

STN	Meracie postupy pre materiály používané vo fotovoltaických moduloch. Časť 1-2: Materiály na zapuzdrenie. Meranie objemovej rezistivity fotovoltaických materiálov použitých na zapuzdrenie a iných polymérnych materiálov.	STN EN 62788-1-2
		36 4605

Measurement procedures for materials used in photovoltaic modules - Part 1-2: Encapsulants - Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials

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. 12/16

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Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy rozmnožovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD

EN 62788-1-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2016

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English Version

Measurement procedures for materials used in photovoltaic modules - Part 1-2: Encapsulants - Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials
(IEC 62788-1-2:2016)

Procédures de mesure des matériaux utilisés dans les modules photovoltaïques - Partie 1-2: Encapsulants - Mesurage de la résistivité transversale des encapsulants photovoltaïques et autres matériaux polymères
(IEC 62788-1-2:2016)

Messverfahren für Werkstoffe, die in Photovoltaikmodulen verwendet werden - Teil 1-2: Verkapselungsstoffe - Messung des spezifischen Durchgangswiderstandes von Verkapselungsstoffen und Rückseitenfolien von Photovoltaikmodulen
(IEC 62788-1-2:2016)

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

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European foreword

The text of document 82/1085/FDIS, future edition 1 of IEC 62788-1-2, prepared by IEC/TC 82 "Solar photovoltaic energy systems" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62788-1-2:2016.

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) 2017-03-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-06-16

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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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 61340-2-3	2000	Electrostatics -- Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation	EN 61340-2-3	2000
IEC 62631-3-2	2015	Dielectric and resistive properties of solid insulating materials - Part 3-2 Determination of resistive properties (DC Methods) - Surface resistance and surface resistivity	EN 62631-3-2	2016
ISO/IEC 17025	-	General requirements for the competence of testing and calibration laboratories	-	-
ASTM D 257-14	-	Standard Test Methods for DC Resistance or Conductance of Insulating Materials	-	-



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Measurement procedures for materials used in photovoltaic modules –
Part 1-2: Encapsulants – Measurement of volume resistivity of photovoltaic
encapsulants and other polymeric materials**

**Procédures de mesure des matériaux utilisés dans les modules
photovoltaïques –
Partie 1-2: Encapsulants – Mesurage de la résistivité transversale des
encapsulants photovoltaïques et autres matériaux polymères**





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INTERNATIONAL STANDARD

NORME INTERNATIONALE

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MEASUREMENT PROCEDURES FOR MATERIALS
USED IN PHOTOVOLTAIC MODULES –**
**Part 1-2: Encapsulants –
Measurement of volume resistivity of
photovoltaic encapsulants and other polymeric materials**
FOREWORD

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International Standard IEC 62788-1-2 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
82/1085/FDIS	82/1105/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.

This publication 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 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.

MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

Part 1-2: Encapsulants – Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials

1 Scope

This part of IEC 62788 provides a method and guidelines for measuring the volume resistivity of materials used as encapsulation, edge seals, front-sheets, backsheets, or any other insulating material in a photovoltaic (PV) module. The test is performed on dry, humid or wet preconditioned samples. In the case of front sheets and backsheets comprised of multiple layers, the measured resistivity is an effective value. This test is designed for room temperature measurement, but can also be utilized at higher temperatures.

Degradation of PV modules is known to occur in part by electrochemical corrosion, and other potential induced degradation processes. These processes may be dependent upon the resistivity of a polymeric component. Therefore, the DC resistivity of polymeric components is relevant to module design and durability in the field. The resistivity may depend on cure state, temperature, water content, and voltage history. A number of options are included to allow the measurement to be performed in a manner consistent with representative fielded module conditions.

Most resistivity measurement methods and equipment typically become inaccurate and variable for materials with volume resistivity above $10^{16} \Omega\cdot\text{cm}$ [5]¹. Therefore, this standard is used for measurements less than $1\cdot 10^{17} \Omega\cdot\text{cm}$.

Both monolithic and multilayer materials (e.g. front sheets and backsheets) are suitable for measurement. Methods are described for room temperature measurement, with guidelines included for testing at elevated temperatures.

Results will vary with moisture content, therefore materials should be tested in a manner anticipatory of usage. Preconditioning procedures for dry, humid and wet environments are included.

Depending on the material, voltage history will affect the measured result. The rate of change of current, and time to equilibrium varies with material often taking hours or days to come to a static level. For this reason, long and short duration methods are included (Methods A and B). The specified short-duration alternating polarity Method B is intended for qualitative comparison. Method A, long-duration on/off polarity, is recommended for characterization with regard to PID resistance.

Measurements obtained using either method may be used by material manufacturers for the purpose of quality control of their electrical insulating material as well as for reporting in product datasheets. PV module manufacturers may use these methods for the purpose of material acceptance, material selection, process development, design analysis, or failure analysis.

¹ Numbers in square brackets refer to the Bibliography.

This measurement method can also be utilized to monitor the performance of electrical insulating materials after weathering, to assess their durability.

2 Normative references

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.

IEC 61340-2-3:2000, *Electrostatics – Part 2-3: Methods for test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation*

IEC 62631-3-2:2015, *Dielectric and resistive properties of solid insulating materials – Part 3-2: Determination of resistive properties (DC methods) – Surface resistance and surface resistivity*

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

ASTM D 257-14, *Standard Test Methods for DC Resistance or Conductance of Insulating Materials*

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