

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

**Photovoltaic (PV) Module Safety Qualification  
Part 1 Requirements for Construction**

*(Second revision)*

(ICS 27.160)

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Solar Photovoltaic Energy  
Systems Sectional Committee, ETD 28

Last date for comments- 24.08.2024

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**NATIONAL FOREWORD**

This draft Indian Standard (Part 1) (Second Revision) which is Identical with IEC 61730-1: 2023 'Photovoltaic (PV) Module Safety Qualification Part 1: Requirements for Construction' 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 Standards was originally Published in 2010 and Subsequently Revised in 2019. The First Revision was based on IEC 61730-1: 2016. The Second Revision of this standard has been undertaken to align with the latest version of IEC 61730-1: 2023.

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 60216-1, Electrical insulating materials – Thermal endurance properties – Part 1: Ageing procedures and evaluation of test results	IS 8504 (Part 1) : 2012 / IEC 60216-1 : 2001 Electrical Insulating Materials — Thermal Endurance Properties Part 1 Ageing Procedures And Evaluation of Test Results ( <i>Second Revision</i> )	Identical
IEC 60216-2, Electrical insulating materials – Thermal endurance properties – Part 2: Determination of thermal endurance properties of electrical insulating materials – Choice of test criteria	IS 8504 (Part 2) : 2013 / IEC 60216-2 : 2005 Electrical Insulating Materials — Thermal Endurance Properties Part 2 Determination of Thermal Endurance Properties of Electrical Insulating Materials — Choice of Test Criteria ( <i>First Revision</i> )	Identical
IEC 60216-5, Electrical insulating materials – Thermal endurance properties – Part 5: Determination of relative temperature index (RTE) of an insulating material	IS 8504 (Part 6) : 2012 / IEC 60216-5 : 2008 Electrical Insulating Materials — Thermal Endurance Properties Part 6 Determination of Relative Thermal Endurance Index (RTE) of an Insulating Material	Identical
IEC 60269-6, Low-voltage fuses – Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems	IS/IEC 60269-6 : 2010 Low-Voltage Fuses Part 6 Supplementary Requirements for Fuse-Links for the Protection of Solar Photovoltaic Energy Systems	Identical
IEC 60364-7-712, Low voltage electrical installations – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems	IS 16997 : 2018 / IEC 60364-7-712 : 2017 Requirements for Low-Voltage Special Electrical Installations or Locations — Solar Photovoltaic ( PV ) Power Supply Systems	Identical
IEC 60529, Degrees of protection provided by enclosures (IP code)	IS/ IEC 60529 : 2001 Degrees of protection provided by enclosures (IP code)	Identical
IEC 60664-1: 2020, Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests	IS 15382 (Part 1) : 2022 / IEC 60664-1 : 2020 Insulation Coordination for Equipment within Low-Voltage Systems Part 1 Principles, Requirements and Tests ( <i>Second Revision</i> )	Identical

IEC 60695-11-10, Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods	IS / IEC 60695-11-10 : 2013 Fire Hazard Testing Part 11 Test Flames Section 10 50 W Horizontal and vertical flame test methods	Identical
IEC TS 60904-1-2, Photovoltaic devices – Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices	IS 12762 (Part 1/Sec 2) : 2020 / IEC TS 60904-1-2 : 2019 Photovoltaic Devices Part 1 Measurement of Current-voltage Characteristics Section 2 Bi-facial photovoltaic ( PV ) devices	Identical
IEC 60950-1:2005, Information technology equipment – Safety – Part 1: General requirements	IS 13252 (Part 1) : 2010 / IEC 60950-1 : 2005 Information Technology Equipment - Safety Part 1 General Requirements ( <i>Second Revision</i> )	Identical
IEC 61032:1997, Protection of persons and equipment by enclosures – Probes for verification	IS 1401 : 2008 / IEC 61032:1997 Protection of Persons And Equipment By Enclosures — Probes For Verification ( <i>Second Revision</i> )	Identical
IEC 61140, Protection against electric shock – Common Aspects for Installation And Equipment	IS 9409 : 2023 / IEC 61140 : 2016 Protection Against Electric Shock — Common Aspects for Installation and Equipment ( <i>First Revision</i> )	Identical
IEC 61215 (all parts), Terrestrial photovoltaic (PV) modules – Design qualification and type approval	IS 14286 (Part 1) : 2019 / IEC 61215-1 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 1 Test Requirements ( <i>Second Revision</i> )	Identical
	IS 14286 (Part 2) : 2019 / IEC 61215-2 : 2016 Terrestrial Photovoltaic (PV) Modules — Design Qualification and Type Approval Part 2 Test Procedures ( <i>Second Revision</i> )	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	Identical

IEC 61215 (all parts), Terrestrial photovoltaic (PV) modules – Design qualification and type approval	(PV) modules ( <i>Second Revision</i> )	
	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 ( <i>Second Revision</i> )	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 ( <i>Second Revision</i> )	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 ( <i>Second Revision</i> )	Identical
IEC 61730-2, Photovoltaic (PV) module safety qualification – Part 2: Requirements for testing	IS/IEC 61730-2 : 2016 Photovoltaic (PV) Module Safety Qualification Part 2 Requirements for Testing ( <i>First Revision</i> )	Identical
IEC TS 61836, Solar photovoltaic energy systems – Terms, definitions and symbols	IS 12834 : 2023 / IEC TS 61836 : 2016 Solar Photovoltaic Energy Systems — Terms, Definitions and Symbols ( <i>Second Revision</i> )	Identical
IEC 62548, Photovoltaic (PV) arrays – Design requirements	IS/IEC 62548 : 2016 Photovoltaic PV Arrays — Design Requirements	Identical
	IS 16792 (Part 1/Sec 2) : 2018 / IEC 62788-1-2 : 2016 Measurement Procedures for	Identical

IEC 62788-1 (all parts), Measurement procedures for materials used in photovoltaic modules – Part 1: Encapsulants	Materials Used in Photovoltaic Modules Part 1 Encapsulants Section 2 Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials	
	IS 16792 (Part 1/Sec 4) : 2023 / IEC 62788-1-4 : 2016+AMD1 : 2020 Measurement Procedures for Materials Used in Photovoltaic Modules Part 1 Encapsulants Section 4 Measurement of Optical Transmittance and Calculation of the SolarWeighted Photon Transmittance, Yellowness Index, and UV Cut-Off Wavelength ( <i>First Revision</i> )	Identical
	IS 16792 (Part 1/Sec 5) : 2020 / IEC 62788-1-5 : 2016 Photovoltaic Devices — Measurement Procedures for Materials Used in Photovoltaic Modules Part 1 Encapsulants Section 5 Measurement of change in linear dimensions of sheet encapsulation material resulting from applied thermal conditions	Identical
	IS 16792 (Part 1/Sec 6) : 2023 / IEC 62788-1-6 : 2017+AMD 1 : 2020 Measurement Procedures for Materials Used in Photovoltaic Modules Part 1 Encapsulants Section 6 Test Methods for Determining the Degree of Cure in Ethylene-Vinyl Acetate ( <i>First Revision</i> )	Identical
IEC TS 62788-2, Measurement Procedures for Materials Used in Photovoltaic Modules Part 2 Polymeric Materials — Frontsheets and Backsheets	IS 16792 (Part 2) : 2020 / IEC TS 62788-2 : 2017 Measurement Procedures for Materials Used in Photovoltaic Modules Part 2 Polymeric Materials — Frontsheets and Backsheets	Identical
IEC 62790: 2020, Junction Boxes For Photovoltaic Modules	IS 16911 : 2023 / IEC 62790 : 2020 Junction Boxes for	Identical

– Safety Requirements And Tests	Photovoltaic Modules — Safety Requirements and Tests ( <i>First Revision</i> )	
IEC 62852, Connectors For DC-Application In Photovoltaic Systems – Safety Requirements And Tests	IS 16781 : 2018 / IEC 62852 : 2014 Connectors for d.c. Application in Photovoltaic Systems — Safety Requirements and Tests	Identical
IEC 62930, Electric cables for photovoltaic systems with a voltage rating of 1.5 kV DC	IS 17293 : 2020 Electric Cables for Photovoltaic Systems for Rated Voltage 1 500 V d.c	Modified/Technically Equivalent
IEC TS 63126, Guidelines for Qualifying PV Modules, Components and Materials for Operation at High Temperatures	IS 17959 : 2023 / IEC TS 63126 : 2020 Guidelines for Qualifying PV Modules, Components and Materials for Operation at High Temperatures	Identical
IEC TR 63225, Incompatibility of Connectors for DC — Application in Photovoltaic Systems	IS 17995 : 2022 / IEC TR 63225 : 2019 Incompatibility of Connectors for DC — Application in Photovoltaic Systems	Identical
ISO 1456, Metallic and other inorganic coatings – Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium	IS 1068 : 1993 Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium - Specification ( <i>Third Revision</i> )	Modified/Technically Equivalent
ISO 2093, Electroplated coatings of tin – Specification and test methods	IS 1359 : 1992 Electroplated Coatings of Tin Specification ( <i>Third Revision</i> )	Modified/Technically Equivalent
ISO 7010, Graphical symbols – Safety colours and safety signs – Registered safety signs, available at <a href="https://www.iso.org/obp">https://www.iso.org/obp</a>	IS 16451 : 2023 / ISO 7010 : 2019 Graphical Symbols — Safety Colours and Safety Signs — Registered Safety Signs ( <i>First Revision</i> )	Identical
ISO 9224: 2012, Corrosion of metals and alloys – Corrosivity of atmospheres – Guiding values for the corrosivity categories	IS 14321: 1995 Corrosion of metals and alloys recommended values for The Corrosivity categories of Atmospheres	Modified/Technically Equivalent
EN 50618, Electric cables for photovoltaic systems	IS 17293 : 2020 Electric Cables for Photovoltaic Systems for Rated Voltage 1 500 V d.c	Modified/Technically Equivalent

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>
IEC 60243-1:2013	Electric strength of insulating materials – Test methods – Part 1: Tests at power frequencies
IEC 60243-2:2013	Electric strength of insulating materials – Test methods – Part 2: Additional requirements for tests using direct voltage
IEC 60417	Graphical symbols for use on equipment, available at <a href="https://www.graphicalsymbols.info/equipment">https://www.graphicalsymbols.info/equipment</a>
IEC 62788-2-1	Measurement procedures for materials used in photovoltaic modules – Part 2-1: Polymeric materials – Frontsheets and backsheets – Safety requirements
ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods
ISO 2081	Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel
UL 746B	Standard for Polymeric Materials – Long Term Property Evaluations
IEC/IEEE 82079-1	Preparation of information for use (instructions for use) of products – Part 1: Principles and general requirements

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 61730-1: 2023 or kindly contact:

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