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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Method for measuring photovoltaic (PV) glass – Part 1: Measurement of total haze and spectral distribution of haze

Méthode de mesure du verre photovoltaïque (PV) – Partie 1: Mesurage de la brume totale et de la répartition spectrale de la brume

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METHOD FOR MEASURING PHOTOVOLTAIC (PV) GLASS –

Part 1: Measurement of total haze and spectral distribution of haze

FOREWORD

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International Standard IEC 62805-1 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
82/1297/FDIS	82/1321/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 62805, published under the general title *Method for measuring photovoltaic (PV) glass*, 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- withdrawn,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.

INTRODUCTION

This document differentiates from the other standards related to haze measurement as follows:

- the scope of this document is restricted to total haze and spectral distribution of haze measurement for PV glass,
- the wavelength range of measurement is different from the visible wavelength range of the other haze test method. In this standard, the wavelength range is typically from 280 nm to 1 250 nm which is related to the spectral response of common solar cells,
- the spectral haze at each wavelength λ is specified in this standard, while the haze integrated over the visible wavelength range 380 nm to 830 nm is always obtained in the other haze test standards.

This part of IEC 62805 establishes IEC requirements for measuring haze and for calculating the total haze of the glass used in photovoltaic modules, especially for the transparent conductive oxide coated (TCO) glass used as substrates for thin-film solar cells.

Thin-film photovoltaic (PV) technology has experienced rapid growth and achieved significant technological advances in recent years due to its advantage over other technologies, including low consumption of raw materials, better performance under high temperatures, reduced sensitivity to overheating, and easier building integration. For the different kinds of thin-film technology used today, such as amorphous silicon (a-Si), amorphous silicon/microcrystalline silicon (a-Si/μ-Si) tandem, cadmium telluride (CdTe), and perovskite thin-film solar cells, TCO glass is used as the substrate. For silicon-based thin-film solar cells, textured TCO substrates are used to introduce surface texture and light scattering within the solar cell structures in order to enhance the light absorption. Such TCO glass with specific surface morphology and light scattering level can enhance the light absorption in specific wavelength ranges. Therefore, the haze values including total haze and spectral distribution of haze are important properties of TCO glass and thus to the solar cell efficiency.

At present, there are no published international standard for measuring the spectral distribution of haze. The haze detection method found in other active international standards only characterizes the visible range of light-scattering ability of transparent material, which is not adequate for measuring the haze of PV glass. In this standard, the wavelength range, equipment requirement and calculation method have been adjusted based on the characteristics of PV glass.

The aim of this standard is:

- to provide specific test methods for measuring haze for PV glass, especially for TCO glass;
- to develop the measurement procedure for spectral distribution of haze in the solar response wavelength range, typically from 280 nm to 1 250 nm;
- to provide the calculation method for total haze in the solar response wavelength range, typically from 280 nm to 1 250 nm.

METHOD FOR MEASURING PHOTOVOLTAIC (PV) GLASS –

Part 1: Measurement of total haze and spectral distribution of haze

1 Scope

This part of IEC 62805 specifies a method for measurement and calculation of the total haze and the spectral distribution of haze of glass used in photovoltaic (PV) modules.

This document is applicable to glass used in PV modules, including transparent conductive oxide coated (TCO) glass and other kinds of glass used in PV modules.

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 60904-3:2016, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61836 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
PV glass
glass used in PV modules, including cover or front glass, back glass and substrate glass

3.2
transparent conductive oxide coated (TCO) glass
flat glass coated with a transparent conductive oxide film that is used as a conductive layer

Note 1 to entry: This note applies to the French language only.

3.3
total haze
ratio of the scattered photon flux to the total photon flux transmitted through the PV glass in the wavelength range 280 nm to 1 250 nm, when the direction of the scattered light deviates more than 2,5° from the direction of the incident beam

Note 1 to entry: In this document, the wavelength range of 280 nm to 1250 nm is chosen as the representative response spectrum of the common solar cells. If the PV glass is used in a PV module in which the response spectrum of the solar cell is beyond the range 280 nm to 1250 nm, a different wavelength range can be used for the measurement.