



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG, NEW DELHI 110002

व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 02:2/टी-35

11 जनवरी 2024

तकनीकी समिति : सीमेंट और कंक्रीट विषय समिति, सीईडी 02

प्राप्तकर्ता :

- 1 सिविल इंजीनियरिंग विभाग परिषद, सीईडीसी के सभी सदस्य
- 2 सीमेंट और कंक्रीट विषय समिति, सीईडी 02 के सभी सदस्य
- 3 सीईडी 02 उपसमिति एंव इसकी पैनल और कार्यदल के सभी सदस्य
- 4 रूचि रखने वाले अन्य निकाय।

महोदया/महोदय,

निम्नलिखित मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 02 (24626)WC	सीमेंट कंक्रीट से संबंधित शब्दों की शब्दावली: भाग 1 ठोस समुच्चय (पहला पुनरीक्षण) का भारतीय मानक मसौदा (ICS: 01.040.91)

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इस पर अमल करने में, आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयाँ आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: **12 फरवरी 2024**

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को उपरिलिखित पते पर संलग्न फॉर्मेट में भेजें या ced2@bis.gov.in पर ईमेल कर दें या सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रलेख को यथावत अंतिम रूप दे दिया जाएगा। यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रलेख को अंतिम रूप दे दिया जाएगा।

यह प्रलेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

भवदीय

ह/-

(अरुण कुमार एस.)

वै. 'ई' / निर्देशक और प्रमुख (सिविल इंजीनियरिंग)

संलग्न: उपरिलिखित



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG, NEW DELHI 110002

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WIDE CIRCULATION

DOCUMENT DESPATCH ADVICE

TECHNICAL COMMITTEE:

Reference	Date
CED 02:2/T-35	11 January 2024

CEMENT AND CONCRETE SECTIONAL COMMITTEE, CED 02

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Cement and Concrete Sectional Committee, CED 02
3. All Members of Subcommittees, Panels and Working Groups under CED 02
4. All other interested

Dear Madam/Sir,

Please find enclosed the following draft:

Doc. No.	Title
CED 02 (24626)WC	Draft Indian Standard Glossary of terms relating to Cement Concrete : Part 1 Concrete Aggregates (<i>First Revision</i>) (ICS 01.040.91)

Kindly examine the draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 12 February 2024

Comments if any, may please be made in the attached format and mailed to the undersigned at the above address or preferably through e-mail to ced2@bis.gov.in. The comments may preferably be shared in the prescribed template through the Manak Online portal at www.manakonline.in. Alternatively, the comments may be sent through the attached format for consideration by the BIS' Sectional Committee for necessary action.

In case no comments are received or comments received are of editorial nature, you will kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,

Sd/-

(Arun Kumar S.)

Sc. 'E'/Director and Head (Civil Engg.)

Encl: As above

BUREAU OF INDIAN STANDARDS**DRAFT FOR COMMENTS ONLY**

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Draft Indian Standard**GLOSSARY OF TERMS RELATING TO CEMENT CONCRETE
PART 1 CONCRETE AGGREGATES
(First Revision)**

Cement and Concrete
Sectional Committee, CED 02

Last date of Comments:
12 February 2024

FOREWORD

(Formal Clauses to be added later)

Cement concrete is one of the most versatile and extensively used building materials in all civil engineering constructions. There are a number of technical terms connected with the basic materials for concrete as well as the production and use of concrete which quite often require clarification to give precise meaning to the stipulations in the standard specifications, codes of practices and other technical documents. Based on this necessity and to standardize the various terms and definitions used in cement and concrete technology, this standard was published in 12 parts.

The other parts in the series are:

Part 2	Materials (other than cement and aggregate)
Part 3	Concrete reinforcement
Part 4	Types of concrete
Part 5	Formwork for concrete
Part 6	Equipment, tools and plant
Part 7	Mixing, laying, compaction, curing and other construction aspects
Part 8	Properties of concrete
Part 9	Structural aspects
Part 10	Tests and testing apparatus
Part 11	Prestressed concrete
Part 12	Miscellaneous

In addition to the above, two separate standards were brought out concerning terminology relating to hydraulic cement and pozzolanic materials. These standards are IS 4845: 1968 'Definitions and terminology relating to hydraulic cement' and IS 4305: 1967 'Glossary of terms relating to pozzolana'.

This standard (Part 1) was first published in 1972. In this revision the necessary changes required have been incorporated in the light of experience gained in its use and also to bring it in line with the latest development on the subject. The significant modifications made in this revision include:

- a) Definitions of mixed sand and manufactured sand has been included; and
- b) Definitions of various terms have been rationalized.

In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving assistance from the following publications:

- a) BS 6100-9 (2007) Building and civil engineering – Vocabulary – Part 9 – Work with concrete and plaster, British Standards Institution
- b) ASTM C125 (2021) Standard terminology relating to concrete and concrete aggregates, American Society for Testing and Materials (revision 21A)
- c) ACI No. SP-19 (1967) Cement and concrete terminology, American Concrete Institute.
- d) ACI 617 (1968) Recommended practice for concrete formwork, American Concrete Institute.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (second revision)'. The number of significant places retained in the rounded off value should be periodically removed to create more space for the future falling blocks

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

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Draft Indian Standard

**GLOSSARY OF TERMS RELATING TO CEMENT CONCRETE
PART 1 CONCRETE AGGREGATES
(First Revision)**

Cement and Concrete
Sectional Committee, CED 02

Last date of Comments:
12 January 2024

1 SCOPE

1.1 This standard (Part 1) covers definitions of terms relating to aggregates for cement concrete.

2 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

2.1 Absorption – The process by which a liquid is drawn into and tends to fill permeable pores in a porous solid body; also, the increase in weight of a porous solid body resulting from the penetration of a liquid into its permeable pores.

NOTE — In the case of concrete and concrete aggregates, unless otherwise stated, the liquid involved is water, the increase in weight is that which does not include water adhering to the outside surface, the increase in weight is expressed as a percentage of the dry weight 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 weight at a temperature between 100°C and 110 °C.

2.2 Aggregate – Granular material, generally inert, such as natural sand, manufactured sand, gravel, crushed gravel, crushed stone, and air-cooled iron blast furnace slag which when bound together into a conglomerated mass by a matrix forms concrete or mortar. Granular material such as sand gravel crushed stone or iron blast furnace slag use with cementing medium to form hydraulic cement concrete or mortar.

2.3 Aggregate, All-in – Material composed of a mixture of coarse aggregate and fine aggregate.

2.3.1 Ballast, All-in – Aggregate containing a substantial proportion of all sizes (including sand) below a stated maximum, as obtained from a pit, river-bed or seashore.

2.3.2 Crusher-Run Stone – Rock that has been broken in a mechanical crusher and has not been subjected to any subsequent screening process.

2.4 Aggregate, Coarse – Aggregate most of which is retained on 4.75 mm IS Sieve and containing only so much of finer material as is permitted by the specification.

OR

Portion of an aggregate retained on the 4.75 mm IS Sieve.

NOTES

1 The definitions are alternatives to be applied under differing circumstances.

2 Coarse aggregate may be described as:

- a) crushed gravel - coarse aggregate produced by crushing gravel (see **2.28**);
- b) crushed stone - coarse aggregate produced by crushing of hard stone (see **2.29**);
- c) uncrushed gravel - coarse aggregate resulting from natural disintegration of rock; That is without crushing.
- d) partially crushed gravel or stone when it is a product of the blending of (a) and (b); and
- e) manually broken stone, that is produced by breaking hard stone manually with hammers.

2.5 Aggregate, Dense Graded – Aggregates graded to produce low void content and maximum weight when compacted.

2.6 Aggregate, Fine – Aggregates most of which passes 4.75 mm IS Sieve and containing only so much coarser material as is permitted for various grading zones in the specification. Fine aggregate may be described as in **2.6.1** to **2.6.3**.

2.6.1 Natural Sand – Fine aggregate resulting from the natural disintegration of rock and/or which has been deposited by streams or glacial agencies.

2.6.2 Crushed Stone Sand – Fine aggregate produced by crushing hard stone.

2.6.3 Crushed Gravel Sand – Fine aggregate produced by crushing natural gravel.

2.7 Aggregate, Gap Graded – Aggregate having a particle size distribution where one or more sizes are missing.

2.8 Aggregate, Graded – Aggregate comprising of a proportion of all sizes from a given nominal maximum to 4.25 mm. When these sizes are so proportioned as to give a definite grading, it is a well graded aggregate.

2.9 Aggregate, Heavy Weight – Aggregate of high specific gravity, such as barite magnetite, limonite, ilmenite iron, or steel used to produce heavy concrete or high density concrete specially for shielding against nuclear radiation.

2.10 Aggregate, Light Weight – Aggregate of low bulk specific gravity, such as expanded or sintered clay, slate, slag, fly ash, vermiculite, or pumice or natural pumice used to produce light weight concrete.

2.11 Aggregate, Maximum Size of – The largest size of aggregate particles present in sufficient quantity to influence the physical properties of concrete, generally designated by the standard sieve nearest to the sieve size on which over 10 percent weight is retained.

2.12 Aggregate, Reactive – 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 some cases in harmful expansion, cracking, or staining.

2.12.1 Alkali Reactivity (of Aggregate) – Susceptibility of aggregate to alkali-aggregate reaction.

2.13 Aggregate, Refractory – Materials having refractory properties which when bound together into a conglomerate mass by a matrix, form a refractory body.

2.14 Aggregate, Single Sized – Aggregate the bulk of which passes one sieve on the normal concrete series and is retained on the next smaller size.

2.15 b/b_0 – Dry rodded bulk volume of coarse aggregate per unit volume of concrete; the ratio of the solid volume of coarse aggregate particles per unit volume of freshly mixed concrete to the solid volume of the coarse aggregate particles per unit volume of dry rodded coarse aggregate.

2.16 Ballast – Stone or gravel mixture of irregular unscreened sizes which may also contain smaller material and sand.

2.17 Blastfurnace Slag – Blastfurnace slag is non-metallic product consisting essentially of glass containing calcium and magnesium silicates and alumino silicates and other bases, which is developed simultaneously with iron in blast furnace or electric pig iron furnace.

2.17.1 Ball-Slag – Blastfurnace slag which has been allowed to solidify in the ladle.

2.17.2 Bank-Slag – Blastfurnace slag which has been poured in a molten state on a bank and allowed to solidify.

2.17.3 Pit-Slag or Modified Pit-Slag – Blastfurnace slag which has been poured in a molten state into prepared pits, canals or large moulds and allowed to solidify therein.

2.18 Blastfurnace Slag, Air-Cooled – The material resulting from solidification of molten blastfurnace slag under atmospheric conditions. Subsequent cooling may be accelerated by application of water to the solidified surface.

2.19 Blastfurnace Slag, Expanded or Foamed – The light weight cellular material obtained by controlled processing of molten blastfurnace slag with water, or with water and other agents, such as steam or compressed air or both; and crushed and graded as required. It consists chiefly of alumino silicates of lime and magnesia in a glassy, partly crystalline or crystalline condition.

2.20 Blastfurnace Slag, Granulated – Granulated slag is obtained by further processing the molten slag by rapidly chilling or quenching it with water or steam and air. Granulated blastfurnace is used for the manufacture of hydraulic cement.

2.21 Bloated – Swollen, as certain light weight aggregates as a result of processing.

2.22 Bulking – Increase in the bulk volume of a quantity of sand in a moist condition over the volume of the same quantity dry or completely inundated.

2.23 Bulking Curve – Graph of change in volume of a quantity of sand due to change in moisture content.

2.24 Bulking Factor – Ratio of the volume of moist sand to volume of the sand when dry.

2.25 Chips – Broken fragments of marble or other mineral aggregate screened to specified sizes.

2.26 Cinder – Well burnt furnace residue which has been fused or sintered into lumps of varying sizes. The same material in a finely powdered form is found to possess some pozzolanic activity.

2.27 Cobble – A rock fragment between 64 and 256 mm in diameter as applied to coarse aggregate for concrete, the material in the nominal size range 75 to 150 mm.

2.28 Crushed Gravel – The product resulting from the artificial crushing of gravel with substantially all fragments having at least one face resulting from fracture.

2.29 Crushed Stone – The product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation.

2.30 Dry Rodding – In measurement of the weight per unit volume of coarse aggregates, the process of compacting dry material in a calibrated container by rodding under standardized conditions.

2.31 Dry Rodded Volume – The volume occupied by an aggregate compacted dry, under standardized conditions used in measuring unit weight of aggregate.

2.32 Dry Rodded Weight – Weight per unit volume of an aggregate compacted dry by rodding under standardized conditions.

2.33 Fineness Modulus – An empirical factor obtained by adding the total percentages of a sample of the aggregate retained on each of a specified series of sieves, and dividing the sum by 100.

NOTE — The sieves used are: 15 micron, 300 micron, 600 micron, 1.18 mm, 2.36 mm, 4.75 mm, 10 mm, 20 mm, 40 mm and larger increasing in the ratio of 2 to 1.

2.34 Flat Piece – One in which the ratio of the width to thickness of its circumscribing rectangular prism is greater than a specified value.

2.35 Free Moisture – Moisture not retained or absorbed by aggregate.

2.36 Fuller's Curve – An empirical curve for gradation of aggregates; also known as the Fuller-Thompson Ideal Grading Curve. The curve is designed by fitting either a parabola or an ellipse to a tangent at the point where the aggregate fraction is one-tenth of the maximum size fraction.

2.37 Gap Grading – A particle size distribution in which particles of certain intermediate sizes are wholly or substantially absent.

2.38 Gradation – See 2.45.

2.39 Grading – See 2.45.

2.40 Grading Continuous – A particle size distribution in which all intermediate size fractions are present, as opposed to gap grading.

2.41 Gravel

- a) Granular material predominantly retained on the 4.75 mm IS Sieve and resulting from natural disintegration and abrasion of rock or processing of weakly bound conglomerate; or
- b) That portion of an aggregate retained on the 4.75 mm IS Sieve and resulting from natural disintegration and abrasion of rock or processing of weakly bound conglomerate.

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

Coarse aggregate resulting from natural disintegration and abrasion of rock or processing of weakly bound conglomerate.

2.42 Grading Curve – A graphical representation of the percentages of different particle sizes in a material obtained by plotting the cumulative or separate percentages of the material passing through sieves in which the aperture sizes form a given series.

2.43 Gravel, Pea – Screened gravel most of the particles of which will pass a 10 mm IS Sieve and will be retained on a 4-25 mm IS Sieve.

2.44 Particle Shape of Aggregate – The particle shape of aggregate, such as angular, cubical, elongated and flaky.

2.44.1 Angular – The particles of aggregates possessing well defined edges formed at the inter-section of roughly planer faces. And those aggregate that consists of particles with sharp edges.

2.44.2 Cubical – Angular aggregate most of its particles have length, breadth and thickness approximately equal. That is the three substantially equal dimensions.

2.44.3 Elongated Piece – The particle of aggregate in which the ratio of length to width of its circumvent rectangular prism is greater than specified value.

2.44.4 Elongation Index – Elongation index of an aggregate is the percentage by weight of particles whose greatest dimensions (length) is greater than one and four-fifths times their mean dimension.

2.44.5 Flaky Material – Particles in aggregate which are usually angular and, of which the thickness is small relative to the width and/or length.

2.44.6 Flakiness Index – The Flakiness index of an aggregate is the percentage by weight of particles in it whose least dimension (thickness) is less than three-fifths of their, mean dimension.

2.44.7 Irregular Aggregate (or Partly Rounded Aggregate) – Aggregates the particle of which are naturally irregular, or partly shaped by attrition and have rounded edges. Coarse aggregate that consists of particles with rounded surfaces. In the case of other that natural aggregates, the coarse aggregate that consist of particles of irregular shape and round edges.

2.44.8 Rounded Aggregate – Aggregate, the particles of which are fully water worn or are completely shaped by attrition.

2.45 Particle Size Distribution – The distribution of particles of granular material among various sizes; usually expressed in terms of cumulative percentages larger or smaller than each of a series of diameters (sieve openings) or the percentages between certain ranges of diameters (sieve openings).

2.46 Petrography – The branch of petrology dealing with description and systematic classification of rocks aside from their geologic relations, mainly by laboratory methods largely chemical and microscopical also loosely, petrology or lithology.

2.47 Petrology – The science of rocks, treating of their origin, structure, composition, etc, from all aspects and in all relations.

2.48 Plum – A large random shaped stone dropped into freshly placed mass concrete.

NOTE — For cyclopean concrete, the weight of each stone may not be less than 50 kg. For rubble concrete the stone may be such that one man can handle.

2.49 Rubble – Rough stone of irregular shape and size, broken from larger masses by geological process or by quarrying.

2.50 Sand

- a) Granular material passing the 10-mm IS Sieve and almost entirely passing the 4.75 mm IS sieve and predominantly retained on the 75 micron IS Sieve, and resulting from natural disintegration and abrasion of rock or processing of completely friable sandstone; or
- b) That portion of an aggregate passing the 4.75 mm IS Sieve and predominantly retained on the 75 micron IS Sieve, and resulting from natural disintegration and abrasion of rock or processing of completely friable sandstone.

NOTE -The definitions are alternatives to be applied under differing circumstances. Definition (a) is applied to an entire aggregate weather in a natural condition or after processing. Definition (b) is applied to a portion of an aggregate. Requirements for properties and grading should be stated in specifications. Fine aggregate produced by crushing rock, gravel, or slag commonly is known as 'manufactured sand'.

2.51 Sand Equivalent – A measure of the amount of clay contamination in fine aggregate.

2.52 Scalper – A screen for removing oversize particles.

2.53 Shingle – Rounded or water worn stone of irregular size occurring in river beds or opened beaches.

2.54 Sieve Analysis – Determination of the proportions of particle lying within certain size ranges in a granular material by separation on sieves of different size openings.

2.55 Sieve Correction – Correction of Sieve analysis to adjust for deviation of sieve performance from that of standard calibrated sieve.

2.56 Silt – A granular material resulting from the disintegration of rock, with grains largely passing a No. 200 (47 micron) sieve; alternatively, such particles in the range from 2 to 50 microns diameter.

2.57 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.

2.58 Specific Gravity, Saturated Dry-Basis – The bulk specific gravity of aggregate determined after complete immersion in water for 24 hours and removing surface water.

2.59 Stone Sand – see 2.6.2.

2.60 Surface Saturated Dry-Aggregate – A condition of the aggregate attained after complete immersion in water and removing the superficial water by soaking with cloth.

2.61 Surface Water – Free water retained on surfaces of aggregate particles and considered to be part of the mixing water in concrete, as distinguished from absorbed moisture.

2.62 Aggregate, Minerals – Aggregates consisting essentially of inorganic nonmetallic rock materials, either natural or crushed and graded.

2.63 Cenosphere – Lightweight aggregate in the form of hollow glass spheres.

2.64 Crushed Rock – Coarse aggregate produced by crushing rock.

2.65 Elongated Aggregate – Coarse aggregate consisting of particles that have one dimension significantly larger than the other two.

2.66 Expanded clay aggregate – Expanded aggregate produced from clay.

2.67 Expanded plastic particle aggregate – Expanded aggregate that consists of plastic particles.

2.68 Flaky Aggregate – Coarse aggregate consisting of particles with a thickness that is small in relation to the other two dimensions.

2.69 Mixed Sand – Fine aggregate produced by blending natural sand and crushed stone sand or crushed gravel sand in suitable proportion.

2.70 Manufactured Fine aggregate (Manufactured sand) – Fine aggregate manufactured from other than natural sources, by processing materials, using thermal or other processes such as separation, washing, crushing and scrubbing.

2.71 Silica Fume – Very fine pozzolonic materials composed mostly of amorphous silica produced by electric arc furnaces as a byproduct of the production of elemental silicon or ferro silicon alloys.

2.72 Sinter – A ceramic material or mixture fired to less than complete fusion, resulting in a coherent mass; also the process involved.
