BRITISH STANDARD

BS EN
12877-3:2000

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Colouring materials in plastics — Determination of colour stability to heat during processing of colouring materials in plastics —

Part 3: Determination by oven test

The European Standard EN 12877-3:1999 has the status of a British Standard

ICS 83.040.30

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee STI/1, Pigments,which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 5 and a back cover.

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 12877-3

October 1999

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English version

Colouring materials in plastics - Determination of colour stability to heat during processing of colouring materials in plastics - Part 3: Determination by oven test

Matières colorantes dans les plastiques - Détermination de la stabilité de la couleur à la chaleur au cours de la mise en oeuvre des matières colorantes dans les plastiques - Partie 3: Détermination par essai à l'étuve

Farbmittel in Kunststoffen - Bestimmung der Beständigkeit der Farbe gegen Hitze beim Verarbeiten von Farbmitteln in Kunststoffen - Teil 3: Bestimmung durch Prüfung im Wärmeschrank

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 298, Pigments and extenders, the Secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

Annex A (normative) indicates test conditions for polyvinyl chloride.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This is one of a number of Parts of EN 12877 dealing with methods for determining the colour stability of colouring materials under the influence of the thermal stress encountered during plastics processing. It should be read in conjunction with EN 12877-1.

1 Scope

This part of EN 12877 describes a method for determining the colour stability of colouring materials in plastics under defined conditions by an oven test. The result of the determination is a relative value, not an absolute one.

The method is mainly used for testing colouring materials in polyvinyl chloride, and in thermosetting materials.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 12877-1:1999	Colouring materials in plastics - Determination of colour stability to heat during processing of colouring materials in plastics - Part 1: General introduction
EN 12877-4:1999	Colouring materials in plastics - Determination of colour stability to heat during processing of colouring materials in plastics - Part 4: Determination by two-roll milling
EN 20105-A02	Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993)
ISO 7724-2:1984	Paints and varnishes - Colorimetry - Part 2: Colour measurement
ISO 7724-3	Paints and varnishes - Colorimetry - Part 3: Calculation of colour differences

3 Principle

Specimens prepared from the colouring material to be tested and the plastics material are subjected to elevated temperatures in an air oven for a specified period. The change in the colour of these specimens, determined by comparison with the colour of untreated specimens, is taken as a measure of the colour stability of the colouring material. The colour comparison is performed either colorimetrically or visually.

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4 Materials

4.1 Test medium, to be agreed between the interested parties.

When evaluating pigments in polyvinyl chloride, the test medium shall be adequately stabilized to heat. The colour stability of the test medium when subjected to heat shall therefore be tested with and without titanium dioxide pigment, using the same procedure. If there are changes, these shall be taken into account when expressing test results.

4.2 Titanium dioxide pigment, grade as recommended for use in plastics.

5 Apparatus

5.1 Air circulating oven, capable of maintaining temperatures up to 250 °C preferably to within ± 1 °C, but not exeeding ± 3 °C.

The oven shall be capable of regaining the test temperatures within 30 s after the specimen has been placed in it. It shall be fitted with forced-ventilation equipment. Shelves shall be such that they allow the free circulation of air within the oven. To regain the test temperature in the specified time, the air oven may be provided with a drawer in the door and/or a metal block for higher heat capacity.

5.2 Temperature-measuring device, for measuring the temperature in the oven as close as possible to the specimens.

5.3 Aluminium sheets, uncoated and degreased, of thickness 0,2 mm to 0,4 mm. The sheets shall be a few centimeters smaller than the shelves or drawers of the oven. The front edge of the sheets may be bent upwards to facilitate handling.

5.4 Plate press, provided with a heating and cooling system.

5.5 Spectrophotometer or **tristimulus colorimeter**, for colour measurements in accordance with ISO 7724-2.

6 Sampling

See EN 12877-1.

7 Test specimens

7.1 Form and dimensions

Unless otherwise specified or agreed, test specimens of dimensions 50 mm x 50 mm x 1 mm, suitable for colorimetry, shall be used.

7.2 Concentration of colouring materia

The colouring material shall be tested in reduced shade (**7.2.1**) and/or in full shade (**7.2.2**).

7.2.1 For testing **in reduced shade**, the concentration of the colouring material in the test medium shall correspond to:

a) 1/3 standard depth of shade (SD) in accordance with EN 12877-1:1999, annex A; or

b) 1/25 standard depth of shade (SD) in accordance with EN 12877-1:1999, annex A; or

c) an agreed reduction ratio.

For a test specimen thickness of 1 mm 5 % of titanium dioxide pigment is necessary to obtain full hiding.

7.2.2 For testing **in full shade**, the concentration of the colouring material in the test medium shall correspond to **7.2.1** a). Alternatively, a concentration of 0,1 % (preferred for organic pigments and dyestuffs), or 2 % (preferred for inorganic pigments) or another agreed appropriate concentration shall be taken.

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8 Procedure

When testing colouring materials in polyvinyl chloride prepare test specimens as described in EN 12877-4:1999 clause **8**, first paragraph.

8.1 Place the test specimens on aluminium sheets (**5.3**) at room temperature. Then place the aluminium sheets with the specimens in the oven (**5.1**), preheated to the specified or agreed test temperature and leave for the specified or agreed period of time.

For standard test conditions (combinations of test temperature and period of time), see annex A.

When the specified or agreed period of time is completed, remove the aluminium sheets with the test specimens from the oven and allow to cool to room temperature. In the case of polyvinyl chloride, press the treated test specimens at 170 °C for 1 min, using the plate press (**5.4**) and sufficient pressure to ensure a smooth surface of the test specimen.

8.2 Compare the colour of the upper surface of the treated test specimens with that of untreated test specimens either colorimetrically or visually.

NOTE Colouring materials such as C.I. Pigment Red 48, 53 and 57 and dyestuffs can change colour reversibly after heat treatment and the specimens should be maintained at room temperature for at least 16 h before assessment.

If colour measurement is specified, proceed in accordance with ISO 7724-2:1984, **4.1.1**, and ISO 7724-3. For visual comparison, use the grey scale specified in EN 20105-A02.

9 Expression of results

Express the test results either as a colour difference in accordance with ISO 7724-3, or as a step of the grey scale, together with the direction of any colour change.

10 Test report

The test report shall contain at least the following information:

a) a reference to this European Standard (EN 12877-3);

b) all details necessary to identify the colouring material tested;

c) all details necessary to identify the test medium together with any other additives used, including the titanium dioxide pigment;

d) all details of preparation of the test specimens;

e) the chosen standard depth(s) of shade or full shade and the concentrations of the colouring material tested;

f) if colour measurement has been specified: type of spectrophotometer or tristimulus colorimeter as well as standard illuminant and standard observer used;

g) the test conditions (temperature, precision of oven and duration);

h) conditions of pressing the treated test specimens (if applicable);

i) the result of the test, as indicated in clause **9**;

j) all visual observations, for example discolouration of the test medium or blooming of the colouring material;

k) any deviation from the test method specified;

l) the date of the test.

11 Precision

Statistical data can not be established.

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Annex A
(normative)

Standard test conditions

Unless otherwise specified, the test conditions shall be agreed between the interested parties. Whenever possible, they shall be selected from the combinations given in Table A.1.

Table A.1 - Standard test conditions

Plastics material used	Temperature °C	Period of heating min
Polyvinyl chloride	180 °C 200 °C	30 10

Appropriate test conditions for other plastics materials may be agreed between the interested parties.

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