

**BUREAU OF INDIAN STANDARDS**  
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*Draft Indian Standard*

**Photovoltaic Devices**

**Part 1: Measurement of Photovoltaic Current-Voltage Characteristics**  
(*Second Revision*)

(ICS 27.160)

Solar Photovoltaic Energy  
Systems Sectional Committee, ETD 28

Last date for comments-29 06 2024

NATIONAL FOREWORD

This draft Indian Standard (Part 1) (Second Revision) which is identical with IEC 60904-1: 2020 'Photovoltaic devices Part 1: Measurement of Photovoltaic Current-Voltage Characteristics' issued by the International Electrotechnical Commission (IEC) will be adopted by the Bureau of Indian Standards on the recommendation of the Solar Photovoltaic Energy Systems Sectional Committee and approval of the Electrotechnical Division Council.

This Standard was first Published in 1989 and subsequently revised in 2010. The first revision was based on IEC 60904-1: 2006. The second revision of this standard has been undertaken to align it with the latest version of IEC 60904-1: 2020.

The text of the IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to International Standards for which Indian Standards also exists. The corresponding Indian Standards, which are to be substituted, are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
IEC 60891, Photovoltaic devices –	IS 12763 : 2013 / IEC 60891 : 2009	Identical

Procedures for temperature and irradiance corrections to measured I-V characteristics	Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I - V characteristics (First Revision)	
IEC 60904-2, Photovoltaic devices – Part 2: Requirements for reference devices	IS 12762 (Part 2) : 2018 / IEC 60904-2 : 2015 Photovoltaic devices: Part 2 Requirements for photovoltaic reference devices (Second Revision)	Identical
IEC 60904-3, Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data	IS 12762 (Part 3) : 2020 / IEC 60904-3 : 2016 Photovoltaic Devices Part 3 Measurement Principles for Terrestrial Photovoltaic PV Solar Devices with Reference Spectral Irradiance Data ( Third Revision )	Identical
IEC 60904-4, Photovoltaic devices – Part 4: Photovoltaic reference devices – Procedures for establishing calibration traceability	IS 12762 (Part 4) : 2014 / IEC 60904-4 : 2009 Photovoltaic devices: Part 4 reference solar devices - Procedures for establishing calibration traceability	Identical
IEC 60904-5, Photovoltaic devices – Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method	IS 12762 (Part 5) : 2014 / IEC 60904-5 : 2011 Photovoltaic devices: Part 5 determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open - Circuit voltage method (First Revision)	Identical
IEC 60904-7, Photovoltaic devices – Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices	IS 12762 (Part 7) : 2023 / IEC 60904-7 : 2019 Photovoltaic Devices Part 7: Computation of the Spectral Mismatch Correction For Measurements of Photovoltaic Devices (First Revision)	Identical
IEC 60904-9, Photovoltaic devices – Part 9: Solar simulator performance requirements	IS 12762 (Part 9) : 2023 / IEC 60904-9 : 2020 Photovoltaic Devices Part 9: Classification of Solar Simulator Characteristicses Part 9: Solar Simulator Performance Requirements (First Revision)	Identical
IEC 60904-10, Photovoltaic devices – Part 10: Methods of linearity measurement	IS 12762 (Part 10) : 2023 / IEC 60904-10 : 2020 Photovoltaic Devices Part 10: Methods of Linear Dependence and Linearity Measurements (Second Revision)	Identical
IEC TR 60904-14, Photovoltaic devices – Part 14: Guidelines for production line measurements of single-junction PV module maximum power output and reporting at standard test conditions	IS 12762 (Part 14) : 2023 / IEC TR 60904-14 : 2020 Photovoltaic devices Part 14: Guidelines for production line measurements of single-junction PV module maximum power output and reporting at standard test conditions	Identical

IEC 61215 (all parts), Terrestrial photovoltaic (PV) modules – Design qualification and type approval	IS 14286 / IEC 61215 (Series) Terrestrial Photovoltaic PV Modules Design Qualification and Type Approval	Identical
	IS 14286 (Part 1) : 2019/ IEC 61215-1 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements (Second Revision)	Identical
	IS 14286 (Part 2) : 2019/ IEC 61215-2 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 2 Test Procedures (Second Revision)	Identical
	IS 14286 (Part 1/Sec 1) : 2019 / IEC 61215-1-1 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements Section 1 Special requirements for testing of crystalline silicon photovoltaic (PV) modules (Second Revision)	Identical
	IS 14286 (Part 1/Sec 2) : 2019/ IEC 61215-1-2 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements Section 2 Special requirements for testing of thin-film cadmium telluride (CdTe) based photovoltaic (PV) modules (Second Revision)	Identical
	IS 14286 (Part 1/Sec 3) : 2019/ IEC 61215-1-3 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements Section 3 Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules (Second Revision)	Identical
	IS 14286 (Part 1/Sec 4) : 2019/ IEC 61215-1-4 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements Section 4 Special requirements for testing of thin-film Cu (In, Ga) (S, Se) <sub>2</sub> based photovoltaic (PV) modules (Second Revision)	Identical
IEC TS 61836, Solar photovoltaic energy systems – Terms,	IS 12834 : 2023/ IEC TS 61836 : 2016 Solar Photovoltaic Energy Systems	Identical

definitions and symbols	Terms Definitions and Symbols (Second Revision)	
IEC 61853-1, Photovoltaic (PV) module performance testing and energy rating – Part 1: Irradiance and temperature performance measurements and power rating	IS 16170 (Part 1) : 2014 / IEC 61853-1 : 2011 Photovoltaic (PV) module performance testing and energy rating: Part 1 irradiance and temperature performance measurements and power rating	Identical
IEC TR 63228, Measurement protocols for photovoltaic devices based on organic, dyesensitized or perovskite materials	IS/IEC 63228 : 2019 Measurement Protocols for Photovoltaic Devices Based on Organic Dye-Sensitized or Perovskite Materials	Identical

The technical committee has reviewed the provision of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

<i>International Standard</i>	<i>Title</i>
ISO 9060	Solar energy – Specification and classification of instruments for measuring hemispherical solar and direct solar radiation

Only English language text has been retained while adopting it in this Indian Standard, and as such the page numbers given here are not the same as in the International Standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2:2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

NOTE — The technical content of their document has not been enclosed as there are identical with the corresponding IEC standards for details, please refer the corresponding IEC 60904-1: 2020 or kindly contact:

Head  
Electrotechnical Department  
Bureau of Indian Standards  
9, Bahadur Shah Zafar Marg,  
New Delhi-110002  
Email: eetd@bis.gov.in  
Telephone: 011-23231192 / 8284