

BS 8500-2:2015+A2:2019



BSI Standards Publication

Concrete – Complementary British Standard to BS EN 206

Part 2: Specification for constituent materials and concrete



Publishing and copyright information

The BSI copyright notice displayed in this document indicates when the document was last issued.

© The British Standards Institution 2019

Published by BSI Standards Limited 2019

ISBN 978 0 580 52486 8

ICS 91.100.30

The following BSI references relate to the work on this document:

Committee reference B/517/1

Drafts for comment 14/30291598 DC, 15/30334432 DC, 18/30371364 DC

Amendments/corrigenda issued since publication

Date	Text affected
May 2016	A1: see Foreword
January 2019	A2: see Foreword

Contents

	Page
Foreword	iii
Introduction	1
1 Scope	1
2 Normative references	1
3 Terms, definitions, symbols and abbreviations	3
4 Complementary requirements for constituent materials	5
Table 1 — General purpose cements and combinations	6
Table 2 — Requirements for coarse crushed concrete aggregate ^{A)}	11
Table 3 — Limitations on the use of coarse CCA	12
Table 4 — Requirements for coarse recycled aggregate	14
5 Complementary basic requirements for concrete	16
Table 5 — Method for determining the chloride content of constituent materials	16
6 Designated concrete	17
Table 6 — Requirements for designated concretes for general applications	18
Table 7 — Requirements for designated cement-bound concretes	20
Table 8 — Range of aggregate grading for cement-bound concrete	21
7 Designed concrete	22
Table 9 — Limiting values of composition and properties for concrete where a DC-class is specified	23
8 Prescribed concrete	24
9 Standardized prescribed concrete	24
Table 10 — Mix proportions for standardized prescribed concretes using class 32,5 cements and combinations	25
Table 11 — Mix proportions for volume batching of ST1, ST2 and ST3	26
10 Proprietary concrete	26
11 Delivery of fresh concrete	27
12 Conformity testing and conformity criteria	27
Table 12 — Additional compressive strength classes to those given in BS EN 206	28
13 Production control	29
Table 13 — Tolerances for constituents when batching less than one cubic metre of concrete ^{A)}	30
Table 14 — Materials control for CCA ^{A)}	31
14 Transport of concrete	31
Annex A (normative) Conformity procedure for combinations	32
Table A.1 — Requirements for the compressive strength of combinations	33
Annex B (normative) Minimizing the risk of damaging alkali-silica reaction in concrete	34
Table B.1 — Proportion of declared mean alkali content of ggbs, natural pozzolana, natural calcined pozzolana, high reactivity natural calcined pozzolana or fly ash to be taken into account in the calculation of alkali content of concrete	36
Table B.2 — Reactivity of constituents of aggregates used in concrete in the UK	37
Annex C (informative) Example of the conformity procedure given in Annex A	39
Table C.1 — Mass fraction of addition ^{A)} in CEM I in combinations for strength testing	40
Table C.2 — Mass fraction of addition ^{A)} to CEM II/A-L or CEM II/A-LL combinations for strength testing	40
Figure C.1 — Determination of conformity limits for combinations	42
Annex D (informative) BS 8500 provisions linked to BS EN 206 requirements	42
Table D.1 — Guidance on where to find BS 8500 provisions that cover BS EN 206 requirements that defer to provisions in the place of use	43

Bibliography

45**Summary of pages**

This document comprises a front cover, and inside front cover, pages i to iv, pages 1 to 45, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 8500 is published by BSI Standards Limited, under licence by the British Standards Institution, and came into effect on 31 May 2016. It was prepared by Working Group B/517/1/WG20, *Specification drafting*, under the authority of Subcommittee B/517/1, *Concrete production and testing*, and Technical Committee B/517, *Concrete and related products*. A list of organizations represented on these committees can be obtained on request to their secretary.

Supersession

BS 8500-2:2015+A1:2016 superseded BS 8500-2:2015, which was withdrawn on 16 July 2016.

BS 8500-2:2015+A2:2019 supersedes BS 8500-2:2015+A1:2016, which is withdrawn.

Relationship with other publications

BS 8500 contains additional United Kingdom provisions to be used in conjunction with BS EN 206. Together they form a complete package for the specification, production and conformity of fresh concrete.

BS 8500 is published in two parts:

- Part 1, *Method of specifying and guidance for the specifier*; and
- Part 2, *Specification for constituent materials and concrete*.

Information about this document

Text introduced or altered by Amendments No. 1 and No. 2, respectively is indicated in the text by tags   and  . Minor editorial changes are not tagged.

BS 8500-2:2015 was a full revision of the standard, and introduced the following principal changes:

- changes necessary to align with the publication of BS EN 206:2013;
- changes resulting from new or revised European Standards published since 2006;
- alignment with conformity assessment and accreditation policy in the United Kingdom;
- introduction of designated cement-bound concrete;
- modification of requirements for concrete to resist freezing and thawing;
- corrections and minor clarifications;
- a new Annex ([Annex D](#)) has been added which sets out where to find the BS 8500 provisions that cover BS EN 206 requirements that defer to provisions in the place of use; and
- all references have been updated.

 The changes are predominantly concerned with the increased range of cementitious materials covered. These include: natural pozzolana, natural calcined pozzolana or high reactivity natural calcined pozzolana as an addition, Portland-pozzolana and pozzolanic cements, as well as a range of ternary cements which include up to 20% limestone fines. The recommendations for the use of natural, natural calcined and high reactivity natural calcined pozzolana, as part of cement or combination, are based on the assumption that their performance in concrete is similar to fly ash. The recommendations for ternary cements, which include up to 20% limestone fines, are for applications where their use is considered safe and durable. The option to use the equivalent concrete performance concept (ECPC) to demonstrate equivalence for the use of additions is clarified.

Additional guidance is provided on the preparation and transport of cube specimens for strength testing. Minor editorial changes are not tagged, such as the change of nomenclature from N/mm² to MPa for stress. ^{A2}

Hazard warnings

WARNING. Where skin is in contact with fresh concrete, skin irritations are likely to occur owing to the alkaline nature of cement. The abrasive effects of sand and aggregate in the concrete can aggravate the condition. Potential effects range from dry skin, irritant contact dermatitis, to – in cases of prolonged exposure – severe burns. Take precautions to avoid dry cement entering the eyes, mouth and nose when mixing mortar or concrete by wearing suitable protective clothing. Take care to prevent fresh concrete from entering boots and use working methods that do not require personnel to kneel in fresh concrete. Unlike heat burns, cement burns might not be felt until some time after contact with fresh concrete, so there might be no warning of damage occurring. If cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash wet concrete off the skin immediately. Barrier creams may be used to supplement protective clothing but are not an alternative means of protection.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

The requirement for third-party certification has been approved by the Standards Policy and Strategy Committee.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Introduction

The requirements in this part of BS 8500 are given for defined materials with an established or accepted adequate performance in the conditions found in the United Kingdom. These requirements might not be appropriate for use in exposure conditions different from the United Kingdom, particularly in hot climates. The use of constituents not listed in this standard should be by agreement between the producer and specifier on a case-by-case basis.

BS 8500 and BS EN 206 take account of the distinct and different technical responsibilities of the specifier, producer and user. Where a body is responsible for more than one of these roles, internal procedures within that body should allocate responsibilities for the various actions.

1 Scope

This part of BS 8500 specifies constituent materials and concrete. This part of BS 8500 complements BS EN 206. It provides United Kingdom national provisions where required or permitted by BS EN 206. It also covers materials, methods of testing and procedures that are outside the scope of BS EN 206, but within national experience.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Standards publications

[BS 812-104](#), *Testing aggregates – Part 104: Method for qualitative and quantitative petrographic examination of aggregates*

[BS 812-123](#), *Testing aggregates – Part 123: Method for determination of alkali-silica reactivity – Concrete prism method*

BS 1704, *Specification for solid-stem general purpose thermometers*

[BS 1881-124](#), *Testing concrete – Part 124: Method for analysis of hardened concrete*

[BS 1881-129](#), *Testing concrete – Part 129: Method for determination of density of partially compacted semi-dry fresh concrete*

BS 6068-2.37, *Water quality – Part 2: Physical, chemical and biochemical methods – Section 2.37: Method for the determination of chloride via a silver nitrate titration with chromate indicator (Mohr's method)*

BS 6068-2.42, *Water quality – Part 2: Physical, chemical and biochemical methods – Section 2.42: Determination of sodium and potassium: determination of sodium by atomic absorption spectrometry*

BS 6068-2.43, *Water quality – Part 2: Physical, chemical and biochemical methods – Section 2.43: Determination of sodium and potassium: determination of potassium by atomic absorption spectrometry*

BS 6068-2.44, *Water quality – Part 2: Physical, chemical and biochemical methods – Section 2.44: Determination of sodium and potassium: determination of sodium and potassium by flame emission spectrometry*

[BS 7943](#), *Guide to the interpretation of petrographical examinations for alkali-silica reactivity*

[BS 7979](#), *Specification for limestone fines for use with Portland cement*

[BS 8000-2.1](#), *Workmanship on building sites – Part 2: Code of practice for concrete work – Section 2.1: Mixing and transporting concrete*

[A2](#) BS 8500-1:2015+A2:2019, *Concrete – Complementary British Standard to BS EN 206 – Part 1: Method of specifying and guidance for the specifier* [A2](#)

[A2](#) BS 8615-1, *Specification for pozzolanic materials for use with Portland cement – Part 1: Natural pozzolana and natural calcined pozzolana* [A2](#)

[A2](#) BS 8615-2, *Specification for pozzolanic materials for use with Portland cement – Part 2: High reactivity natural calcined pozzolana* [A2](#)

BS EN 196-1, *Methods of testing cement – Part 1: Determination of strength*

BS EN 196-2, *Methods of testing cement – Part 2: Chemical analysis of cement*

BS EN 197-1:2011, *Cement – Part 1: Composition, specifications and conformity criteria for common cements*

[A2](#) BS EN 206:2013+A1:2016, *Concrete – Specification, performance, production and conformity* [A2](#)

BS EN 450-1:2012, *Fly ash for concrete – Part 1: Definitions, specifications and conformity criteria*

BS EN 480-1, *Admixtures for concrete, mortar and grout – Test methods – Part 1: Reference concrete and reference mortar for testing*

BS EN 480-10, *Admixtures for concrete, mortar and grout – Test methods – Part 10: Determination of water soluble chloride content*

BS EN 480-11, *Admixtures for concrete, mortar and grout – Test methods – Part 11: Determination of air void characteristics in hardened concrete*

BS EN 480-12, *Admixtures for concrete, mortar and grout – Test methods – Part 12: Determination of the alkali content of admixtures*

BS EN 933-11, *Tests for geometrical properties of aggregates – Part 11: Classification test for the constituents of coarse recycled aggregates*

BS EN 934-2, *Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling*

BS EN 1008, *Mixing water for concrete – Specification for sampling, testing and assessing the suitability of water, including water recovered from processes in concrete industry, as mixing water for concrete*

BS EN 1097-3, *Tests for mechanical and physical properties of aggregates – Part 3: Determination of loose bulk density and voids*

BS EN 1744-1:2009+A1:2012, *Tests for chemical properties of aggregates – Part 1: Chemical analysis*

BS EN 12350-6, *Testing fresh concrete – Part 6: Density*

BS EN 12390-2, *Testing hardened concrete – Part 2: Making and curing specimens for strength testing*

BS EN 12390-3, *Testing hardened concrete – Part 3: Compressive strength of test specimens*

BS EN 12390-7, *Testing hardened concrete – Part 7: Density of hardened concrete*

BS EN 12620, *Aggregates for concrete*

BS EN 12878:2014, *Pigments for the colouring of building materials based on cement and/or lime – Specifications and methods of test*

BS EN 13055-1, *Lightweight aggregates – Part 1: Lightweight aggregates for concrete, mortar and grout*

BS EN 13263-1, *Silica fume for concrete – Part 1: Definitions, requirements and conformity criteria*

BS EN 13286-51, *Unbound and hydraulically bound mixtures – Part 51: Method for the manufacture of test specimens of hydraulically bound mixtures using vibrating hammer compaction*

BS EN 14216, *Cement – Composition, specifications and conformity criteria for very low heat special cements*

BS EN 15167-1, *Ground granulated blastfurnace slag for use in concrete, mortar and grout – Part 1: Definitions, specifications and conformity criteria*

BS EN 45011, *General requirements for bodies operating product certification systems*

BS EN ISO 9001, *Quality management systems – Requirements*

BS EN ISO/IEC 17021-1, *Conformity assessment – Requirements for bodies providing audit and certification of management systems – Part 1: Requirements*

Other publications

[N1] BRITISH CEMENT ASSOCIATION (BCA). *Alkali-silica reaction – Testing protocol for greywacke aggregates – Protocol of the BSI B/517/1/20 ad hoc group on ASR*. BCA: Crowthorne, Berkshire, 1999.

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this part of BS 8500, the terms and definitions given in BS EN 206 and [BS 8500-1](#) and the following apply.

NOTE The definition of the term “site (construction site)” given in BS EN 206:2013 [\[A2\]](#) +A1:2016, [\[A2\]](#) **3.1.1.16** may be taken to include any land immediately adjacent to the contract specifically used for the purpose of setting up a batching plant.

3.1.1 cement-bound concrete

concrete suitable for vibrating plate compaction or roller compaction to a target density

NOTE Cement-bound concrete that conforms to this British Standard is concrete comprised of any cements or combination listed in [Table 7](#), which have a maximum size of aggregate of 20 mm or 40 mm, and where the aggregate conforms to the grading shown in [Table 8](#).

3.1.2 certified average alkali content

average of 25 consecutive determinations of alkali content carried out on spot samples and expressed as the sodium oxide equivalent (Na_2O eq.)

3.1.3 declared mean alkali content

alkali content expressed as the sodium oxide equivalent, which is not exceeded without prior notice from the manufacturer

NOTE It is a certified average alkali content plus a margin that reflects the manufacturer’s variability of production.

3.1.4 density of fresh concrete

mass of a quantity of compacted fresh concrete divided by its volume, expressed in kilograms per cubic metre (kg/m^3)

NOTE For the method of determining the density of fresh concrete, see BS EN 12350-6. Compaction by the method described in BS EN 12350-6 is not appropriate for semi-dry concretes. The method for determining the density of partially compacted semi-dry concrete is described in [BS 1881-129](#).

3.1.5 general suitability

suitability of each constituent for its use in concrete

NOTE 1 This term is used in BS EN 206.

NOTE 2 Where general suitability is established for a constituent, this does not indicate suitability in every intended use of the concrete and for every concrete composition.

3.1.6 guaranteed alkali limit

alkali limit, expressed as the sodium oxide equivalent (Na_2O eq.), which the constituent material supplier guarantees is not exceeded by any test result on any spot sample

3.1.7 lot

quantity of a material produced under conditions presumed uniform

NOTE After specified tests this quantity, as a whole, is regarded as conforming or not conforming to the specified requirements.

3.1.8 production day

3.1.8.1 production day (for strength testing)

day on which 20 m³ or more of concrete from a family or a designed or designated concrete outside of a family has been produced or day on which a cumulative 20 m³ has been produced since the last production day or since commencing production

3.1.8.2 production day (for air content testing)

day on which 50 m³ or more of concrete with a specified air content has been produced or day on which a cumulative 50 m³ has been produced since the last production day or since commencing production

3.1.9 production week

period of seven consecutive days comprising at least five production days or the period taken to complete five production days, whichever is longer

3.1.10 time of loading

time of first contact between cement and aggregates or, where the aggregates are surface dry, between cement and added water

3.1.11 product conformity certification

certification, based on product testing and surveillance, and approved by an accredited third-party certification body in accordance with a documented quality system

NOTE 1 Users of this part of BS 8500 are advised to consider the desirability of quality system assessment and registration against BS EN ISO 9001 by an accredited third-party certification body. Many certification bodies have this as a requirement of their product conformity certification. Further information on the provisions for assessment, surveillance and certification of production control can be found in BS EN 206:2013 ^[A2] +A1:2016 ^[A2], Annex C.

NOTE 2 Users seeking assistance in identifying appropriate conformity assessment bodies or schemes may ask BSI to forward their enquiries to the relevant association.

NOTE 3 Attention is drawn to the Department for Business, Innovation and Skills policy document, Conformity assessment and accreditation policy [1].

3.2 Symbols and abbreviations

For the purposes of this part of BS 8500, the symbols and abbreviations given in BS EN 206 and [BS 8500-1](#) apply.

4 Complementary requirements for constituent materials

4.1 General

Constituent materials that conform to the relevant European Standards cited in BS EN 206 or the relevant British Standards cited in this part of BS 8500 shall be deemed to meet the requirement that they do not contain harmful ingredients in such quantities as might be detrimental to the durability of the concrete or cause corrosion of the reinforcement, provided that the concrete conforms to any specified limits placed on it, e.g. chloride class.

Where types and classes of constituent materials are not detailed in the specification, the producer shall select constituent materials for the specified requirements.

4.2 Cement and combinations

Where cements and combinations have been specified using a broad designation, the producer shall select one of the cements or combinations from [Table 1](#) for the specified designation. Where neither a DC-class nor a specific cement or combination type is specified, the producer shall use one of the cements or combinations from [Table 1](#).

Other cements and combinations A_2 *Text deleted* A_2 shall be used only when specified or agreed with the specifier.

A_2 *NOTE* The specifier might want to use cements and combinations that are demonstrably equivalent to those listed in [Table 1](#) by application of the equivalent concrete performance concept (ECPC) as given in [4.4.3](#). A_2

4.3 Aggregates

4.3.1 General suitability

General suitability is established for the following:

- normal-weight and heavyweight aggregates conforming to BS EN 12620 and the requirements specified in [4.3.2](#);
- coarse crushed concrete aggregate (CCA) conforming to BS EN 12620 and the requirements specified in [4.3.2](#) and [4.3.3](#);
NOTE 1 In previous editions of this standard and other guidance documents, CCA was called recycled concrete aggregate (RCA).
- granulated, including pelletized, blastfurnace slag and air-cooled blastfurnace slag conforming to BS EN 12620 and the requirements specified in [4.3.2](#) and [4.3.4](#);
- lightweight aggregates conforming to BS EN 13055-1 and the requirements specified in [4.3.2](#) and [4.3.5](#); and
- reclaimed aggregate conforming to BS EN 206.

NOTE 2 Suitability is not established for coarse recycled aggregate (RA), fine RA or fine CCA. There are some requirements for coarse RA set out in [4.3.6](#) but these are not sufficient to form an adequate specification.

NOTE 3 When using the European Standards, the use of normal-weight and heavyweight aggregates should follow the recommendations given in PD 6682-1.

Table 1 — *General purpose cements and combinations*

Type	Notation	Standard	Broad designation	Grouping used in BRE SD1:2005 [2]
Portland cement	CEM I	BS EN 197-1	CEM I	A
☞ Sulfate-resisting Portland cements	CEM I-SR 0	BS EN 197-1	CEM I-SR 0	G
	CEM I-SR 3	BS EN 197-1	CEM I-SR 3	G ☞
Portland silica fume cement ^{A)}	CEM II/A-D	BS EN 197-1	IIA	A
Portland limestone cements	CEM II/A-L	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-LL	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
Portland slag cements	CEM II/A-S	BS EN 197-1	IIA	A
	CEM II/B-S	BS EN 197-1	IIB-S	A
☞ Portland natural pozzolana cements	CEM II/A-P	BS EN 197-1	IIA	A
	CEM II/B-P	BS EN 197-1	IIB-P	A
	CEM II/B-P+SR ^{C)}	BS EN 197-1	IIB-P+SR	D ☞
☞ Portland natural calcined pozzolana cements	CEM II/A-Q	BS EN 197-1	IIA	A
	CEM II/B-Q	BS EN 197-1	IIB-Q	A
	CEM II/B-Q+SR ^{D)}	BS EN 197-1	IIB-Q+SR	D ☞
Portland fly ash cements	CEM II/A-V	BS EN 197-1	IIA	A
	CEM II/B-V	BS EN 197-1	IIB-V	A
	CEM II/B-V+SR ☞ ☞ ☞	BS EN 197-1	IIB ☞ -V ☞ +SR	D
☞ Portland composite cements ^{F)}	CEM II/A-M (S-L or LL)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-M (L or LL-S)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-M (P or Q-L or LL)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-M (L or LL-P or Q)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-M (V-L or LL)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/A-M (L or LL-V)	BS EN 197-1	IIA	B ^{B)} or C ^{B)}
	CEM II/B-M (S-L or LL)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)}
	CEM II/B-M (L or LL-S)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)}
	CEM II/B-M (P or Q-L or LL)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)}
	CEM II/B-M (L or LL-P or Q)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)}
	CEM II/B-M (V-L or LL)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)}
	CEM II/B-M (L or LL-V)	BS EN 197-1	IIB-M	B ^{B)} or C ^{B)} ☞

Table 1 (continued)

Type	Notation	Standard	Broad designation	Grouping used in BRE SD1:2005 [2]
Blastfurnace cements	CEM III/A	BS EN 197-1	IIIA	A
	CEM III/A+SR ^{A2} ^{G1} ^{A2}	BS EN 197-1	IIIA+SR	D
	CEM III/B	BS EN 197-1	IIIB	A
	CEM III/B+SR ^{A2} ^{G1} ^{A2}	BS EN 197-1	IIIB+SR	F
Pozzolanic cement ^{A2} s ^{A2}	^{A2} CEM IV/B(P) ^{H1} ^{I1} ^{A2}	^{A2} BS EN 197-1 or BS EN 14216 ^{A2}	^{A2} IVB-P ^{A2}	^{A2} E ^{A2}
	^{A2} CEM IV/B(Q) ^{H1} ^{K1} ^{A2}	^{A2} BS EN 197-1 or BS EN 14216 ^{A2}	^{A2} IVB-Q ^{A2}	^{A2} E ^{A2}
	CEM IV/B(V) ^{A2} ^{L1} ^{A2}	BS EN 197-1 or BS EN 14216	IVB-V	E
	^{A2} Text deleted ^{A2}	^{A2} Text deleted ^{A2}	^{A2} Text deleted ^{A2}	^{A2} Text deleted ^{A2}
Combinations conforming to Annex A ^{A2} are manufactured in the concrete mixer. They may be combinations of Portland cement and natural pozzolana, natural calcined pozzolana, high reactivity natural calcined pozzolana, fly ash, ggbs or limestone fines. They may also be combinations of CEM II/A-L or CEM II/A-LL cement with either natural pozzolana, natural calcined pozzolana, high reactivity natural calcined pozzolana, fly ash or ggbs. ^{A2}				
^{A2} CEM I cement conforming to BS EN 197-1 with a mass fraction of 6% to 20% of combination of limestone fines conforming to BS 7979	CIIA-L	BS 8500-2, Annex A	IIA	B ^{B1} or C ^{B1}
	CIIA-LL		IIA	B ^{B1} or C ^{B1}
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6% to 20% of combination of ggbs conforming to BS EN 15167-1	CIIA-S	BS 8500-2, Annex A	IIA	A
CEM I cement conforming to BS EN 197-1 with a mass fraction of 21% to 35% of combination of ggbs conforming to BS EN 15167-1	CIIB-S	BS 8500-2, Annex A	IIB-S	A
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6% to 20% of combination of natural pozzolana conforming to BS 8615-1	CIIA-P	BS 8500-2, Annex A	IIA	A
CEM I cement conforming to BS EN 197-1 with a mass fraction of 21% to 35% of combination of natural pozzolana conforming to BS 8615-1	CIIB-P	BS 8500-2, Annex A	IIB-P	A
	CIIB-P+SR ^{G1}		IIB-P+SR	D

Table 1 (continued)

Type	Notation	Standard	Broad designation	Grouping used in BRE SD1:2005 [2]
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6% to 20% of combination of natural calcined pozzolana to BS 8615-1 or high reactivity natural calcined pozzolana conforming to BS 8615-2	CIIA-Q	BS 8500-2, Annex A	IIA	A
CEM I cement conforming to BS EN 197-1 with a mass fraction of 21% to 35% of combination of natural calcined pozzolana to BS 8615-1 or high reactivity natural calcined pozzolana conforming to BS 8615-2	CIIB-Q CIIB-Q+SR ^{D)}	BS 8500-2, Annex A	IIB-Q IIB-Q+SR	A D ^{A2)}
CEM I cement conforming to BS EN 197-1 with a mass fraction of 6% to 20% of combination of fly ash conforming to BS EN 450-1	CIIA-V	BS 8500-2, Annex A	IIA	A
CEM I cement conforming to BS EN 197-1 with a mass fraction of 21% to 35% of combination of fly ash conforming to BS EN 450-1	CIIB-V CIIB-V+SR ^{A2)} ^{B)} ^{A2)}	BS 8500-2, Annex A	IIB-V IIB ^{A2)} -V ^{A2)} +SR	A D
^{A2)} CEM II/A-L or LL conforming to BS EN 197-1 with a mass fraction of 6% to 29% of combination of ggbs conforming to BS EN 15167-1, and where the mass fraction of Portland cement clinker of combination is not less than 65%	CIIB-M (S-L or LL) ^{F)} CIIB-M (L or LL-S)	BS 8500-2, Annex A	IIB-M	B ^{B)} or C ^{B)}
CEM II/A-L or LL conforming to BS EN 197-1 with a mass fraction of 6% to 29% of combination of fly ash conforming to BS EN 450-1, and where the mass fraction of Portland cement clinker of combination is not less than 65%	CIIB-M (V-L or LL) ^{F)} CIIB-M (L or LL-V)	BS 8500-2, Annex A	IIB-M	B ^{B)} or C ^{B)}
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36% to 65% of combination of ggbs conforming to BS EN 15167-1	CIIIA CIIIA+SR ^{G)}	BS 8500-2, Annex A	IIIA IIIA+SR	A F
CEM I cement conforming to BS EN 197-1 with a mass fraction of 66% to 80% of combination of ggbs conforming to BS EN 15167-1	CIIBB CIIBB+SR ^{G)}	BS 8500-2, Annex A	IIIB IIIB+SR	A F

Table 1 (continued)

Type	Notation	Standard	Broad designation	Grouping used in BRE SD1:2005 [2]
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36% to 55% of combination of natural pozzolana conforming to BS 8615-1	CIVB-P ¹⁾	BS 8500-2, Annex A	IVB-P	E
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36% to 55% of combination of natural calcined pozzolana to BS 8615-1 or high reactivity natural calcined pozzolana conforming to BS 8615-2	CIVB-Q ¹⁾	BS 8500-2, Annex A	IVB-Q	E A2
CEM I cement conforming to BS EN 197-1 with a mass fraction of 36% to 55% of combination of fly ash conforming to BS EN 450-1	CIVB-V	BS 8500-2, Annex A	IVB-V	E
A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2
A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2
A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2
A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2
A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2	A2 Text deleted A2

Table 1 (continued)

Type	Notation	Standard	Broad designation	Grouping used in BRE SD1:2005 [2]
A) When IIA or IIA-D is specified, CEM I and silica fume may be combined in the concrete mixer using the k-value concept; see A1 BS EN 206:2013 A2 +A1:2016 A3, 5.2.5.2.3 A1. B) The classification is B if the cement or combination strength is class 42,5 or higher and C if it is class 32,5. A2 C) With a minimum proportion of natural pozzolana of 25%. The performance of CEM II/B-P cement and its equivalent combination CIIB-P are not covered by BRE SD1:2005 [2] but are categorized as 'D' on the basis that the performance of natural pozzolana in concrete is assumed to be similar to fly ash. D) With a minimum proportion of natural calcined pozzolana or high reactivity natural calcined pozzolana of 25%. The performance of CEM II/B-Q cement and its equivalent combination CIIB-Q are not covered by BRE SD1:2005 [2] but are categorized as 'D' on the basis that the performance of natural calcined pozzolana or high reactivity natural calcined pozzolana in concrete is assumed to be similar to fly ash. E) With a minimum proportion of fly ash of 25%. F) Within the brackets the constituent listed first is the constituent with the highest proportion, e.g. (LL-S) means the proportion of limestone is greater than the proportion of ggbs and (V-L) means the proportion of siliceous fly ash is greater than the proportion of limestone. G) Where the alumina content of the slag exceeds 14%, the tricalcium aluminate content of the Portland cement fraction shall not exceed 10%. H) CEM IV/A cement with natural pozzolana should be classified as either CEM II/A-P (6%–20% natural pozzolana) or CEM II/B-P (21%–35% natural pozzolana). A2 I) The performance of CEM IV/B(P) cement and its equivalent combination IV/B(P) are not covered by BRE SD1:2005 [2] but are categorized as 'E' on the basis that the performance of natural pozzolana in concrete is assumed to be similar to fly ash. J) CEM IV/A cement with natural calcined pozzolana or high reactivity natural calcined pozzolana should be classified as either CEM II/A-Q (6%–20% pozzolana) or CEM II/B-Q (21%–35% pozzolana). K) The performance of CEM IV/B(Q) cement and its equivalent combination IV/B(Q) are not covered by BRE SD1:2005 [2] but are categorized as 'E' on the basis that the performance of natural calcined pozzolana or high reactivity natural calcined pozzolana in concrete is assumed to be similar to fly ash. L) CEM IV/A cement with siliceous fly ash should be classified as either CEM II/A-V (6%–20% siliceous fly ash) or CEM II/B-V (21%–35% siliceous fly ash).				

4.3.2 Requirements for aggregates

Where D_{upper} is specified, the producer shall supply concrete with a D_{max} not greater than D_{upper} .

NOTE 1 Where D_{max} is specified, either in error or in accordance with previous editions of this standard, then the producer is likely to assume D_{max} equals D_{upper} and that a D_{lower} has not been specified. In practical terms this means that specifying D_{max} in accordance with a previous version of this standard is the same as specifying D_{max} to this edition of the standard.

Where D_{lower} is specified, the producer shall supply concrete with a D_{max} not less than D_{lower} .

The aggregate drying shrinkage shall be not more than 0.075% when determined in accordance with BS EN 12620, unless otherwise specified.