

BS 1881-124:2015+A1:2021



BSI Standards Publication

Testing concrete

Part 124: Methods for analysis of hardened concrete

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Summary of pages

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Foreword

Publishing information

This part of BS 1881 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 August 2015. It was prepared by Subcommittee B/517/1, *Concrete production and testing*, under the authority of Technical Committee B/517, *Concrete and related products*. A list of organizations represented on these committees can be obtained on request to the committee manager.

Supersession

BS 1881-124:2015+A1:2021 supersedes BS 1881-124:2015, which is withdrawn.

Relationship with other publications

The BS 1881 series contains test methods for concrete currently used in the United Kingdom which are not covered by [BS EN 12350](#), [BS EN 12390](#) and [BS EN 12504](#).

Reference is made to the relevant part of [BS EN 12350](#), [BS EN 12390](#) and [BS EN 12504](#) where appropriate. These test methods may be used in conjunction with BS EN 206.

BS 1881, Testing concrete, is published in the following parts:

- [BS 1881-113](#), *Method for making and curing no-fines test cubes*
- [BS 1881-119](#), *Method for determination of compressive strength using portions of beams broken in flexure (equivalent cube method)*
- [BS 1881-122](#), *Method for determination of water absorption*
- BS 1881-124, *Methods for analysis of hardened concrete*
- [BS 1881-125](#), *Methods for mixing and sampling fresh concrete in the laboratory*
- [BS 1881-129](#), *Method for the determination of density of partially compacted semi-dry fresh concrete*
- [BS 1881-130](#), *Method for temperature-matched curing of concrete specimens*
- [BS 1881-131](#), *Methods for testing cement in a reference concrete*
- [BS 1881-204](#), *Recommendations on the use of electromagnetic covermeters*
- [BS 1881-206](#), *Recommendations for determination of strain in concrete*
- [BS 1881-207](#), *Recommendations for the assessment of concrete strength by near-to-surface tests*
- [BS 1881-208](#), *Recommendations for the determination of the initial surface absorption of concrete*
- [BS 1881-209](#), *Recommendations for the measurement of dynamic modulus of elasticity*
- [BS 1881-210](#), *Determination of the potential carbonation resistance of concrete – Accelerated carbonation method*

Information about this document

A1 Text deleted A1

Text introduced or altered by Amendment No. 1 is indicated in the text by tags A1 A1. Minor editorial changes are not tagged.

Amendment 1 introduces the following principle changes:

- [Annex A](#) has been replaced and additional tables included.

 Copyright is claimed on [Table A.1](#), [Table A.2](#), [Table A.3](#), [Table A.4](#) and [Table A.5](#). The copyright holder is The Concrete Society, Riverside House, 4 Meadows Business Park, Station Approach, Blackwater, Camberley, Surrey, GU17 9AB. 

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 and irritant contact dermatitis, to severe burns in cases of prolonged exposure. 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 sometime 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.

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.

1 Scope

This part of BS 1881 describes sampling procedures, treatment of samples and analytical methods to determine the cement content, aggregate content, aggregate grading, original water content, type of cement, type of aggregate, chloride content, sulfate content and alkali content of a sample of concrete.

The procedures are applicable to concretes made with CEM I cements and, in favourable circumstances, concretes containing ground granulated blastfurnace slag (GGBS).

This part of BS 1881 does not cover the analysis of concretes made with other cements and the determination of fly ash content.

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.

BS 410-1:2000, *ISO 3310-1:2000 – Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth*

BS 8500 (all parts), *Concrete – Complementary British Standard to BS EN 206*

BS EN 196-2:2013, *Methods of testing cement – Part 2: Chemical analysis of cement*

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

BS EN 206, *Concrete – Specification, performance, production and conformity*

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

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

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

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

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

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

BS EN ISO 1042, *Laboratory glassware – One-mark volumetric flasks*

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*

3 Terms and definitions

For the purposes of this part of BS 1881, the terms and definitions given in BS 8500 (all parts) and BS EN 206 apply.

4 Sampling

COMMENTARY ON CLAUSE 4

The tests in this part of BS 1881 are usually applied only when there is some uncertainty about the quality of the concrete (for example, the average quality of a mass of concrete or the quality of a particular part of this mass might be in question). The size of the mass can vary greatly and the sampling techniques necessary to provide information on the quality of a concrete are determined by the form of the concrete (for example, the requirements for a concrete retaining wall and for a concrete backing to a decorative panel can be quite different). For these reasons it is extremely difficult to specify how a sample should be taken and no requirements can be given.

No sample should be taken for testing without agreement between the interested parties about the method of taking the sample and the quantity of material that is considered to be represented by the sample (see 4.2).

4.1 Selection of sample

When selecting a concrete sample ensure that:

- a) the minimum linear dimension of the sample is at least five times that of the nominal maximum aggregate size;
- b) the sample is in a single piece and has no evidence of fracture cracking apparent, if original water content is to be determined;
- c) the mass is not less than 1 kg in any case, not less than 2 kg if the original water content is to be determined, and not less than 4 kg if aggregate grading is to be determined;

NOTE The minimum mass of the sample is determined by testing requirements.

- d) foreign matter and reinforcements are avoided unless they are subject to test;
- e) the sample is indelibly labelled with full particulars, including the date, exact position from which the sample was taken, the method of sampling and any other relevant information; and
- f) the sample is sealed or tied securely into a heavy-duty polyethylene bag.

4.2 Number of samples

When information about the composition of concrete with a volume of up to 6 m³ is required, take not less than 2 (preferably 4) representative and independent samples and analyse them separately.

When very large volumes of concrete or large numbers of concrete units are to be examined, take not less than 10 independent samples and analyse them separately.

NOTE The results can then be used to identify locations requiring more extensive investigation.

4.3 Additional material

COMMENTARY ON 4.3

In addition to the concrete samples, information on the composition of all the constituent materials improves the accuracy of the test results.

Where they are available, take representative samples of all the constituents of the concrete used in accordance with the relevant British Standard (i.e. aggregates BS EN 932-1; cement BS EN 196-7; GGBS BS EN 15167-1; fly ash BS EN 450-1; silica fume BS EN 13263-1; admixture BS EN 934-2).

Enclose the samples in heavy-duty polyethylene bags that are clearly labelled and sealed or tied securely.

Where such samples are not available, provide any information on the source and nature of these materials that might be useful to the test(s) being carried out, such as acid-soluble material content in aggregates; soluble silica and calcium oxide contents in cement, aggregates and additions.

4.4 Documentation of sampling

With each sample provide a document signed by the person responsible for taking it, stating that sampling was carried out in accordance with this part of BS 1881¹⁾ and including the following information:

- a) the date and time of sampling;
- b) a description of the structure or component under investigation;
- c) the location of the positions from which the concrete samples were taken;
- d) the method of sampling;
- e) details of the concrete, in particular its age, where known;
- f) the identification of the samples (including orientation, see [5.3](#));
- g) the name of the sampler; and
- h) the signature of the person responsible for sampling.

5 Treatment of samples

5.1 Apparatus

5.1.1 *Ventilated oven*, controlled to maintain a temperature of $(105 \pm 5) ^\circ\text{C}$.

5.1.2 *Crushing and grinding equipment*.

NOTE Jaw crushers, hammer mills, disc grinders, gyratory mills and mechanical or hand-operated mortars and pestles are examples of suitable equipment.

5.1.3 *125 μm test sieve*, conforming to BS 410-1 (BS ISO 3310-1) or [BS ISO 3310-2](#), complete with the appropriate size of lid and receiver.

NOTE Similar test sieves with apertures of 4.0 mm, 2.0 mm and 500 μm are also required if mechanical crushing and grinding is not used (see [5.5.2](#)).

5.1.4 *Permanent bar magnet*.

5.1.5 *Airtight bottles*, made of glass or plastics and with a capacity of 100 mL to 500 mL.

5.1.6 *Saw*, fitted with a diamond or carborundum blade, when original water content is to be measured.

5.1.7 *Device for sample reduction*, e.g. a riffle box.

5.2 Density

5.2.1 When the content of constituents, determined as a percentage by mass of the oven-dried ($105 ^\circ\text{C}$) concrete, is to be converted to kg/m^3 of concrete, measure the oven-dried ($105 ^\circ\text{C}$) density of a single sound piece of concrete before starting any work involving breakdown of the concrete samples.

5.2.2 Determine the volume (V_3) of the sample by water displacement and its oven-dried density (ρ_9) in accordance with BS EN 12390-7.

¹⁾ Marking BS 1881-124 on or in relation to a sample represents a declaration of conformity, i.e. a claim by or on behalf of the person responsible for sampling that the sampling meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

5.3 Determination of original water content

5.3.1 Cut a slice approximately 20 mm thick to produce a single face area of not less than 10 000 mm² from the sample with two parallel cuts, preferably with a diamond saw (5.1.6), avoiding as far as possible loss of material out of the cut faces.

5.3.2 Saw from top to bottom of the concrete as cast where this can be identified.

NOTE For horizontally-drilled cores from columns, walls, etc., that are more than 1 m high, the slice may be cut parallel to the axis of the core to provide a specimen of adequate size.

5.3.3 Test samples that have a cross-sectional area of less than 2 500 mm², e.g. 50 mm cubes or 50 mm diameter cylinders or cores, for water content without sawing before the test for cement content.

5.3.4 To reduce carbonation of the concrete, store specimens in airtight containers until they are ready for testing.

5.4 Nature of aggregate

Examine the concrete sample (see 10.3), and broadly classify both coarse and fine aggregate under the following headings:

- a) type I: natural aggregates essentially insoluble in dilute hydrochloric acid;
- b) type S: natural aggregates largely soluble in dilute hydrochloric acid; and
- c) type O: other aggregates.

5.5 Preparation of test samples

5.5.1 Initial treatment

5.5.1.1 Break up the sample into lumps not larger than approximately 50 mm in size, avoiding as far as possible fracture of the aggregate.

5.5.1.2 Dry the lumps in the oven (5.1.1) at (105 ± 5) °C for at least 15 h and continue until constant mass is achieved.

NOTE Constant mass is achieved when successive weighings after drying at least 1 h apart do not differ by more than 0.1%, or the mass does not change by more than 0.2% in any 24 h period.

5.5.1.3 Allow the lumps to cool to room temperature.

5.5.1.4 Divide the sample into two portions, A and B, so that portion A is approximately three-quarters of the bulk and portion B is the remainder, ensuring as far as possible that each portion is representative of the whole.

5.5.2 Treatment of portion A

COMMENTARY ON 5.5.2

Avoid the loss of material (particularly dust), during the crushing and grinding operations. Avoid excessive particle size reduction during the preparation of the analytical sample. The crushing, grinding and following operations should be carried out as quickly as possible so that the sample is exposed to atmospheric carbon dioxide for the minimum time.

A major source of error in the analysis of hardened concrete is inadequate sample preparation.

A suitable procedure to provide a representative sub-sample of not less than 20 g of ground material, all passing a 125 µm sieve, to be used as the analytical sample is as follows.

- 5.5.2.1** Using suitable crushing and grinding equipment ([5.1.2](#)), crush portion A until it all passes a 4.0 mm sieve (see [5.1.3](#), Note).
- 5.5.2.2** Using a riffle box or by equivalent means ([5.1.7](#)), subdivide this to produce a sub-sample weighing between 500 g and 1 000 g.
- 5.5.2.3** Crush this sub-sample such that it can pass through a 2.0 mm sieve (see [5.1.3](#), Note) and reduce by two separate subdividing operations, discarding one half on each occasion.
- 5.5.2.4** Crush the whole of the remaining part such that it can pass through a 500 µm sieve (see [5.1.3](#), Note) and again reduce by two separate subdividing operations, discarding one half on each occasion.
- 5.5.2.5** Crush the whole of the remaining part such that it can pass through a 125 µm sieve ([5.1.3](#)).

NOTE 1 When mechanical means of crushing and grinding are used some of these stages may be bypassed. For example, the initial crushing of portion A might yield a product passing a 1 mm sieve. In this case the subdivision before the next stage should provide a sub-sample of between 100 g and 200 g. This may then all be ground in a suitable grinder to pass a 125 µm sieve.

NOTE 2 Before the final grinding operation, the material in the sub-sample which passes a 125 µm sieve should be removed by sieving, and reserved and recombined with the ground fraction. If a number of passes through the grinding apparatus is required, this removal of fine material should be done each time.

- 5.5.2.6** Remove any metallic iron from the analytical sample by placing it in a porcelain evaporating basin or similar container and then stirring with a permanent bar magnet ([5.1.4](#)).
- 5.5.2.7** Transfer the analytical sample to a clean dry bottle with an airtight closure ([5.1.5](#)) and thoroughly mix the sample by tumbling, rolling or shaking for at least 2 min.
- 5.5.2.8** When aggregate control samples are available, dry and grind them by the same method as that used for the concrete.

5.5.3 Treatment of portion B

Retain portion B in an airtight bottle for use in the tests in [Clause 8](#), [Clause 10](#) and [Clause 11](#).

6 Cement and aggregate content

COMMENTARY ON CLAUSE 6

The closeness of agreement between the cement and aggregate contents, determined by the methods for analysis described in this part of BS 1881, and the actual values depends on a knowledge of the chemical composition of these constituents of the concrete (see [6.4](#) to [6.8](#)).

If the procedure given in [6.5](#) is being used, the method for the extraction of soluble silica described in [6.5.1](#) should be followed exactly.

Methods of proven accuracy are given for other determinations. Alternative methods for the determination of the following may be used:

- calcium oxide (see [6.5.4](#)), e.g. by atomic absorption spectrophotometry;
- soluble silica (see [6.5.3](#)), e.g. by atomic absorption spectrophotometry;
- loss on ignition (see [6.6](#)), e.g. by thermogravimetry;
- carbon dioxide (see [6.7](#)), e.g. by instrumental methods; and
- sulfide (see [6.8](#)), e.g. by instrumental methods, provided evidence is documented that such methods give equivalent results.

NOTE 1 The precision with which the analytical methods can be carried out, in terms of repeatability by one operator in one laboratory and reproducibility between different operators in different laboratories, has been determined for cement content (see [Annex A](#)). In the case of this precision experiment, the actual cement and aggregates used to make the concrete were available and the calculated mean cement contents were found to be close to the actual cement contents.

NOTE 2 In cases where samples of the original constituents of the concrete are not available for analysis, the agreement between observed and actual contents of cement and aggregate depends on the validity of the assumptions made on the composition of the materials present in the concrete sample (see [6.9.8](#) and [Annex B](#)). For example, an error of 1% in the assumed calcium oxide content of an aggregate is equivalent to an error of about 35 kg/m³ in the calculated cement content. Similarly, a 1% error in the assumed soluble silica content is equivalent to an error of approximately 110 kg/m³.

6.1 General

Use one or more of the methods detailed in this clause as appropriate.

Make duplicate analyses unless a series of concrete samples from a single batch is being tested. Carry out duplicate analyses from the sample preparation stage, i.e. two analytical samples ([5.5.1](#)) shall be prepared and each analysed separately.

Wherever possible, obtain representative samples of all the constituents used in making the concrete and carry chemical analyses on them in a similar manner to that described for the concrete analytical sample.

6.2 Reagents

6.2.1 General

Use reagents of analytical reagent quality and distilled or deionized water.

NOTE 1 Dilutions of acids and other liquid reagents are given as (1 + n) which indicates that one volume of the concentrated reagent is added to n volumes of water and mixed.

Filter solutions that are not transparent. Prepare the reagents in accordance with [6.2.2](#) to [6.2.18](#).

NOTE 2 Proprietary reagents of equal quality may be used as alternatives.

6.2.2 Ammonium chloride solution, 1 g/L

Dissolve 1 g of ammonium chloride in 1 L of water.

6.2.3 Calcein (screened) indicator

Mix, by grinding together, 0.2 g of calcein, 0.12 g of thymolphthalein and 20 g of potassium chloride.

6.2.4 Calcium standard solution, approximately 1.00 g CaO/L

6.2.4.1 Weigh between 1.78 g and 1.79 g of pure calcium carbonate dried at a temperature in the range 150 °C to 200 °C and record the mass to the nearest 0.000 1 g.

6.2.4.2 Dissolve in a slight excess of dilute hydrochloric acid (1 + 4) ([6.2.9](#)), boil to expel carbon dioxide, cool and dilute to 1 L in a volumetric flask.

6.2.4.3 Express the concentration of CaO in g/L to three significant figures as mass of CaCO₃/1.784 8.

6.2.5 Triethanolamine solution (1 + 4)

6.2.6 Sodium hydroxide solution, 200 g/L

Dissolve 200 g of sodium hydroxide in 1 L of water.

6.2.7 EDTA standard solution

- 6.2.7.1** Dissolve 6.67 g of EDTA (ethylenediaminetetraacetic acid, disodium dihydrate salt) in warm water, filter if necessary, cool and dilute to 1 L. Store in a polyethylene bottle.
- 6.2.7.2** To standardize against standard calcium solution pipette 25 mL of the calcium standard solution (6.2.4) into a 250 mL beaker or flask, add 10 mL of triethanolamine solution (6.2.5) and 10 mL of sodium hydroxide solution (6.2.6), and dilute to about 150 mL.
- 6.2.7.3** Add approximately 0.15 g calcein indicator (6.2.3) and titrate with the EDTA solution until the fluorescent green of the indicator completely changes to pink-purple with no residual fluorescence.
- NOTE The end-point is more easily seen if observed against a black background.*
- 6.2.7.4** Calculate the CaO equivalent of the EDTA, E , (in mg CaO/mL) from the expression:

$$E = \frac{25 \times h}{t}$$

where:

- h is the concentration of CaO in the standard calcium solution (in g/L);
 t is the volume of EDTA required in the titration, to the nearest 0.05 mL.

6.2.8 Hydrochloric acid, relative density 1.18

6.2.9 Hydrochloric acid, dilute, (1 + 1), (1 + 4), (1 + 9) and (1 + 49)

6.2.10 Polyacrylamide solution, 1 g/L

Add 0.1 g of polyacrylamide, molecular weight about 5×10^6 , to 100 mL of water. Stir using a mechanical stirrer until dissolved (see 6.3.1, Note).

6.2.11 Polyethylene oxide solution, 2.5 g/L

Slowly add 0.5 g of polyethylene oxide, molecular weight less than 1×10^6 , to 200 mL of water, stirring using a mechanical stirrer until dissolved. Discard after two weeks.

6.2.12 Sodium carbonate solution, 50 g/L

Dissolve 50 g of anhydrous sodium carbonate in 1 L of water.

6.2.13 Orthophosphoric acid, relative density 1.7

NOTE This is used when carbon dioxide is to be determined.

6.2.14 Starch solution

Suspend 1 g of starch in 5 mL of cold water and add to 100 mL of boiling water. After cooling, add a solution of 1 g of sodium carbonate in 10 mL of water and 3 g of potassium iodide.

NOTE This is used when sulfur as sulfide is to be determined.

6.2.15 Potassium iodate standard solution

NOTE This is used when sulfur as sulfide is to be determined.

- 6.2.15.1** Dry pure potassium iodate at $(120 \pm 5)^\circ\text{C}$, and allow to cool in a desiccator.
- 6.2.15.2** Dissolve between 1.112 g and 1.113 g of the potassium iodate with 12 g of potassium iodide and two pellets of sodium hydroxide in freshly boiled and cooled water.

- 6.2.15.3** Dilute the solution to 1 000 mL in a volumetric flask, mix and store in a glass-stoppered bottle. 1 mL of this solution is equivalent to 0.5 mg sulfide.

NOTE This potassium iodate solution is stable for several months.

6.2.16 Sodium thiosulfate solution

NOTE This is used when sulfur as sulfide is to be determined.

- 6.2.16.1** Dissolve 7.4 g of sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$) in water and make up to 1 L. Standardize this solution in accordance with [6.2.16.2](#) to [6.2.16.4](#).
- 6.2.16.2** Pipette 20 mL of the potassium iodate standard solution ([6.2.15](#)) into a 500 mL beaker or flask, dilute to approximately 300 mL with water and add 40 mL of dilute hydrochloric acid (1 + 1) ([6.2.9](#)).
- 6.2.16.3** Immediately titrate with the sodium thiosulfate solution until the colour of the liquid becomes a pale yellow and then add 2 mL of the starch solution ([6.2.14](#)). Continue the titration until the solution changes from blue to colourless.
- 6.2.16.4** Record the volume, V , of sodium thiosulfate solution required to the nearest 0.01 mL.
- 6.2.16.5** Calculate the factor, T , of the sodium thiosulfate solution from the expression:

$$T = \frac{20}{V}$$

6.2.17 Stannous chloride, solid ($\text{SnCl}_2 \cdot 2\text{H}_2\text{O}$)

NOTE This is used when sulfur as sulfide is to be determined.

6.2.18 Ammoniacal zinc sulfate solution

NOTE This is used when sulfur as sulfide is to be determined.

- 6.2.18.1** Dissolve 50 g of zinc sulfate ($\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$) in 150 mL of water and 350 mL of concentrated ammonium hydroxide solution.
- 6.2.18.2** Allow to stand for at least 24 h and filter.

6.3 Apparatus

6.3.1 General apparatus, comprising the apparatus listed in [6.3.1.1](#) to [6.3.1.6](#).

NOTE It is assumed that laboratories carrying out these tests are equipped with basic apparatus such as analytical balances, beakers, volumetric flasks, pipettes, burettes, filtration apparatus, magnetic and mechanical stirrers, etc. Only apparatus needed specifically for the determinations necessary to analyse hardened concrete is therefore listed. The filter papers used should be ashless.

- 6.3.1.1** Volumetric glassware, with an accuracy of class B or better in accordance with BS EN ISO 1042.
- 6.3.1.2** 250 mL polypropylene beakers.
- 6.3.1.3** Plastic stirring rods.
- 6.3.1.4** Furnace(s), controlled to maintain temperatures of $(925 \pm 25)^\circ\text{C}$ and $(1\,200 \pm 50)^\circ\text{C}$.
- 6.3.1.5** Boiling water or steam bath.
- 6.3.1.6** Desiccator, containing dried magnesium perchlorate.

6.3.2 Apparatus for the determination of carbon dioxide, which shall be free from leaks.

NOTE A typical apparatus is shown in [Figure 1](#).