BRITISH STANDARD

BS 3900-B15: 1987

Methods of test for paints

Part B15: Rapid method for estimation of lead in liquid paints

It is recommended that this Part be read in conjunction with the general information in the Introduction to BS 3900, issued separately

Confirmed October 2008

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Foreword

This Part of BS 3900 has been prepared under the direction of the Pigments, Paints and Varnishes Standards Committee.

The method of test described in this Part is a rapid procedure for the estimation of the amount of lead, within the range of 0.01 % (*m*/*m*) to 0.1 % (*m*/*m*), contained in liquid paint.

The result obtained enables a decision to be taken as to whether the estimated lead content justifies an accurate determination of the content by one of the methods described in Part B4 of this British Standard.

Part B4 of BS 3900 describes two methods for the determination, in the liquid product, of the total lead content of paints or similar materials using flame atomic absorption spectroscopy. The referee method for the determination of lead in the range of about 0.01 % (*m*/*m*) to 2 % (*m*/*m*) uses a dry ashing procedure to obtain the test solution. An alternative method uses a wet oxidation procedure.

It has been assumed in the drafting of this standard that it will be used and applied by those who are appropriately qualified and experienced.

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.

This British Standard, having been prepared under the direction of the Pigments, Paints and Varnishes Standards Committee, was published under the authority of the Board of BSI and comes into effect on 27 February 1987

The Committees responsible for this British Standard are shown in BS 3900: Introduction

The following BSI references relate to the work on this standard:
Committee reference PVC/10
Draft for comment 85/55930 DC

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

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1 Scope

This Part of BS 3900 describes a method for the rapid examination of liquid paint to ascertain the level of lead present in the range 0.01 % (*m*/*m*) to 0.1 % (*m*/*m*).

The method is not applicable to those paints or similar products (e.g. fillers and putties) that do not allow a drop of the required diameter to be spotted onto a hardened filter paper. It is applicable principally to the general range of decorative and industrial paints.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 3900, the definitions given in BS 2015 apply.

3 Principle

A small drop of the paint sample is spotted onto a hardened filter paper and the lead present estimated by flame atomic absorption spectroscopy.

4 Apparatus and materials

4.1 *Flame atomic absorption (A.A.) spectrophotometer,* suitable for measurements at a wavelength of 283.3 nm and fitted with a burner fed with acetylene and air.

4.2 *Lead spectral source* comprising either a lead hollow-cathode lamp or lead discharge lamp.

4.3 *Potentiometer chart recorder*

4.4 *Acetylene*, commercial grade, in a steel cylinder.

4.5 *Compressed air*

4.6 *Hardened filter paper*

NOTE Whatman No. 541 has been found to be satisfactory.

4.7 *Glass rod*, of sufficiently small diameter such that, when a drop of the paint is allowed to fall from it onto the hardened filter paper (**4.6**), it produces a spot of 4.5 ± 0.5 mm diameter.

4.8 *Pair of tongs*

4.9 *Reference paints*, as follows:

a) paint A containing a lead content, as Pb, of approximately 100 mg/kg;

b) paint B containing a lead content, as Pb, of approximately 500 mg/kg;

c) paint C containing a lead content, as Pb, of approximately 1 000 mg/kg.

The actual lead content of each of these paints shall be determined using the referee method described in BS 3900-B4.

5 Instrument calibration

5.1 Install the lead spectral source (**4.2**) in the spectrophotometer (**4.1**) and optimize the conditions for the determination of lead. Adjust the instrument in accordance with the manufacturer's instructions, and adjust the monochromator to the region of 283.3 nm wavelength in order to obtain the maximum response. Lower the burner of the spectrophotometer to its minimum height. Adjust the flow of the acetylene (**4.4**) and of the compressed air (**4.5**) according to the characteristics of the aspirator and burner, and ignite the flame.

5.2 As described in **7.2**, prepare a test strip of hardened filter paper and apply a drop of paint C [**4.9** c)]. Using the pair of tongs (**4.8**), insert the paint spot on the test strip into the flame, as shown in Figure 1, and adjust the instrument's conditions, so that the peak shown on the potentiometer chart recorder (**4.3**) is as close as possible to the maximum width of the chart recorder paper.

Repeat this procedure until three successive test strips give the same response to within 5 %.

5.3 Without further adjustment of the instrument's conditions, carry out the procedure described in **7.2** to **7.4** for paint A [**4.9** a)], paint B [**4.9** b)] and paint C [**4.9** c)] to establish their peak heights.

5.4 Calculate for each peak, by proportion to the lead content, as Pb, of the reference paint, the response corresponding to 100 mg/kg, 500 mg/kg or 100 mg/kg as appropriate, and mark these adjusted responses A, B or C on the chart (see Figure 2).

6 Sampling

Take a representative sample of the product to be tested as described in BS 3900-A1.

Examine and prepare the sample as described in BS 3900-A2.

7 Procedure

7.1 Carry out this determination in triplicate.

7.2 Cut a strip, approximately 12 mm × 38 mm, from the hardened filter paper.

Dip the glass rod (**4.7**) into the paint sample (clause **6**), previously stirred until homogeneous. Withdraw the glass rod and allow a drop of the paint to fall from the rod onto the hardened filter paper, centred at the position shown in Figure 3, to produce a spot of 4.5 ± 0.5 mm diameter. Fold the strip centrally along its length (see Figure 3).

NOTE Thixotropic paints, even after vigorous stirring, may present difficulties in forming a spot of the specified size.

7.3 Using the pair of tongs, insert the paint spot on the strip into the flame of the spectrophotometer as described in **5.2**, maintaining the established operating conditions. Note the response on the potentiometer chart recorder.

7.4 Repeat the procedure described in **7.2** and **7.3** until three responses agree to within 5 %. If the variation in response exceeds 5 %, check the instrument calibration (**5.2**).

8 Assessment of results

8.1 Compare each response obtained for the product under test with the adjusted responses A, B and C obtained as described in clause **5** and as illustrated in Figure 2. Assess the product under test by reference to Table 1.

Table 1 — Paint categorization

Lead content, as Pb	Category
mg/kg	
$\leqslant$ 100	1
> 100 but $\leqslant$ 500	2
> 500 but $\leqslant$ 1 000	3

8.2 Record the category appropriate to the lead content indicated by the response on the potentiometer recorder chart. Alternatively, record the lead content, as Pb, as "below/above *x* mg/kg", where *x* is the maximum permitted lead content in the relevant product specification or legislation.

NOTE By consideration of the category assigned to the product under test, a decision may be made as to whether, in view of the lead content permitted in the product specification or legislation, the lead content should be verified by the method described in BS 3900-B4. Unless previous experience indicates otherwise, if the lead content, as estimated by the method given in this Part, is greater than 50 % of the specified limit, the accurate quantitative determination is recommended.

9 Test report

The test report shall contain the following information:

a) the type and identification of the product under test;

b) reference to this standard, i.e. BS 3900-B15;

c) the stated requirements given in the relevant product specification or legislation;

d) any supplementary information provided with regard to c) of this clause;

e) the results of the test in accordance with clause **8**;

f) any deviation, agreed or otherwise, from the test procedure described;

g) the date of the test.

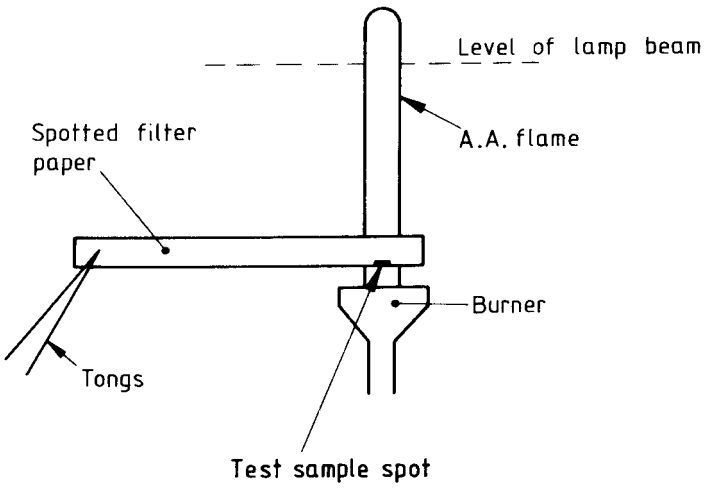
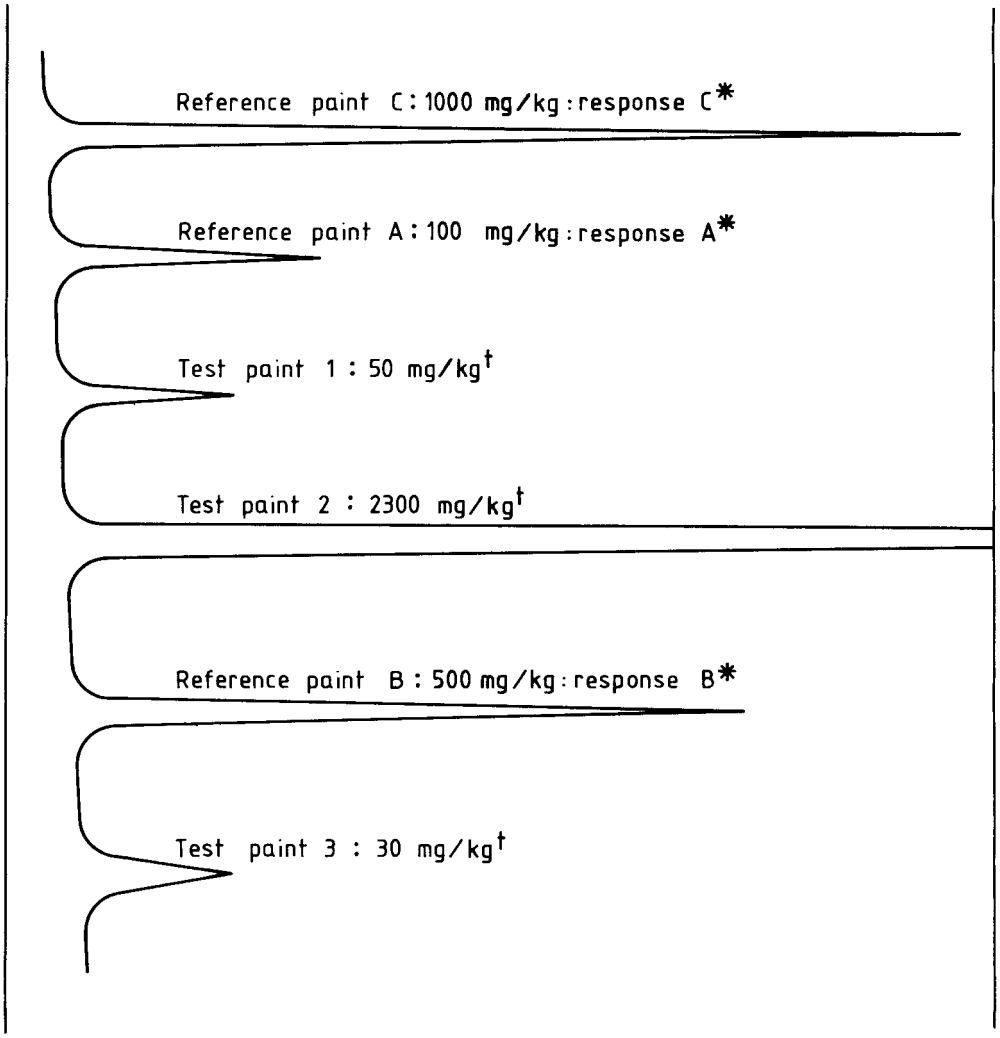


Figure 1 — Position of test strip in the flame



*Calibration adjusted to account for actual values determined.
†Included as an example only.

Figure 2 — Typical recorder traces

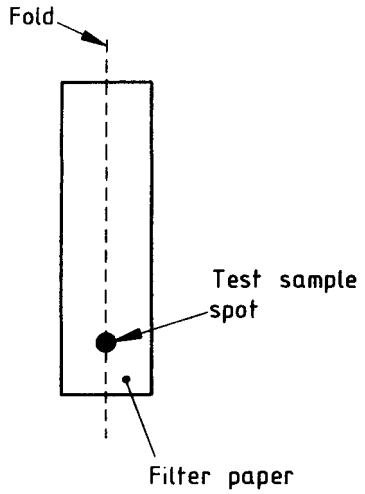


Figure 3 — Sample preparation

Publications referred to

BS 2015, *Glossary of paint terms.*
BS 3900, *Methods of test for paints.*
BS 3900-A1, *Sampling.*
BS 3900-A2, *Examination and preparation of samples for testing.*
BS 3900-B4, *Determination of total lead in paints and similar materials.*

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