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

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 frequency

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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

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EUROPEAN STANDARD
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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)

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)

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(IEC 62788-1-4:2016)

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

EN 62788-1-4:2016**European foreword**

The text of document 82/1148/FDIS, future edition 1 of IEC 62788-1-4, 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.

The following dates are fixed:

- latest date by which the document has to be (dop) 2017-08-01
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2019-11-01
standards conflicting with the
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IEC/TS 61836 NOTE Harmonized as CLC/TS 61836.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60904-3	-	Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	EN 60904-3	-
ISO 291	2008	Plastics - Standard atmospheres for conditioning and testing	EN ISO 291	2008
ISO 11664-1	2007	Colorimetry - Part 1: CIE standard colorimetric observers	EN ISO 11664-1	2011
ISO 11664-2	2007	Colorimetry - Part 2: CIE standard illuminants	EN ISO 11664-2	2011
ISO 13468-2	1999	Plastics - Determination of the total luminous transmittance of transparent materials - Part 2: Double-beam instrument	EN ISO 13468-2	2006
ISO 17223	2014	Plastics - Determination of yellowness index and change in yellowness index	-	-
ASTM E424-71	2007 ¹⁾	Standard test methods for solar energy transmittance and reflectance (Terrestrial) of sheet materials	-	-

¹⁾ Superseded by ASTM E424-71:2015.

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NORME INTERNATIONALE

**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**

[SIST EN 62788-1-4:2017](https://standards.iteh.ai/catalog/standards/sist/c559f52d-f29a-4672-b531-518243e7206c/sist-62788-1-4:2017)

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**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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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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International Standard IEC 62788-1-4 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

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

FDIS	Report on voting
82/1148/FDIS	82/1165/RVD

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

A list of all parts in the IEC 62788 series, published under the general title *Measurement procedures for materials used in photovoltaic modules*, can be found on the IEC website.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this 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
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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

1 Scope

This part of IEC 62788 provides a method for measurement of the optical transmittance of encapsulation materials used in photovoltaic (PV) modules. The standardized measurements in this procedure quantify the expected transmittance of the encapsulation to the PV cell. Subsequent calculation of solar-weighted transmittance allows for comparison between different materials. The results for unweathered material may be used in an encapsulation manufacturer's datasheets, in manufacturer's material or process development, in manufacturing quality control (material acceptance), or applied in the analysis of module performance.

This measurement method can also be used to monitor the performance of encapsulation materials after weathering, to help assess their durability. The standardized measurements are intended to examine an interior region within a PV module, e.g., without the effects of oxygen diffusion around the edges of the cells. Subsequent calculation of yellowness index allows for quantification of durability and consideration of appearance. The change in transmittance, yellowness index, and ultraviolet (UV) cut-off wavelength may be used by encapsulation or module manufacturers to compare the durability of different materials.

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IEC 60904-3, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

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ISO 17223:2014, *Plastics – Determination of yellowness index and change in yellowness index*

ASTM E424-71:2007, *Standard test methods for solar energy transmittance and reflectance (Terrestrial) of sheet material*