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Interested committees:

Title: BS 1924-1 Unbound, hydraulically bound and stabilized materials for civil engineering purposes - Part 1:
Sampling, sample preparation and testing of materials before treatment - Test method

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Introduction

Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international and European standards, comments will be reviewed by the relevant UK national committee before submitting the consensus UK vote and comments. If the draft standard is approved, it is usual for the resulting published standard to be adopted as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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BS 1924-1, Unbound, hydraulically bound and stabilized materials for civil engineering purposes – Part 1: Sampling, sample preparation and testing of materials before treatment – Test method

IMPORTANT INFORMATION

Please note that this is a draft and not a typeset document. Editorial comments are welcomed, but persons commenting on this draft are advised not to comment on detailed matters of typography and layout.

Foreword

Publishing information

This part of BS 1924 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on XX Month XXXX. It was prepared by Subcommittee B/510/4, *Cementitious bound materials, unbound granular materials, waste materials and marginal materials*, under the authority of Technical Committee B/510, *Road materials*. A list of organizations represented on these committees can be obtained on request to the committee manager.

Supersession

This part of BS 1924 supersedes BS 1924-1:2018, which is withdrawn.

Relationship with other publications

BS 1924 is published in the following parts:

- Unbound, hydraulically bound and stabilized materials for civil engineering purposes – Part 1: Sampling, sample preparation and testing of materials before treatment – Test method
- Unbound, hydraulically bound and stabilized materials for civil engineering purposes – Part 2: Sample preparation and testing of materials during and after treatment – Test method

Information about this document

BS 1924 provides tests for soil and/or aggregate treatment employed solely or in combination: cement, granulated blast furnace slag (GBS), ground granulated blast furnace slag (GGBS), (coal) fly ash and/or lime. Granulated blast furnace slag (GBS) and GGBS are hydraulic materials that require activation by the addition of lime and/or sulfate or products that contain these compounds. Coal fly ash exists in two forms: calcareous fly ash and siliceous fly ash. The former is hydraulic, i.e. cementitious, in its own right; the latter is pozzolanic and needs activation by lime or hydraulic binders.

BS 1924 contains the full range of tests required before and after treatment, whether improvement, modification or stabilization. This standard is also suitable for the testing of hydraulically bound materials and roller compacted concrete detailed in BS 9227 and BS 9228, granular mixtures detailed in BS EN 14227-1 to BS EN 14227-5, and hydraulically stabilized soils in BS EN 14227-15.

The tests for materials in the untreated condition are given in BS 1924-1, either by reference to other British Standards or in full.

The tests for materials in the treated condition are given in BS 1924-2, either by reference to other British Standards or in full.

This is a full revision of the standard, and introduces the following principal changes:

- change of title to reflect the wider scope of this revision, which is intended to cover a greater range of materials within civil engineering applications;
- change of terminology from calcium hydroxide (hydrated lime) to calcium oxide (quicklime);
- general update to take into account new and revised standards published since 2018; and
- updating the calibration requirements of test sieves.

This revision includes all the tests, with minor exceptions, for materials treated with hydraulic binders and lime that were included in the 2018 edition.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at knowledge.bsigroup.com, or by contacting the Customer Services team.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Use of this document

It has been assumed in the drafting of this part of BS 1924 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this document are presented in roman (i.e. upright) type. Its methods are expressed as a set of instructions, a description, or 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”).

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1 Scope

This part of BS 1924 describes sampling procedures, sample preparation and preliminary tests carried out on materials in the untreated condition to assess their suitability for treatment. It includes laboratory specimen preparation up to and including the addition of the treating agent(s).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions, or limits the application, of this document¹⁾. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 593:1989, *Specification for laboratory thermometers*

BS 1377-3:2018+A1:2021, *Methods of test for soils for civil engineering purposes – Part 3: Chemical and electro-chemical tests*

BS 1924-2, *Unbound, hydraulically bound and stabilized materials for civil engineering purposes – Part 2: Sample preparation and testing of materials during and after treatment – Test method*

BS EN 932-1, *Tests for general properties of aggregates – Part 1: Methods for sampling*

BS EN 932-2, *Tests for general properties of aggregates – Part 2: Methods for reducing laboratory samples*

BS EN 932-5:2012, *Tests for general properties of aggregates – Part 5: Common equipment and calibration*

BS EN 933-1, *Tests for geometrical properties of aggregates – Part 1: Determination of particle size distribution – Sieving method*

BS EN 1097-2, *Tests for mechanical and physical properties of aggregates – Part 2: Methods for the determination of resistance to fragmentation*

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

BS EN 12620, *Aggregate for concrete*

BS EN 14227-4, *Hydraulically bound mixtures – Specifications – Part 4: Fly ash for hydraulically bound mixtures*

BS EN ISO 3611, *Geometrical product specifications (GPS) – Dimensional measuring equipment: Micrometers for external measurements – Design and metrological characteristics*

BS EN ISO 3696, *Water for analytical laboratory use – Specification and test methods*

BS EN ISO 4787, *Laboratory glassware – Volumetric instruments — Methods for testing of capacity and for use*

BS EN ISO 10012, *Measurement management systems – Requirements for measurement processes and measuring equipment*

BS EN ISO 17025, *General requirements for the competence of testing and calibration laboratories*

BS EN ISO 17892-4, *Geotechnical investigation and testing – Laboratory testing of soil – Part 4: Determination of particle size distribution*

BS ISO 3310-1, *Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth*

BS ISO 3310-2, *Test sieves – Technical requirements and testing – Part 2: Test sieves of perforated metal plate*

¹⁾ Documents that are referred to solely in an informative manner are listed in the Bibliography.

3 Terms and definitions

For the purposes of this part of BS 1924, the following terms and definitions apply.

3.1 batch

definite quantity of material produced under conditions which are presumed uniform

3.2 bulk sample

Aggregation of the sampling increments

3.3 clay

fraction composed of particles smaller in size than 0.002 mm

3.4 cohesive material

material which by virtue of its clay (3.3) content forms a coherent mass

3.5 compaction

process of packing treated particles more closely together by rolling or mechanical means, thus increasing the dry density of a treated material

3.6 hydraulic binder

material or a combination of materials that set and harden by chemical reaction with water and remain stable, even under water

NOTE 1 Within this part of BS 1924, the term “treating agent” is used to include hydraulic binder.

NOTE 2 Hydraulic binders include cements, (coal) fly ash, granulated blast furnace slag (GBS), ground granulated blast furnace slag (GGBS) and hydraulic road binder.

3.7 hydraulically bound material

mixture of soil or graded granular material with hydraulic binder (3.6) that sets and hardens by hydraulic reaction

NOTE Hydraulically bound material includes stabilized soils and mixtures defined in BS EN 14227. The mixtures defined in BS EN 14227 are hydraulically bound granular mixtures and hydraulically stabilized soils. Within BS 1924 the terms “treated material” and “untreated material” are used to differentiate materials with or without treating agent. Treating agents include cement, (coal) fly ash, granulated blast furnace slag (GBS), ground granulated blast furnace slag (GGBS), hydraulic road binder and/or lime.

3.8 improvement

operation which, in the short term, improves the physical properties of a soil or material by the addition of a treating agent

NOTE 1 Physical properties that can be improved include water content, plasticity, water and frost susceptibility, compactability and swelling potential.

NOTE 2 The quantity of treating agent added might not be sufficient to induce significant permanent properties.

NOTE 3 The purpose is to enable the soil to provide one or more of the following:

- *the ability to be handled by conventional earthmoving equipment;*
- *the ability to be satisfactorily compacted in layers;*
- *the ability to be trafficked and provide a working platform for the superimposed layer;*
- *the preparation of material for a subsequent treatment.*

3.9 laboratory sample

sample intended for laboratory inspection or testing

3.10 lime

quicklime (calcium oxide) which can be used in combination with other products in a hydraulic binder (3.6) or on its own for improvement (3.8)