SLOVENSKI STANDARD
SIST EN ISO 4892-2:2000

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Polimerni materiali - Metode izpostavitve laboratorijskim virom svetlobe - 2. del: Ksenonske svetilke (ISO 4892-2:1994)

Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources (ISO 4892-2:1994)

Kunststoffe - Künstliches Bewittern oder Bestrahlen in Geräten - Teil 2: Gefilterte Xenonbogenstrahlung (ISO 4892-2:1994)

Plastiques - Méthodes d'exposition à des sources lumineuses de laboratoire - Partie 2: Sources a arc au xénon (ISO 4892-2:1994)

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Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources (ISO 4892-2:1994)

Plastiques - Méthodes d'exposition à des sources lumineuses de laboratoire - Partie 2: Sources à arc au xénon (ISO 4892-2:1994)

Kunststoffe - Bestrahlungsverfahren mit Laboratoriumslichtquellen - Teil 2: Xenonbogenlampen (ISO 4892-2:1994)

This European Standard was approved by CEN on 16 April 1999.

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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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 an 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 November 1999, and conflicting national standards shall be withdrawn at the latest by November 1999.

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.

Endorsement notice

The text of the International Standard ISO 4892-2:1994 has been approved by CEN as a European Standard without any modification.

INTERNATIONAL STANDARD

ISO 4892-2

First edition
1994-05-01

Plastics — Methods of exposure to laboratory light sources —

Part 2: Xenon-arc sources

Plastiques — Méthodes d'exposition à des sources lumineuses de laboratoire —
Partie 2: Sources à arc au xénon

Reference number
ISO 4892-2:1994(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 4892-2 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 6, *Ageing, chemical and environmental resistance*.

Together with the other parts of ISO 4892, it cancels and replaces ISO 4892:1981, of which it constitutes a technical revision.

ISO 4892 consists of the following parts, under the general title *Plastics — Methods of exposure to laboratory light sources*:

— *Part 1: General guidance*

— *Part 2: Xenon-arc sources*

— *Part 3: Fluorescent UV lamps*

— *Part 4: Open-flame carbon-arc lamps*

Annex A of this part of ISO 4892 is for information only.

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Plastics — Methods of exposure to laboratory light sources —

Part 2:
Xenon-arc sources

1 Scope

This part of ISO 4892 specifies methods for exposing specimens to xenon-arc light sources. General guidance is given in ISO 4892-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4892. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4892 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4582:1980, *Plastics — Determination of changes in colour and variations in properties after exposure to daylight under glass, natural weathering or artificial light.*

ISO 4892-1:1994, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance.*

CIE Publication No. 20:1972, *Recommendations for the integrated irradiance and the spectral distribution of simulated solar radiation for testing purposes.*

CIE Publication No. 85:1989, *Technical Report — Solar spectral irradiance.*

3 Principle

3.1 A xenon arc, when fitted with suitable filters and properly maintained, produces radiation with a spectral energy distribution similar to that of terrestrial sunlight in the ultraviolet and visible regions of the spectrum.

3.2 Specimens of the samples to be tested are exposed to the light source under controlled environmental conditions.

3.3 The procedure may include measurement of the irradiance and radiant exposure at the surface of the specimen.

3.4 It is recommended that a similar material of known behaviour be exposed simultaneously with the experimental material as a reference.

3.5 Intercomparison of results obtained from specimens exposed in different apparatus should not be made unless reproducibility has been established among devices for the material to be tested.

4 Apparatus

4.1 Laboratory light source

4.1.1 Quartz-jacketed xenon-arc lamps emit radiation in a range that extends from below 270 nm in the ultraviolet through the visible region of the spectrum and into the infrared.

To simulate direct natural exposure, the radiant energy must be filtered to provide a spectral power distribution that closely approximates to that of terrestrial daylight (method A), as described in CIE Publication No. 85.

Filters designed to reduce the irradiance below 320 nm are used to simulate daylight filtered through window glass (method B).

Additional filters to reduce the level of non-actinic infrared energy may be desirable when heating of the specimen adversely influences the photochemical-reaction rate or causes thermal degradation not experienced during real-time natural exposure.

The characteristics of xenon arcs and filters are subject to change during use due to ageing, and lamps and filters shall be replaced at suitable intervals. Furthermore, they are subject to change due to the accumulation of dirt and shall therefore be cleaned at suitable intervals. Follow the manufacturer's recommendations for replacement and cleaning of lamps and filters.

4.1.2 Recommendations for UV-radiation distributions of filtered xenon-arc sources, together with tolerance limits, are given in table 1 for artificial weathering (method A) and table 2 for simulated exposure to daylight behind window glass (method B).

4.1.3 For reference purposes, an irradiance of 550 W/m^2 in the 290 nm to 800 nm passband has been selected (see CIE Publication No. 20). It is not necessarily the preferred irradiance. When mutually agreed upon between interested parties, other irradiance levels may be selected. Report the irradiance and the passband selected.

Table 1 — Relative spectral irradiance for artificial weathering (method A)

Wavelength, λ nm	Relative spectral irradiance[1] %
$290 < \lambda \leqslant 800$	100
$\lambda \leqslant 290$	0[2]
$290 < \lambda \leqslant 320$	0,6 ± 0,2
$320 < \lambda \leqslant 360$	4,2 ± 0,5
$360 < \lambda \leqslant 400$	6,2 ± 1,0

1) The spectral irradiance between 290 nm and 800 nm is defined as 100 %.

2) Xenon arcs operating as specified in method A emit a small amount of radiation below 290 nm. In some cases, this can cause degradation reactions which do not occur in outdoor exposures.

Table 2 — Relative spectral irradiance for daylight behind window glass (method B)

Wavelength, λ nm	Relative spectral irradiance[1] %
$300 < \lambda \leqslant 800$	100
$\lambda \leqslant 300$	0
$300 < \lambda \leqslant 320$	< 0,1
$320 < \lambda \leqslant 360$	3,0 ± 0,5
$360 < \lambda \leqslant 400$	6,0 ± 1,0

1) The spectral irradiance between 300 nm and 800 nm is defined as 100 %.

4.1.4 The irradiance at the test specimen surface shall not vary by more than ± 10 % comparing any two points in the sample holder plane parallel to the lamp axis. If this is not possible, specimens shall be periodically repositioned to provide equivalent exposure periods in each location.

NOTE 1 Depending on the exact design of test chamber (4.2) used, the spectral-irradiance values may be time-averaged values.

4.2 Test chamber

The test chamber contains a frame, carrying specimen holders if necessary, with provision for passing air over the specimens for temperature control.

The source(s) of radiant energy shall be located, with respect to the specimens, such that the irradiance at the specimen surface complies with 4.1.3 and 4.1.4.

Should any ozone be generated from operation of the lamp(s), the lamp(s) shall be isolated from the test specimens and operating personnel. If the ozone is in an air stream, it shall be vented directly to the outside of the building.

To reduce the effect of any eccentricity in the lamp, or when more than one lamp is used in a single chamber to increase irradiance, the uniformity of exposure may be improved by rotating the frame carrying the specimens around the light source(s) and, if necessary, by periodically changing the position of each specimen.

The specimen holders may also rotate about their own axis, thus exposing directly to the radiation from the light source the side of the specimen holder that was previously not directly exposed.

Programmes may be used which employ a dark cycle obtained by extinguishing the light source to provide controlled exposure conditions without the presence of simulated solar radiation.

When any of these operating modes or programmes are used, they shall be reported in full.

4.3 Radiometer

When a radiometer is used, it shall comply with the requirements outlined in ISO 4892-1:1994, subclause 5.2.

4.4 Black-standard/black-panel thermometer

The black-standard or black-panel thermometer used shall comply with the requirements outlined in ISO 4892-1:1994, subclause 5.1.5.

4.5 Relative-humidity control equipment

The relative humidity of the air passing over the test specimens shall be controlled at an agreed value, and measured by suitable instruments inserted into the test chamber and shielded from the lamp radiation.

4.6 Spray system

Specimens may be sprayed with distilled or demineralized water (having a conductivity below 5 µS/cm) intermittently under specified conditions. The spray system shall be made from inert materials that do not contaminate the water employed. The water shall leave no observable stains or deposits and should therefore preferably contain less than 1 ppm of solids. In addition to distillation, a combination of deionization and reverse osmosis can be used to produce water of the required quality. The pH of the water used shall be reported.

4.7 Specimen holders

Specimen holders may be in the form of an open frame, leaving the back of the specimen exposed, or they may provide the specimen with a solid backing. They shall be made from inert materials that will not affect the test results, for example non-oxidizing alloys of aluminium or stainless steel. Brass, steel or copper shall not be used in the vicinity of the test specimens. The backing used may affect the results, particularly with transparent specimens, and shall be agreed on between the interested parties.

4.8 Apparatus to assess changes in properties

The apparatus required by the International Standards relating to the determination of the properties chosen for monitoring (see also ISO 4582) shall be used.

5 Test specimens

Refer to ISO 4892-1.

6 Test conditions

6.1 Black-standard/black-panel temperature

Two black-standard temperatures have been selected for reference purposes:

65 °C ± 3 °C

100 °C ± 3 °C

NOTE 2 The higher temperature is intended for special tests, but will increase the tendency of the specimen to undergo thermal degradation and influence the test results.

These temperatures are not necessarily the preferred ones. When mutually agreed upon, another temperature may be selected, but shall be stated in the exposure report.

If water spray is used, the temperature requirements apply to the end of the dry period. If the thermometer does not attain equilibrium during a short cycle, the specified temperature shall be established without water spray and the maximum temperature attained during the dry cycle shall be reported.