SLOVENSKI STANDARD
SIST EN 62788-1-4:2017/A1:2021

01-januar-2021

Merilni postopki za materiale, uporabljene v fotonapetostnih modulih - 1-4. del: Enkapsulanti - Meritev optične prosojnosti in izračun solarno utežene prosojnosti, indeks porumenelosti in ultravijolične mejne frekvence - Dopolnilo A1

Measurement procedures for materials used in photovoltaic modules - Part 1-4: Encapsulants - Measurement of optical transmittance and calculation of the solar-weighted photon transmittance, yellowness index, and UV cut-off wavelength

Messverfahren für Werkstoffe, die in Photovoltaikmodulen verwendet werden - Teil 1-4: Verkapselungsstoffe - Messung der optischen Transmission und Berechnung der solargewichteten Photonentransmission, des Vergilbungsindex und der UV-Grenzfrequenz

Amendement 1 - Procédures de mesure des matériaux utilisés dans les modules photovoltaïques - Partie 1-4: Encapsulants - Mesurage du facteur de transmission optique et calcul du facteur de transmission photonique à pondération solaire, de l'indice de jaunissement et de la fréquence de coupure des UV

Ta slovenski standard je istoveten z: **EN 62788-1-4:2016/A1:2020**

ICS:

17.180.99	Drugi standardi v zvezi z optiko in optičnimi merjenji	Other standards related to optics and optical measurements
27.160	Sončna energija	Solar energy engineering

SIST EN 62788-1-4:2017/A1:2021 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62788-1-4:2016/A1

November 2020

ICS 27.160

English Version

Measurement procedures for materials used in photovoltaic modules - Part 1-4: Encapsulants - Measurement of optical transmittance and calculation of the solar-weighted photon transmittance, yellowness index, and UV cut-off wavelength (IEC 62788-1-4:2016/A1:2020)

Procédures de mesure des matériaux utilisés dans les modules photovoltaïques - Partie 1-4: Encapsulants - Mesurage du facteur de transmission optique et calcul du facteur de transmission photonique à pondération solaire, de l'indice de jaunissement et de la fréquence de coupure des UV
(IEC 62788-1-4:2016/A1:2020)

Messverfahren für Werkstoffe, die in Photovoltaikmodulen verwendet werden - Teil 1-4: Verkapselungsstoffe - Messung der optischen Transmission und Berechnung der solargewichteten Photonentransmission, des Vergilbungsindex und der UV-Grenzfrequenz
(IEC 62788-1-4:2016/A1:2020)

This amendment A1 modifies the European Standard EN 62788-1-4:2016; it was approved by CENELEC on 2020-11-19. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 CEN-CENELEC Management Centre or to any CENELEC member.

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

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 82/1767/FDIS, future IEC 62788-1-4/A1, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62788-1-4:2016/A1:2020.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021-08-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-11-19

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62788-1-4:2016/A1:2020 was approved by CENELEC as a European Standard without any modification.

IEC 62788-1-4

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Measurement procedures for materials used in photovoltaic modules –
Part 1-4: Encapsulants – Measurement of optical transmittance and calculation of the solar-weighted photon transmittance, yellowness index, and UV cut-off wavelength**

**Procédures de mesure des matériaux utilisés dans les modules photovoltaïques –
Partie 1-4: Encapsulants – Mesurage du facteur de transmission optique et calcul du facteur de transmission photonique à pondération solaire, de l'indice de jaunissement et de la fréquence de coupure des UV**

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FOREWORD

This amendment has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this amendment is based on the following documents:

FDIS	Report on voting
82/1767/FDIS	82/1791/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

1 Scope

In the second sentence of the second paragraph, replace:

around the edges

by:

at the periphery

4 Principle

In the last sentence, replace:

concentration

by:

optical concentration

6.1 Nominal (and unweathered) transmittance to the cell

In the fifth paragraph, replace:

The nominal thickness of the encapsulation specimens

by:

The nominal thickness of the encapsulant specimens

6.2 Weathering studies

Replace the existing third paragraph by the following:

The minimum size of 7,5 cm × 7,5 cm is recommended for weathering specimens based on previous examinations of poly (ethylene-co-vinyl acetate).

In the eighth paragraph, replace:

The nominal thickness of the encapsulation specimens

by:

The nominal thickness of the encapsulant specimens

6.3 Glass for superstrates/substrates

Replace the existing second paragraph by the following:

The solar-weighted transmittance of photon irradiance of silica glass, which may be used to verify that the composition of the glass is appropriate, is approximately (93 ± 1) % between 280 nm and 2 500 nm, because the reduction in transmittance comes from reflections at the surfaces. The UV cut-off wavelength for silica should be less than 225 nm. As in [1] and [12], the transmittance of the glass should be greater than 90 % at 280 nm.

Replace the existing fourth paragraph by the following:

Subsequent examination beyond that intended for the encapsulation material datasheet (including performance and weathering), such as for the purpose of quality control for production monitoring, may be performed according to this procedure using other superstrate and/or substrate materials that can incorporate other optical features, e.g., antireflective coatings, surface texture, and untempered soda-lime PV glass.

Add, at the end of the subclause, the following:

The process of solarization, where a redox reaction of trace impurities affects the UV cut-off wavelength and corresponding range of transmittance, can occur if glass other than silica is used [14]. It is therefore advised for weathering studies to UV condition substrate and superstrate materials, other than silica, prior to lamination.

NOTE Silica glass is more durable than soda-lime glass and will better resist glass corrosion in accelerated tests.

6.5 Preconditioning of specimens

In the title of the subclause, replace:

preconditioning

by

conditioning

In the first sentence, replace:

(23 ± 2) °C, (50 ± 5) % RH for at least 24 h, as recommended in ISO 291, prior to optical measurement.

by:

(23 ± 2) °C, (50 ± 10) % RH for at least 24 h, as specified per Class 2 in ISO 291, prior to optical measurement.

7.2 Specimen preparation

Replace the first sentence by the following:

Prior to measurement, specimens should be free of dust, grease or other contaminants. Specimens may be wiped with a solution of deionized water and mild soap for cleaning prior to measurement using a cleanroom wipe or lint free cloth.

7.4 Specimen measurements

In the first sentence of the fourth paragraph, replace:

durability

by:

weathering durability

7.5 Witness measurements

Add the following new subclause:

7.5.1 Witness specimen(s)

The witness specimens may include a traceable standard specimen, laboratory working witness specimen, or the silica superstrate/substrate material. Witness specimen(s) for control measurements may also include a non-weathered glass working witness specimen of the same construction used in module representative test specimen(s) or reference (glass or polymeric superstrate) specimen(s). When not being used for control measurements, a working witness specimen shall be stored in the dark at 23 °C and 50 % humidity as specified per Class 2 in ISO 291.

7.5.2 Procedure for the witness specimen prior to the test specimen(s)

After instrument equilibration and baselining, perform the transmittance measurements on a witness specimen at the beginning of each measurement session to ensure proper operation of the instrument and minimize the measurement error. Perform the transmittance measurements of the witness specimen using the same procedure that will be applied to the test specimen(s).

The verification wavelengths for the working reference shall be ± 50 nm from the instrument transitions for the source, detector, and gratings. Because of the limitations of measurement, including noise from scattering at short wavelengths, the verification wavelengths shall not extend below 225 nm. In the case of many commercial instruments where the source, detector, and grating transitions occur at 350 nm, 800 nm, and 800 nm, respectively, the verification wavelengths should include the ranges 250 nm to 300 nm, 400 nm to 750 nm and 850 nm to 2500 nm (in the case of standard measurements) or 225 nm to 300 nm, 400 nm to 750 nm and 850 nm to 2 500 nm (in the case of measurements of weathered specimens).

The transmittance at each of the verification wavelengths should be within 0,25 % of the known transmittance (or laboratory running average) for the witness specimen. If the transmittance at each verification wavelength is not within 0,25 % of the known transmittance, the instrument baseline shall be performed again (including as many as three times) and the witness specimen shall be remeasured. If the transmittance at each wavelength continues to be greater than 0,25 % of the known transmittance, the instrument should be maintenanced or repaired.

7.5.3 Measurement of the test specimen(s)

After the witness specimen has been verified, the test specimen(s) shall be measured.

7.5.4 Procedure for the witness specimen after the test specimen(s)

After the test specimen(s) have been measured, perform the transmittance measurements on a witness specimen at the end of each measurement session to ensure proper operation of the instrument through the measurement session. Perform the transmittance measurements of the witness specimen using the same procedure that will be applied to the test specimen(s). The transmittance at each of the verification wavelengths should be within 0,25 % of the known transmittance (or laboratory running average) for the witness specimen. If the transmittance at each verification wavelength is not within 0,25 % of the known transmittance, the measured data for the test specimen(s) shall be considered invalid and the test specimen(s) shall be measured again in a subsequent session.