeyance 1.** A state of suspension, temporarily inactive, cessation or put to one side for a period of time. **2.** When the ownership of a property has not yet been decided or the condition of a property without an owner.

abioseston Non-living particulate matter found floating in watercourses.

**abiotic** Non-living chemical and physical matter (not biological). **Abiotic components** are parts of the environment; water, sunlight, oxygen, temperature, soil, and climate.

ablution fitting A large communal sanitary fitting used to perform ritual washing.

**Abney level** A hand-held instrument to measure vertical angles. *See also* CLINOMETER OF ACTION.

above grade A higher elevation than ground level. See also ABOVE GROUND LEVEL.

**above ground level (US above grade) 1.** The height above ground level. **2.** Work undertaken on a building after the building has come out of the ground.

**Abram's law** A rule that states the strength of concrete (or mortar) is inversely related to the water/cement (w/c) ratio. Provided there is sufficient water to ensure that the \*hydration reaction occurs, the lower the water/cement ratio, the higher the strength of the concrete/mortar.

**abrasion** The wearing away of one material against another by \*friction.

**abrasion resistance** The ability of a finish to withstand wear.

**abrasive** The use of friction/roughness to clean, grind, or polish a surface.

**abrupt wave** An unexpected increase in flow caused by a sudden change in flow conditions.

**ABS** (acrylonitrile butadiene styrene) A polymeric material composed of acrylonitrile, butadiene, and styrene to give a good balance of mechanical properties, used commonly as lavatory seats.

abscissa The horizontal or x-coordinate within the \*Cartesian coordinate system.



**abseil survey** An inspection undertaken on a tall building/structure by a qualified person suspended via a rope.

absolute Not depending on anything else.

absolute assignment The irrevocable transfer of the entire debt or all legal rights.

**absolute zero** The lowest possible temperature. Defined as zero degrees \*Kelvin, which is equivalent to -273.15 degrees on the Celsius scale.

absorbent The ability to absorb, i.e. to soak up a liquid.

absorption The process of absorbing a liquid.

**absorption rate** (absorption coefficient of water) The rate of water absorption, ingress by capillary action, into a material when exposed to a water medium over a period of time. The method for determining the water absorption property is carried out in accordance with BS EN 772-11. After drying to constant mass, a face of the masonry material is immersed in water for a specific period of time, both short- and long-term and the increase in mass is usually determined. The water absorption of the face of the unit exposed is measured, after drying to constant mass. The minimum immersion time is usually one hour, as specified in BS EN 771-4. The coefficient of water absorption is normally stated at 10, 30, and 90 minutes for masonry materials (bricks and blocks).

**absorption refrigerator** A refrigerator that operates using the absorption cycle rather than the vapour compression cycle. In such systems, a heat source, usually waste heat, is absorbed and used to evaporate the refrigerant rather than using a compressor to compress the refrigerant. Quiet in operation and capable of being driven by solar energy.

absorptive form See PERMANENT FORMWORK.

**absorptivity** (absorptive power) A property of a material that determines the amount of incident heat, light, or sound energy that is absorbed by the material.

ABT See ASSOCIATION OF BUILDING TECHNICIANS

abut To adjoin; be next to; touch.

**abutment 1.** A solid structure, usually a pier or wall, which provides support to an arch, bridge, or vault. It enables the loads from the structure to be transmitted to the \*foundations. **2.** The point where a roof slope intersects a wall that extends above the roof slope. **3.** The intersection between two building elements. **4.** In dam construction, the sides of the valley against which the dam is constructed.

**abutment flashing** A \*flashing at an \*abutment, usually made from lead, although copper and mortar have been used.

abutment piece (US) A \*sill or \*sole plate.

abutment wall The wall that extends beyond an \*abutment.

**ACA Form of Building Agreement** The Association of Consultant Architects construction contract.

**ACAS (Advisory, Conciliation, and Arbitration Service)** An independent publicly funded organization founded in 1975 that acts to prevent and resolve employment disputes. It also provides professional advice and training.

**accelerated weathering (artificial ageing)** Normally a cyclic process that simulates adverse climatic conditions (such as temperature, ultraviolet radiation, and moisture), which is used to assess the durability of materials.

**acceleration** A measure of the rate at which \*velocity is changing, i.e. a change in speed over time.

**acceleration of work** Agreement to complete the work in a shorter time. Within general law, the architect, contract administrator, or client has no power to instruct the contractor to complete the work in a shorter period of time than the expressed completion date, unless there is a provision (term) within the contract that allows for the acceleration of works.

**accelerator** An admixture that enhances early strength (hardening) but the long-term strength remains unaffected. Regularly used in cold weather when urgent repair work is needed. Calcium chloride is the most common accelerator, however, it reduces corrosion protection.

accelerometer An instrument for measuring acceleration.

**acceptance** An agreement, based on an offer, which forms a contract. An offer and acceptance are used in contract law to determine whether a contract exists. For a contract to exist, there needs to be an offer, acceptance of that offer, and consideration (the thing of value at the centre of the contract). Acceptance can be made orally, in writing, or by conduct. Acceptance must be unqualified.

**accepted programme** The schedule of works that has been agreed, under the contract terms, to be used to schedule activities and resources. The \*Engineering and Construction Contract, previously the New Engineering Contract, makes reference to the accepted programme.

**accepted risk** Risks accepted by the client or employer which can influence the works but are beyond the contractor's control or scope of works. Term used in GC (General Contract)/Works Contract.

**access 1.** The method of gaining entry to a building, a room, a site, or services. **2.** The right or permission to use something (access to documents).

access chamber See INSPECTION CHAMBER.

access cover (access eye, inspection cover) The removable cover on an \*inspection chamber.

**access floor** (raised floor) A floor that is suspended above the structural floor. Usually consists of removable panels supported on a metal grid that is raised off the floor by adjustable pedestals or battens. The space between the two floors can be used to route various services such as data, telephone, power, lighting, heating and cooling pipes, and ventilation.

access hole An opening, usually large enough for a person, that enables access to be gained to an area, an installation, or services.

**accessories 1.** Components not included as part of the original product. Often used to enhance or modify the performance of the original product. **2.** Components that are used to connect various building elements or services together.

accessory box (accessory enclosure) A box that is used to store accessories.

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**Access to Neighbouring Land Act 1992** Act designed to address problems that arise when entry to a neighbour's land is required to carry out work. The Act applies to basic preservation works only and would include maintenance and repair of buildings and property that cannot be reasonably undertaken within the boundary of the property. Application is made to the courts. The courts can only award access if it does not interfere with the enjoyment of an owner's land, nor should it cause hardship.

**access to works** The contractual right to have access to the place where the work is to be undertaken. The employer has to give the contractor access to the site otherwise it would be impossible for him/her to carry out the work. It is not a breach of contract where access is prevented by third parties over whom the employer has no control.

**accident** An identifiable and specific event that was not anticipated and was unexpected. Generally, the fact that something was an accident is not an adequate defence to an action brought in tort.

**accidental error** A mistake happening by chance that would influence accuracy; for instance, taking an incorrect reading without realizing the mistake.

acclivity An upward slope or incline.

**accommodation works** Activities that are undertaken or required to maintain structures, equipment, or land that is the property or under the control of a statutory undertaker; such work may include: bridges, fences, and gates to protect railways, substations, etc. Where there is a statutory obligation to protect such works it must be undertaken.

**accord and satisfaction** The purchase of a release from an \*obligation. In \*contract law an obligation arising under the contract may be purchased by means of consideration, without having to undertake the obligation. The accord is the agreement and the satisfaction represents the consideration taken into account to discharge the obligation and makes the agreement valid.

**accordion door** A door comprising a number of sections that fold together like the bellows of an accordion when opened.

**accreditation** A certification process by which an organization is awarded a standard of competency and credibility.

**accrued rights** The rights and duties of the parties following a contractor's determination of employment under the contract (remedies of either party). Such rights also give powers to contract administrators to issue instructions, in relation to work already completed, e.g. for defective work.

**accumulation** The increase of something over time.

acequia An irrigation canal/ditch used in Spain and the American Southwest.

**acetone** A flammable liquid from the family of ketones.

acetylene A hydrocarbon substance from the alkynes family.

acid A liquid with a pH value of less than 7.0.

acidic A chemical compound whose properties are typical of an \*acid.

**acknowledgement of service** The formal step, by way of a letter, of responding to a claim. The letter would state that a defendant intends to dispute part or all of the

claim, state the particulars of the claim, and record whether the court's jurisdiction is accepted. The procedure is governed by the Civil Procedure Rules.

**acoustic board** A board used on walls, floors, and ceilings that is designed to improve \*sound absorption or \*sound insulation.

**acoustic clip** A clip that is attached to the floor joists to provide support for an acoustic floor. Used to reduce \*impact sound transmission on floating timber floors.

**acoustic construction** Any type of construction that improves the \*acoustics of the construction. For instance, reduces \*sound transmission, improves \*sound insulation, or increases \*sound absorption.

**acoustic finish (acoustic finishing)** A finish that reduces sound energy by absorption.

acoustic floor A floor that is designed to reduce sound transmission.

**acoustic lining** A lining material that is designed to absorb noise and reduce \*sound transmission. Used on pipes and ductwork.

acoustic plaster Plaster that has high sound absorption properties.

**acoustics 1.** A branch of physics that relates to the study of \*sound generation, sound transmission, absorption, and reflection. **2.** In construction, the effect that sound has on a room or space.

**acoustic tile** A tile manufactured from \*acoustic board that is usually used on ceilings to improve \*sound absorption or \*sound insulation.

acre An area of land equal to 4840 square yards (0.405 hectares).

**acrylated rubber paints** Special type of paints that are suitable for internal and external applications exposed to chemical attack, or wet and humid conditions. May be applied to metal or masonry by either brushing or spraying.

acrylic A compound derived from acrylic acid.

**acrylic paints** A type of paint in an acrylic polymer emulsion renowned for its quick drying properties.

acrylic resin See POLYMETHYLMETHACRYLATE.

acrylic sealants A type of \*sealant derived from acrylic acid.

acrylic sheet A polymer material derived from acrylic acid, usually transparent.

acrylonitrile butadiene styrene See ABS.

**action 1.** The physical operation of something. **2.** A civil legal proceeding brought by one party against another.

active earth pressure  $(p_a)$  The horizontal pressure that is exerted on a retaining wall by the mass of soil it retains. Active pressure develops when the wall moves away from the retained mass and the soil expands sufficiently to mobilize its shear strength. The minimum horizontal stress  $(p_a)$  occurs when the failure strength of the soil is fully mobilized, represented by the minor principal stress, and is calculated by multiplying the \*coefficient of active earth pressure  $(K_a)$  by the vertical stress at the point of consideration.

#### **Active Earth Pressure** Passive Earth Pressure Structure moves away from soil Structure pushes into soil Active Earth Active Pressure Farth Retainin Pressure wall Passive Farth Pressure Pn

**active fire protection** A fire protection system that uses electrical and/or mechanical equipment to detect or suppress fires, such as \*fire detectors, \*alarms, \*sprinklers, or \*spray systems. They require regular maintenance to ensure that they are fully operational.

active leaf The most frequently used opening leaf on a double door. When closed, it is held in position by latching to the \*inactive leaf.

**active solar heating** A heating system that utilizes electrical and/or mechanical equipment, such as solar collectors, pumps, and fans to collect solar energy from the sun to heat water.

**activity** An item of work or task that is needed to complete a project. Used in \*Critical Path Method scheduling. An **activity arrow** is used to represent an activity graphically. The time that is expected to be taken to complete an activity is known as the **activity duration**. An **activity schedule** is a list of all of the activities that are required to be carried out to complete a project.

**Act of God** A legal term meaning an occurrence caused by natural forces where foresight and prudence could not reasonably anticipate it and guard against it. The term is not generally used in construction contracts, \*force majeure is the term usually used to cover such occurrences.

**Act of Parliament** A statute that sets out the law, the legal will of Parliament in written form. The Acts provide the broad principles, with the detail of the law covered by regulations in the form of a statutory instrument.

**actuator** A mechanical device that is used to convert electrical, hydraulic, or pneumatic energy into mechanical energy. Used in flow control valves, meters, motors, pumps, switches, and relays.

**acute angle** An angle that is greater than zero degrees but less than 90°. In an **acute angle triangle** all three angles are acute.

**adaptor** A device that enables the characteristics of one component to be matched to another component. Used for joining \*pipework, \*ductwork, and electrical cables.

**addendum bills** Bills of quantities produced to alter or modify parts of the original bills. Problems often occur where additional documents are used to modify the original bills as the addendum will refer to the original document, but the original document does not make reference to the addendum. If not cross-referenced properly such documents can be problematic. Addendums may be used to reduce the lowest tender so that it is within the client's budget or to cater for minor alterations.

**additional work** Work not identified or work over and above that specified in the contract. In standard building contracts additional work is dealt with under the various terms associated with \*variations. *See also* EXTRA.

**additive** A substance that is added to another to alter (normally improve) properties or performance, e.g. an \*admixture to concrete.

**addressable system (intelligent fire alarm)** A fire alarm system incorporating detectors that are capable of sending signals back to the main control unit. Such a system can be used to determine the location of a fire and activate the fire protection system.

**adds** Quantities of work, of a similar nature, that are added together under the same description. Adds are brought together before deducts are taken off, e.g. quantities of brickwork added together before the wall openings, windows and doors, are taken off (deducts).

**adhesion** A process whereby the molecules of two separate substances cling together to form a bond.

adhesive (glue) A substance used to bond two objects or materials together.

**ad hoc** Something that is undertaken only when necessary for the specific purpose in question and is not planned in advance.

**ad idem** A Latin expression that means at the same point, agreed, or of the same mind. Parties that have agreed to a contract are said to be *ad idem* when agreement has been reached on the contract terms.

adjacent Adjoining, next to, near, or close to.

**adjoining property** A building that has a common boundary or is attached to another property.

adjudication Method used to resolve disputes. An adjudicator is empowered by contract or statute to settle a dispute. A party to a construction contract has the right to refer a dispute to an adjudicator, where the parties to the contract have failed to resolve their contractual differences. The adjudicator must act independently, hearing the evidence and facts from both sides. Adjudicators are often lawyers or experts within the industry, but can be any person that the parties agree to. Adjudication was introduced as a quick and cost effective method of resolving disputes, when compared to \*arbitration or litigation. The Housing Grant Construction Regeneration Act 1996 states that provisions for adjudication must be included within construction contracts. Where contracts do not comply with the Act, the Scheme for Construction Contracts will apply, thus adjudication is forced into contracts even if the construction contract does not have provisions to include it. The Construction Industry Council (CIC) procedures and the Technology and Construction Court (TeCSA) rules are often adopted as part of the contractual machinery associated with adjudication.

**adjustable steel prop (ASP)** A steel support that is adjustable along its length. Used to provide vertical support to floors and temporary beams.

**administrative charges** Costs associated with off-site secretarial, coordination, and management provisions. With off-site resources it may be difficult to identify an exact figure, for one contract, so a percentage for the \*overheads, which includes administration, insurance, and banking charges are included in the \*preliminaries.

a

**administrative receiver** A person or group appointed to act on behalf of the debenture holders to manage the company as a going concern, often before the company goes into \*liquidation.

**admissibility of evidence** The degree of consideration that can be given to evidence. Information, hearsay, or opinion of an expert that a tribunal finds useful in coming to its decision. Where issues are irrelevant or considered to be biased, overstated, or glorified, the tribunal may be restricted in the use of such evidence. It is more common in criminal cases for evidence to be restricted for fear that the nature of the evidence will result in undue prejudice.

**admixture** A chemical product which is added to \*concrete (<5% by mass) during mixing or by additional mixing, prior to placing, such that the normal concrete properties are changed, e.g. the speed of \*strength development, improvement of \*permeability, protection from \*fungicidal attack, improvement in \*workability.

#### SEE WEB LINKS

 Home page of the UK Cement Admixtures Association (CAA), a trade association of UK admixture manufacture, providing information on types, current standards, and publication downloads.

**adobe** A building material made from water, sand, and soil containing clay that is dried in the sun. Straw or other organic fibrous materials may be added to reduce cracking, aid drying, and to help bind the material together. An **adobe brick**, or mud brick, is made by placing adobe into a mould.

**adsorption** The accumulation of a substance (gas or liquid) on a surface of another substance (liquid or solid), forming a molecular film.

**advance** (advance payment) Payment or part payment made before work is undertaken. Some standard forms of contract have provisions for advance payment. To be binding, the amount agreed and the date for payment must be inserted in the \*appendix of the contract, together with the times and amounts of repayment. \*Bonds are normally required for advanced payments.

**advances on account** A provision (term) used in construction contracts which refers to periodic payments during the progress of the work, normally at monthly intervals. The housing Grants Construction and Regeneration Act 1996 now requires that all construction contracts make provision for periodic payments. Periodic payments may be covered under the provisions for \*interim certificates.

**adverse possession** Where the title of a person's land transfers to another without compensation, often called squatter's rights. Title of land may be acquired under the Limitations Act 1980. If a person occupies or remains in possession of land without rent or payment for a period of twelve years for private land or 30 years for Crown land, and makes uses of the land which are inconsistent with the owner's enjoyment or intended use, then the land may be acquired.

**adverse weather conditions** Weather conditions that restrict or preclude work from being undertaken on site, such as high winds and heavy rain.

advertisement for bids See INVITED BIDDER.

**adze** A carpenter's tool used for shaping wood. It has an axe-like head, long handle, and a thin blade perpendicular to the handle.

aerated concrete See AIRCRETE.

**aeration** The introduction of air (or gas) into a substance (e.g. water, concrete, sewage).

**aerial** Relating to the air, e.g. an **aerial photograph** can be taken from an aeroplane to produce maps and scale drawings of the ground.

aerobic Any treatment, activity, or process that requires the presence of air (oxygen).

**aerochlorination** Treatment of wastewater (e.g. \*sewage) by a mixture of compressed air and \*chlorine gas.

**aerodynamics** The study of airflow around objects and the movement of objects through air, with particular reference to the forces experienced by an object as a result of the movement of air.

**aerotriangulation** The use of angles and distances to orient and align overlapping \*aerial photographs.

**affidavit** A factual or written statement or evidence made under oath. Documents sworn in under an affidavit are called exhibits.

**affirmation of contract** Where there is a breach of contract, the innocent party may choose to continue with the contract and affirm the contract, treating it as still being in force.

**AFNOR** (Association Française de Normalisation) The French national standards organization.

**a fortiori argument** Latin term used in law to show that the case being presented falls well within the scope of something that has gone before, thus there is even greater reason that the situation under examination should be treated with at least the same consideration. The situation can be treated as *a maiore ad minus* e.g. if the situation applies to a large group then it should also hold true for a smaller group or if 8 m³ of concrete is contained in a dumper then 6 m³ would also fit into the same dumper. Alternatively, but less common, *a minor ad maius* argument can be used, which means from smaller to bigger, e.g. if two packs of bricks overloaded the scaffolding, then six packs of the same type of brick would also overload it. All of these arguments rely on the first assumption holding true, thus if two packs of bricks would not overload the scaffolding then there would be no evidence to check the second part of the statement. Where illogical arguments are used to justify a claim, it falls under the term *petitio principii*.

**A-frame building** A triangular-shaped building with a steeply sloping roof that extends to ground level.

**African mahogany** Common name for genus *Khaya* of the *meliaceae* family and genus *Afzelia* of the *fabaceae* (legumes) family trees.

**after-flush** The water remaining in a cistern after the toilet has been flushed. This water provides the water seal between flushing.

**aftershock** A small earthquake, normally one of many, that occurs after a large earthquake.

aftertack (after-tack) A defect in a paint film where the film remains tacky and sticky over an extended period of time.

ageing See PRECIPITATION HARDENING.

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