

British Standard Methods for testing pigments for paints

Part A3. Comparison of resistance to light of coloured pigments of similar types under specified light sources

[ISO title: General methods of test for pigments and extenders — Part 15: Comparison of resistance to light of coloured pigments of similar types]

Méthodes d'essai des pigments dans les peintures

Partie A3. Comparaison de la résistance à la lumière de pigments colorés de types semblables exposés à de sources de lumière spécifiées

Verfahren zur Prüfung von Pigmenten für Anstrichstoffe

Teil A3. Vergleich der Lichtbeständigkeit von Buntpigmenten ähnlichen Typs

This Part should be read in conjunction with the General Introduction to BS 3483 issued separately.

National foreword

This revision of Part A3 of BS 3483 has been prepared under the direction of the Pigments, Paints and Varnishes Standards Committee. It is identical with ISO 787/15-1986 'General methods of test for pigments and extenders — Part 15 : Comparison of resistance to light of coloured pigments of similar types' published by the International Organization for Standardization (ISO). This revision supersedes BS 3483 : Part A3 : 1974, which is withdrawn.

BS 3483 : Part A3 was first published in 1974 and this first revision brings the standard into line with international agreements by implementing the ISO standard as an identical British Standard. The main changes in this edition are as follows:

- (a) the natural light and artificial light sources and exposures are both specified;
- (b) comparisons under natural light exposure for light fastness are recommended to be compared using the blue wool scale to assist evaluation;
- (c) the referencing to the grey scale has been updated.

It has been assumed in the drafting of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people.

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline of the decimal marker.

Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'British Standard', 'this part of ISO 787' should be read as 'this Part of BS 3483', and 'ISO 787/15' should be read as 'BS 3483 : Part A3'.

Cross-references

International standard	Corresponding British Standard
ISO 105 : Section A02-1984	BS 1006 Methods of test for colour fastness of textiles and leather A02 : 1978 Grey scale for assessing change in colour* (Technically equivalent)
ISO 842-1984	BS 4726 : 1986 Methods for sampling raw materials for paints and varnishes (Identical)
ISO 4892-1981	BS 2782 Methods of testing plastics Method 540B : 1982 Methods of exposure to laboratory light sources, (xenon arc lamp, enclosed carbon arc lamp, open-flame carbon arc lamp, fluorescent tube lamps) (Identical)

The Technical Committee has reviewed the provisions of ISO 105 : Section B01 and ISO 105 : Section B02, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

A related British Standard to ISO 105 : Section B01 is BS 1006 : B01 'Methods of test for colour fastness of textiles and leather. Blue wool standards'. No British Standard corresponds to ISO 105 : Section B02.

The Technical Committee has also reviewed the relevant provisions of the CIE Publication No. 20 (TC-2.2), to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

The publications are published by Commission Internationale d'Éclairage (CIE) and obtainable from the Honorary Librarian (National Illumination Committee), c/o Thorn Lighting Limited, Great Cambridge Road, Enfield, Middlesex EN1 1UL.

Additional information. In order to carry out some of the tests described in this standard it is necessary for a reference sample to be supplied or agreed by the parties concerned (see clause 3). It is also necessary to agree supplementary information (see clause 0) before commencing the comparison.

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

*Reference should be made to BS 1006 'Methods of test for colour fastness of textiles and leather' for the general principles on the use of the scale.

0 Introduction

This document is a part of ISO 787, *General methods of test for pigments and extenders*.

The terms "resistance to light" and "light fastness (or colour fastness)" describe the resistance of a material to change in its appearance as a result of exposure to light. The magnitude of the change, if any, is influenced by the quantity and quality of the light to which the material is exposed, and by the nature and composition of the material itself. Two compositions, each consisting of identical components but in different proportions, may not have the same resistance to light. Also, two compositions each consisting of the same proportions of similar, but not identical, components may not have the same resistance to light.

When exposed to natural light, the conditions of the test vary continuously because of the large number of variables (for example intensity and spectral distribution of the light, temperature, relative humidity, and the amount and nature of atmospheric contaminants) and therefore results cannot be related to similar tests carried out on other occasions. Consequently expressing the results as a function of time alone is not recommended.

These considerations form the basis for the comparison of light fastness of two different samples of a coloured pigment. Each sample is incorporated in the same proportion in otherwise identical compositions and these compositions, in a suitable form, are examined for any difference in their change of appearance after exposure to the same quantity and quality of light. In order to comply with these exposure conditions, it is necessary for the compositions to be exposed side by side at the same time to the same light source for the same period of time.

In addition, the light fastness of a pigment may be affected by the presence of other pigments such as titanium dioxide. This

important aspect may be accommodated in this part of ISO 787 by allowing the agreed binder (medium) to consist of a dispersion of such a pigment. The test procedure is then followed as described.

The extent to which the change on exposure is allowed to proceed before the comparison is made, may be of importance. It is unrealistic to assess the exposures when the change is only equivalent to the first perceptible change, but it is also inadvisable to wait until the amount of change is large. Thus, it is recommended that comparisons of change of appearance be made when the amount of change of the pigment with low resistance to light (agreed reference pigment) is equal to fastness grade 4 and 3 of the grey scale in accordance with ISO 105, section A02.

For any particular application, the method of test described in this International Standard needs to be completed by the following supplementary information. This information should be derived, in part or totally, from an international standard or other document related to the product under test or, if appropriate, should be agreed between the interested parties.

- a) Type and identification of the agreed reference pigment.
- b) The binder (medium) for dispersion of the test sample and the agreed reference pigment and details of the composition of the dispersion.
- c) The method of dispersion to be used.
- d) Whether the test is to be carried out under natural exposure (method A) or artificial light (method B).
- e) If method A is to be used, the exposure angle of the test specimens and glass cover.
- f) If method B is to be used, the details of the apparatus and of the light source.

1 Scope and field of application

This part of ISO 787 describes a general method of test for comparing the resistance to light of samples of similar types of coloured pigments (agreed reference pigment and test sample).

Two methods of exposure are described. In method A, the material is exposed under glass to natural light. In method B, the material is exposed to direct artificial light.

NOTE — When either of these general methods (A or B) is applicable to a given pigment, only a cross-reference to the appropriate method should be included in the International Standard relating to that pigment, indicating any detailed modification that may be needed in view of the special properties of the product. Only when the procedures given in this general method are not applicable to a particular product should a different method for comparison of resistance to light be specified.

2 References

ISO 105, *Textiles — Tests for colour fastness —*

Section A02: Grey scale for assessing change in colour.

Section B01: Colour fastness to light: Daylight.

Section B02: Colour fastness to artificial light: Xenon arc fading lamp test.

ISO 842, *Raw materials for paints and varnishes — Sampling.*

ISO 4892, *Plastics — Methods of exposure to laboratory light sources.*

CIE Publication No. 20 (TC-2.2), *Recommendations for the integrated irradiance and the spectral distribution of simulated solar radiation for testing purposes.*

3 Principle

The test sample and the agreed reference pigment are each dispersed in the same agreed binder (medium). The dispersions are applied to a substrate and dried; they are then exposed to natural daylight with protection from rain (method A) or to artificial light (method B) under specified conditions.

The resistance to light is assessed by comparing the change in colour of the test sample to that of the agreed reference pigment.

4 Apparatus and materials

4.1 Substrate

- a) aluminium or rigid cardboard panels of suitable size for the applicator used, and with a white high gloss, light fast, coated and non-absorbent surface for the application of paint or
- b) paper used as substrate for mass tone prints.

4.2 Film applicator or other device, suitable for applying, side by side, two films of wet thickness 50 to 100 μm , or a **suitable apparatus** for preparing mass tone prints with a thickness of about 1,5 μm .

4.3 Cover sheet, of aluminium foil or other suitable opaque material.

4.4 Grey scale for assessing change in colour, complying with ISO 105, section A02.

4.5 Agreed reference pigment, for comparison with the test sample. It shall be agreed between the parties and shall be similar in composition to that of the test sample.

4.6 Binder (medium) to be agreed between the interested parties. Its choice should be made with regard to the field of application of the pigments being tested.

4.7 Cabinet for exposure under glass to natural light (for method A).

The exposure cabinet shall have a glass cover and shall be of a sufficient size to carry out the expected number of tests.

The cabinet shall be constructed of metal, wood or other material capable of protecting the coated test substrates (specimens) from rain and similar climatic effects, and there shall be adequate ventilation to allow free flow of air over the test specimens.

The glass cover shall be a single piece of clear sheet glass, of thickness 2 to 3 mm, and free from bubbles or other imperfections. The transmittance of the glass shall be approximately 90 % at 360 nm and throughout the visible region of the spectrum, falling to a transmittance of less than 1 % at 300 nm and shorter wavelengths. To maintain these characteristics it is usually necessary to clean the glass periodically and to replace the glass at intervals of not more than 2 years.

The cabinet shall be fitted with a means of support that allows the specimens to be placed not less than 50 mm below, and in a plane parallel to, the glass cover. The cabinet shall be placed so as to receive direct sunlight throughout the day without shadows of neighbouring objects falling upon it. If the cabinet is placed over ground, the distance between the bottom of the cabinet and the plane of the cleared area shall be great enough to avoid any undesirable effects of contact with grass or plant growth during the period of exposure. The glass cover and the test specimens shall slope toward the equator at an angle from the horizontal approximately equal to the latitude of the location at which the tests are being made. Other angles of exposure such as 45° may be used, but the angle shall be stated in the test report.

4.8 Apparatus for exposure to artificial light (for method B).

The apparatus may be a conventional artificial weathering machine, containing a suitable light source such as a xenon arc lamp and filter system, or a similar device. (See also clause 5.1.2 of ISO 4892-1981 which gives further details of the characteristics of xenon arc lamps.)