

Plastics — Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors

The European Standard EN ISO 877:1996 has the status of a British Standard

IMPORTANT NOTE: Before reading this method it is essential to read BS 2782-0 *Introduction* issued separately

ICS 83.080.01

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/21, Testing of plastics, upon which the following bodies were represented:

- The British Apparel and Textile Confederation
- British Plastics Federation
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (National Physical Laboratory)
- Electrical and Electronic Insulation Association
- GAMBICA (BEAMA Ltd.)
- Institute of Materials
- Ministry of Defence
- Packaging and Industrial Films Association
- PIRA International
- RAPRA Technology Ltd.
- Royal Society of Chemistry

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National foreword

This British Standard has been prepared by Technical Committee PRI/21 and is the English language version of EN ISO 877:1996 *Plastics — Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors* published by the European Committee for Standardization (CEN). It is identical with ISO 877:1984 published by the International Organization for Standardization.

Cross-references

International Standard	Corresponding British Standard
ISO 105-A01:1994	BS EN ISO 105-A01:1996 <i>Textiles — Tests for colour fastness</i> Part A01 <i>General principles of testing</i> (Identical)
ISO 105-A02:1993	BS EN 20105-A02:1995 <i>Textiles — Tests for colour fastness</i> Part A02 <i>Grey scale for assessing change in colour</i> (Identical) BS 2782 <i>Methods of testing plastics</i>
ISO 293:1986	Part 9 <i>Sampling and test specimen preparation</i> Method 901A:1988 <i>Compression moulding test specimens of thermoplastic materials</i> (Identical)
ISO 294:1975 ^a	Method 910A:1996 <i>Injection moulding test specimens of thermoplastic materials</i> (Identical)
ISO 2557-1:1989	Method 940A:1990 <i>Preparation of test specimens of amorphous thermoplastics in the form of bars with a specified reversion</i> (Identical)
ISO 2818:1994	Method 930A:1996 <i>Preparation by machining</i> (Identical)
ISO 3167:1993	Method 931A:1993 <i>Preparation and use of multipurpose test specimens</i> (Identical) Part 5 <i>Optical and colour properties, weathering</i>
ISO 4582:1980	Method 552A:1981 <i>Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or artificial light</i> (Identical)
ISO 4892:1981	Method 540B:1982 <i>Methods of exposure to laboratory light sources, (xenon arc lamp, enclosed carbon arc lamp, open-flame carbon arc lamp, fluorescent tube lamps)</i> (Identical)

^a ISO 294:1975 has been replaced by ISO 294:1995 which is identical to BS 2782-9:Method 910A:1996.

The Technical Committee has reviewed the provisions of ISO 291:1977 and ISO 105-B01:1989¹⁾ and has decided that they are acceptable for use in conjunction with this standard. Related British Standards to ISO 291 are BS 2782-0 and BS 2782-10:Method 1004:1977.

NOTE International and European Standards as well as overseas standards are available from Customer Services, BSI, 389 Chiswick High Road, London, W4 4AL.

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.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN ISO title page, pages 2 to 20, 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.

¹⁾ ISO 105-B01:1989 has been replaced by ISO 105-B01:1994.

ICS 83.080

Descriptors: Plastics, tests, daylight tests, determination, daylight resistance, test equipment, testing conditions, test specimens

English version

Plastics — Methods of exposure to direct weathering, to weathering using glass-filtered daylight, and to intensified weathering by daylight using Fresnel mirrors

(ISO 877:1994)

Plastiques — Méthodes d'exposition directe aux intempéries, ou d'exposition indirecte sous verre, et à la lumière du jour intensifiée par des miroirs de Fresnel
(ISO 877:1994)

Kunststoffe — Verfahren zur natürlichen Bewitterung, zur Bestrahlung hinter Fensterglas und zur beschleunigten Bewitterung durch Sonnenstrahlung mit Hilfe von Fresnelspiegeln
(ISO 877:1994)

This European Standard was approved by CEN on 1996-11-22. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

The text of the International Standard from Technical Committee ISO/TC 61, Plastics, of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 249, Plastics, the secretariat of which is held by IBN.

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 June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

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

Introduction

Outdoor-exposure tests of the type specified in this International Standard are needed to evaluate the performance of plastics when exposed to daylight. The results of such tests should be regarded only as an indication of the effect of exposure to direct weathering (Method A), or to indirect weathering using glass-filtered daylight (Method B) or to intensified daylight (Method C) by the methods described. Results obtained after exposure for a given time may not be comparable to those obtained after other exposures of equal time using the same method. When identical materials are exposed at different times for extended periods of several years, they generally show comparable behaviour after equal-exposure intervals. However, even in long-term tests, the results may be affected by the season in which the tests are started. This is particularly true when exposure tests are performed in accordance with Method C, using the Fresnel-reflecting concentrators described in this International Standard.

Fresnel-reflecting concentrators of the type described in Method C, which employ solar radiation as the source of ultraviolet light, are utilized to provide accelerated outdoor-exposure testing of many plastics materials.

However, some plastics materials, especially those that may tend to be comparatively moisture-sensitive, may not exhibit losses in certain properties at the same rate as in outdoor, natural exposures.

The results of short-term outdoor-exposure tests can give an indication of the relative outdoor performance, but should not be used to predict the absolute long-term performance of a material. Even results of tests carried out for longer than 24 months can show an effect of the season in which the exposure was started. Comparisons of non-full-year exposure will exhibit seasonal effects.

A system of classifying and characterizing climates in different parts of the world is given in Annex B.

It is noted that the test method chosen is usually designed to expose the material to the most severe conditions associated with any particular climate. It should, therefore, be borne in mind that the severity of exposure in actual use is, in most cases, likely to be less than that specified in this International Standard, and allowance should be made accordingly when interpreting the results. For example, vertical exposure at 90° from the horizontal is considerably less severe in its effects on plastics than near-horizontal exposure, particularly in tropical regions, where the sun is most powerful at high zenith angles.

Polar-facing surfaces are much less likely to be degraded than equator-facing surfaces because they are less exposed to solar radiation. However, the fact that they remain wet for longer periods may be of significance for materials affected by moisture.

1 Scope

This International Standard specifies methods of exposing plastics to solar radiation, either by direct exposure to natural weathering (Method A), to indirect solar radiation by modification of its spectral distribution with glass to simulate ageing of plastics behind building or automotive window glass (Method B), or to solar radiation intensified by the use of Fresnel mirrors to achieve acceleration of the weathering processes (Method C). The purpose is to assess changes produced after specified stages of such exposures.

This International Standard specifies the general requirements for the apparatus and operating procedures for using the test methods described. Although this International Standard does not include direct weathering using black-box test fixtures, attention is drawn to this method of exposure testing of materials under conditions simulating their end-use temperatures.²⁾

Methods B and C exclude the effects of weathering influences such as wind and rain, although the Method C apparatus used to produce intensified solar radiation is equipped to provide moisture in the form of water spray.

²⁾ ASTM G 7-89, *Standard practice for atmospheric environmental exposure testing of nonmetallic materials* and ASTM D 4141-82 (reapproved 1987), *Standard practice for conducting accelerated outdoor exposure tests of coatings*.