

Specification for limestone fines for use with Portland cement

ICS 91.100.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee B/516, Cement and lime, upon which the following bodies were represented:

- British Cement Association
- British Precast Concrete Federation Ltd.
- Cement Admixtures Association
- Cementitious Slag Makers Association
- County Surveyors Society
- Department of the Environment, Transport and the Regions — Building Research Establishment
- Department of the Environment, Transport and the Regions — Highways Agency
- Environment Agency
- Mortar Industry Association
- Quarry Products Association
- Society of Chemical Industry
- UK Quality Ash Association

The following organizations were also represented in the drafting of the standard, through subcommittees:

- Electricity Association

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Foreword

This British Standard has been prepared by Technical Committee B/516.

WARNING. This British Standard calls for the use of substances that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Attention is drawn to the safety precautions given in Annex A.

Annex B and Annex C are normative. Annex A and Annex D are informative.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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1 Scope

This British Standard specifies requirements for the production, chemical composition and mechanical and physical properties of limestone fines for use in combination with Portland cement class 42.5 N or greater conforming to BS EN 197-1 as a component of concrete, mortar or grout. It also specifies requirements for marking, provision of information, sampling and testing for acceptance at delivery, and conformity criteria for the manufacturer's autocontrol system.

NOTE Guidance on the use of limestone fines is given in Annex A.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 3892-1:1997, *Pulverized-fuel ash — Part 1: Specification for pulverized-fuel ash for use with Portland cement*.

BS 6100-6.1:1984, *Glossary of building and civil engineering terms — Part 1: Concrete and plaster — Section 6.1: Binders*.

BS EN 196-1:1995, *Methods of testing cement — Part 1: Determination of strength*.

BS EN 196-2:1995, *Methods of testing cement — Part 2: Chemical analysis of cement*.

BS EN 196-3:1995, *Methods of testing cement — Part 3: Determination of setting time and soundness*.

BS EN 196-7:1992, *Methods of testing cement — Part 7: Methods of taking and preparing samples of cement*.

BS EN 196-21:1992, *Methods of testing cement — Part 21: Determination of the chloride, carbon dioxide and alkali content of cement*.

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

3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS 6100-6.1:1984 and the following apply.

3.1

limestone fines

fine powder obtained from the processing of limestone

NOTE Specially selected calcareous materials with an appropriate particle size distribution can improve the physical properties (such as workability) and reduce bleeding of the concrete.

3.2

additive

constituent, other than those specified in 4.2, which is added to facilitate the production of limestone fines

3.3

lot

quantity of limestone fines, produced under conditions presumed uniform

3.4

spot sample

sample taken at one time and from one place

NOTE A spot sample may be obtained by combining one or more immediately consecutive incremental samples.

3.5

characteristic value

value of a required property outside which lies a specified percentage, P_k , of all the values of the population

3.6

single result limit value

value which, for any single test result, in the case of an upper limit is not to be exceeded or in the case of a lower limit is a minimum to be reached

4 Composition

4.1 General

Limestone fines shall be correctly prepared, i.e. selected, homogenized and comminuted depending on their state of production or delivery.

During the production of limestone fines and their control, the composition and requirements specified in this British Standard shall be maintained.

Limestone fines shall be subjected to the conformity assessment specified in Annex B.

4.2 Chemical composition

4.2.1 *Calcium carbonate*

When determined in accordance with the method given in BS EN 196-2:1995, **13.12** or **13.14**, for calcium oxide, and expressed as calcium carbonate, the calcium carbonate content shall be not less than a mass fraction of 75 % of the limestone fines.

NOTE The preferred method for this test is given in BS EN 196-2:1995, **13.12**.

4.2.2 *Chloride*

When determined in accordance with BS EN 196-21:1992, clause 4, the chloride content shall be not greater than a mass fraction of 0.10 % of the limestone fines.

NOTE BS 5328-1 gives recommendations for the maximum total chloride content of concrete mixes for various applications.

4.2.3 *Total sulfur*

When determined in accordance with BS EN 196-2:1995, national annex NA, the total sulfur content (expressed as sulfate, SO_4) shall be not greater than a mass fraction of 1.0 % of the limestone fines.

4.2.4 *Clay content*

When determined in accordance with BS EN 196-2:1995, national annex NE, the methylene blue adsorption (which indicates the clay content) shall be not greater than 1.2 g blue per 100 g of limestone fines.

4.2.5 *Organic material content*

When determined in accordance with BS EN 196-2:1995, national annex NF, the organic material content shall be not greater than a mass fraction of 0.5 % of the limestone fines.

4.3 Additives

The total quantity of additives shall not exceed a mass fraction of 1.0 % of the limestone fines.

Additives shall be acceptable for use only if they are known not to promote corrosion of the reinforcement or impair the properties of the limestone fines or of the concrete or mortar made from the combination of the limestone fines and cement.

5 Moisture content

When determined in accordance with Annex C, the moisture content shall be not greater than a mass fraction of 0.5 % of the limestone fines.

6 Compressive strength

When tested in accordance with BS EN 196-1, a combination consisting of 80 % Portland cement strength class 42.5 N conforming to BS EN 197-1, and 20 % limestone fines, shall have the following compressive strength:

- a) at 7 days, $\geq 16.0 \text{ N/mm}^2$;
- b) at 28 days, $\geq 32.5 \text{ N/mm}^2$ and $\leq 52.5 \text{ N/mm}^2$.

NOTE A recommended procedure for determining conformity to strength class criteria for combinations of limestone fines and Portland cement is given in Annex D.