ICS 27.160 SLOVENSKÁ TECHNICKÁ NORMA December 2017

STN	**Meracie postupy na materiály používané vo fotovoltických moduloch Časť 1-6: Materiály na zapuzdrenie Skúšobné metódy na stanovenie stupňa vytvrdnutia etylén-vinylacetátového zapuzdrenia**	**STN EN 62788-1-6** 36 4630

Measurement procedures for materials used in photovoltaic modules - Part 1-6: Encapsulants - Test methods for determining the degree of cure in Ethylene-Vinyl Acetate

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/17

Obsahuje: EN 62788-1-6:2017, IEC 62788-1-6:2017

125676

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62788-1-6

May 2017

ICS 27.160

English Version

Measurement procedures for materials used in photovoltaic modules - Part 1-6: Encapsulants - Test methods for determining the degree of cure in Ethylene-Vinyl Acetate (IEC 62788-1-6:2017)

Procédures de mesure des matériaux utilisés dans les modules photovoltaïques - Partie 1-6: Encapsulants - Méthodes d'essai pour déterminer le degré de durcissement dans l'éthylène-acétate de vinyle (IEC 62788-1-6:2017)

Werkstoffe, die in photovoltaischen Modulen verwendet werden - Messverfahren - Teil 1-6: Verkapselungsstoffe - Prüfverfahren zur Bestimmung des Aushärtungsgrads der Ethylen-Vinyl-Acetat-Verkapselung (IEC 62788-1-6:2017)

This European Standard was approved by CENELEC on 2017-03-03. CENELEC 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 CEN-CENELEC Management Centre or to any CENELEC member.

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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

Ref. No. EN 62788-1-6:2017 E

EN 62788-1-6:2017

European foreword

The text of document 82/1197/FDIS, future edition 1 of IEC 62788-1-6, prepared by IEC/TC 82 “Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62788-1-6:2017.

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)	2017-12-03
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2020-03-03

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Endorsement notice

The text of the International Standard IEC 62788-1-6:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61215 (series)	NOTE	Harmonized as EN 61215 (series).
ISO 11357-2	NOTE	Harmonized as EN ISO 11357-2.
ISO 11357-3	NOTE	Harmonized as EN ISO 11357-3.

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.

Publication	Year	Title	EN/HD	Year
IEC 61215-1	-	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements	EN 61215-1	-
ISO 291	2008	Plastics - Standard atmospheres for conditioning and testing	EN ISO 291	2008
ISO 6427	2013	Plastics - Determination of matter extractable by organic solvents (conventional methods)	EN ISO 6427	2014
ISO 10147	-	Pipes and fittings made of crosslinked polyethylene (PE-X) - Estimation of the degree of crosslinking by determination of the gel content	EN ISO 10147	2012
ISO 11357-1	2009	Plastics - Differential scanning calorimetry (DSC) - Part 1: General principles	-	-
ISO/IEC 17025	2005	General requirements for the competence of testing and calibration laboratories	EN ISO/IEC 17025	2005
ASTM D2765-11	-	Standard Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics	-	-

IEC 62788-1-6

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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FOREWORD

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International Standard IEC 62788-1-6 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
82/1197/FDIS	82/1231/RVD

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

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

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.

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

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

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MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

Part 1-6: Encapsulants – Test methods for determining the degree of cure in Ethylene-Vinyl Acetate

1 Scope

This part of IEC 62788 defines the terminology, test equipment, test environment, specimen preparation, test procedures, and test report for measuring the degree of cure of Ethylene-Vinyl Acetate (EVA) encapsulation sheet used in photovoltaic (PV) modules. The differential scanning calorimetry (both residual enthalpy and melt/freeze protocols) and gel content methods are included herein. This procedure can be used by material- or module-manufacturers to verify that the cross-linking additive is present and is active. The procedure can also be used to verify the module manufacturing (lamination) process for the purposes of quality- and process-control. The procedure can also be used to assess the uniformity of the EVA formulation within a roll as well as to compare variation of the EVA formulation from roll to roll. This procedure can be applied to uncured or recently cured EVA sheet as well as uncured or recently cured EVA from PV modules.

This test procedure can also be applied to cross-linking ethylenic co-polymers other than EVA. The temperatures identified for the calorimetry measurements in this procedure have been optimized for EVA. Therefore, if the test procedure is applied to other encapsulation materials, the range of the test temperatures can have to be adjusted based on the active temperature of the curing agent and/or the melt/freeze temperature of the base material.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61215-1, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1: Test requirements*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

ISO 291:2008, *Plastics – Standard atmospheres for conditioning and testing*

ISO 6427:2013, *Plastics – Determination of matter extractable by organic solvents (conventional methods)*

ISO 11357-1:2009, *Plastics – Differential scanning calorimetry (DSC) – Part 1: General principles*

ISO 10147:2011, *Pipes and fittings made of crosslinked polyethylene (PE-X) – Estimation of the degree of cross-linking by determination of the gel content*

ASTM D2765-11, *Standard test methods for determination of gel content and swell ratio of crosslinked ethylene plastics*