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## INTRODUCTION

This Annex serves as a comprehensive and support companion to the main report "Overview report of standards and requirements for the pilot cases" (Deliverable D6.3) of the INCREASE project. Its purpose are to provide an extensive compilation of relevant standards, regulations, and normative documents related to Building Integrated Photovoltaics (BIPV) and Infrastructure Integrated Photovoltaics (IIPV) systems. While the main report offers analysis and insights on the standardization landscape, this Annex acts as a detailed reference guide, listing and briefly describing a wide range of applicable standards. It is structured into several key sections:

1. Standard documents containing references to fire safety of photovoltaic systems
2. Photovoltaics in buildings
3. Normative documents referred to by EN 50583-1 and EN 50583-2
4. Overview of normative documents affecting photovoltaic systems, including:
  - Solar energy
  - Terminology
  - Photovoltaic modules
  - Solar concentrating power modules and systems
  - Monitoring, measurement systems and performance
  - Inverters
  - Module support structures
  - Other components
  - PV installations or systems
  - Design criteria and documentation
  - Grid connection and electrical safety
  - Electrical assemblies/boards
  - Cables, conduits and accessories
  - Atmospheric discharges and overvoltages
  - Electromagnetic compatibility
  - Life cycle assessment

This compilation is intended to serve as a valuable resource for stakeholders involved in the INCREASE project, as well as for professionals in the BIPV and IIPV fields. It provides a comprehensive overview of the complex regulatory environment surrounding these technologies, supporting the objectives outlined in the main report.

## ANNEX1: STANDARD DOCUMENTS

### Standard documents containing references to fire safety of photovoltaic systems

<u>standard</u>	<u>Titolo</u>
IEC 61730-2: 2016	<p><b>Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing</b></p> <p>IEC 61730-2:2016 provides the testing sequence intended to verify the safety of PV modules whose construction has been assessed by IEC 61730-1. The test sequence and pass criteria are designed to detect the potential breakdown of internal and external components of PV modules that would result in fire, electric shock, and/or personal injury. The standard defines the basic safety test requirements and additional tests that are a function of the PV module end-use applications. Test categories include general inspection, electrical shock hazard, fire hazard, mechanical stress, and environmental stress. This new edition includes the following significant technical changes with respect to the previous edition:</p> <ul style="list-style-type: none"><li>- the test sequences have been rearranged;</li><li>- various tests have been detailed or added</li></ul>
IEC 61215-1:2021	<p><b>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements</b></p> <p>IEC 61215-1:2021 lays down requirements for the design qualification of terrestrial photovoltaic modules suitable for long-term operation in open-air climates. The useful service life of modules so qualified will depend on their design, their environment and the conditions under which they are operated. Test results are not construed as a quantitative prediction of module lifetime. This document is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules. It does not apply to systems that are not long-term applications, such as flexible modules installed in awnings or tenting. This second edition of IEC 61215-1 cancels and replaces the first edition of IEC 61215-1, published in 2016. This edition includes the following significant technical changes with respect to the previous edition:</p> <ul style="list-style-type: none"><li>a. Addition of a test taken from IEC TS 62782.</li><li>b. Addition of a test taken from IEC TS 62804-1.</li></ul>



	<p>c. Addition of test methods required for flexible modules. This includes the addition of the bending test (MQT 22).</p> <p>d. Addition of definitions, references and instructions on how to perform the IEC 61215 design qualification and type approval on bifacial PV modules.</p> <p>e. Clarification of the requirements related to power output measurements.</p> <p>f. Addition of weights to junction box during 200 thermal cycles.</p> <p>g. Requirement that retesting be performed according to IEC TS 62915.</p> <p>h. Removal of the nominal module operating test (NMOT), and associated test of performance at NMOT, from the IEC 61215 series.</p> <p>The contents of the corrigendum of May 2021 have been included in this copy.</p>
IEC 61215-2:2021	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures</p> <p>IEC 61215-2:2021 lays down requirements for the design qualification of terrestrial photovoltaic modules suitable for long-term operation in open-air climates. This document is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules. The objective of this test sequence is to determine the electrical characteristics of the module and to show, as far as possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure outdoors. This second edition of IEC 61215-2 cancels and replaces the first edition of IEC 61215-2 issued in 2016. This edition includes the following significant technical changes with respect to the previous edition:</p> <p>a. Addition of cyclic (dynamic) mechanical load testing (MQT 20).</p> <p>b. Addition of a test for detection of potential-induced degradation (MQT 21).</p> <p>c. Addition of test methods required for bifacial PV modules.</p> <p>d. Addition of test methods required for flexible modules. This includes the addition of the bending test (MQT 22).</p> <p>e. Revision of simulator requirements to ensure uncertainty is both well-defined and minimized.</p> <p>f. Correction to the hot spot endurance test, where the procedure for monolithically integrated (MLI) thin film technologies (MQT 09.2) previously included two sections describing a procedure only appropriate for silicon modules.</p> <p>g. Selection of three diodes, rather than all, for testing in the bypass diode thermal test (MQT 18).</p> <p>h. Removal of the nominal module operating test (NMOT), and associated test of performance at NMOT, from the IEC 61215 series.</p>



UL 1703:2019	<p><b>Standard for Flat-Plate Photovoltaic Modules and Panels</b></p> <p><i>These requirements cover flat-plate photovoltaic modules and panels intended for installation on or integral with buildings, or to be freestanding (that is, not attached to buildings), in accordance with the National Electrical Code, NFPA 70, and Model Building Codes.</i></p> <p><i>These requirements cover modules and panels intended for use in systems with a maximum system voltage of 1500 V or less.</i></p> <p><i>These requirements also cover components intended to provide electrical connection to and mounting facilities for flat-plate photovoltaic modules and panels.</i></p> <p><i>These requirements do not cover:</i></p> <ul style="list-style-type: none"><li><i>a) Equipment intended to accept the electrical output from the array, such as power conditioning units (inverters) and batteries;</i></li><li><i>b) Any tracking mechanism;</i></li><li><i>c) Cell assemblies intended to operate under concentrated sunlight;</i></li><li><i>d) Optical concentrators; or</i></li><li><i>e) Combination photovoltaic-thermal modules or panels.</i></li></ul>
UL 790:2022	<p><b>Standard for Standard Test Methods for Fire Tests of Roof Coverings</b></p> <p><i>These requirements cover the measurement of the relative fire characteristics of roof coverings exposed to simulated fire sources originating from outside a building on which the coverings are installed. They are applicable to roof coverings intended for installation on either combustible or noncombustible roof decks (see 1.4) when the roof coverings are applied as intended. The following test methods are included:</i></p> <ul style="list-style-type: none"><li><i>a) Intermittent-Flame Exposure test;</i></li><li><i>b) Spread of Flame test;</i></li><li><i>c) Burning Brand test;</i></li><li><i>d) Flying Brand test; and</i></li><li><i>e) Rain test.</i></li></ul> <p><i>Three classes of fire exposure are described.</i></p> <ul style="list-style-type: none"><li><i>a) Class A roof coverings that are expected to be effective against severe fire exposures. Under such exposures, roof coverings of this class afford a high degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.</i></li><li><i>b) Class B roof coverings that are expected to be effective against moderate fire exposures. Under such exposures, roof coverings of this class afford a moderate degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.</i></li><li><i>c) Class C roof coverings that are expected to be effective against light fire exposures. Under such exposures, roof coverings of this class</i></li></ul>





	<p><i>afford a light degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.</i></p> <p><i>Tests conducted in accordance with these requirements are intended to demonstrate the performance of roof coverings during the types and periods of fire exposure involved, but are not intended to determine the acceptability of roof coverings for use after exposure to fire. These fire test methods do not provide a basis to compare expected performance under all actual fire conditions but they do provide a basis for comparison of the response of roof coverings when subjected to fire sources that are described herein.</i></p> <p><i>These test methods address roof coverings used over both combustible and noncombustible decks. A combustible deck is generally constructed using materials that do not comply with the requirements of ASTM E136, such as wood sheathing boards, oriented strand boards (OSB), or plywood. A noncombustible deck is generally constructed entirely of materials that comply with the requirements of ASTM E136, such as metal, concrete, or poured gypsum.</i></p>
ISO 5660-1	<p><b><i>Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Part 1: Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement)</i></b></p> <p><i>This standard specifies a method for assessing the heat release rate and dynamic smoke production rate of specimens exposed in the horizontal orientation to controlled levels of irradiance with an external igniter. The heat release rate is determined by measurement of the oxygen consumption derived from the oxygen concentration and the flow rate in the combustion product stream. The time to ignition (sustained flaming) is also measured in this test.</i></p> <p><i>The dynamic smoke production rate is calculated from measurement of the attenuation of a laser light beam by the combustion product stream. Smoke obscuration is recorded for the entire test, regardless of whether the specimen is flaming or not.</i></p>
CEN EN 13501-1:2018	<p><b><i>Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests</i></b></p> <p><i>This document provides the reaction to fire classification procedure for all construction products, including products incorporated within building elements with the exception of power, control and communication cables which are covered by EN 13501-6.</i></p> <p><i>Products are considered in relation to their end use application.</i></p> <p><i>This document applies to three categories, which are treated separately in this document:</i></p> <ul style="list-style-type: none"><li><i>- construction products, excluding floorings and linear pipe thermal insulation products;</i></li></ul>

	<ul style="list-style-type: none"> <li>- floorings;</li> <li>- linear pipe thermal insulation products.</li> </ul> <p><i>NOTE For CE marking of construction products under the Construction Product Regulation ((EC) 305/2011) the NPD option can be used when no reaction of fire performance is to be declared</i></p>
<p>CEN EN 13501-2:2016</p>	<p><b><i>Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services</i></b></p> <p><i>This document specifies the procedure for classification of construction products and building elements using data from fire resistance and/or smoke leakage/control tests and/or mechanical tests which are within the direct field of application of the relevant test method. Classification on the basis of extended application of test results is also included in the scope of this document.</i></p> <p><i>This document deals with:</i></p> <p><i>a) loadbearing elements without a fire separating function:</i></p> <ul style="list-style-type: none"> <li>- walls;</li> <li>- floors;</li> <li>- roofs;</li> <li>- beams;</li> <li>- columns;</li> <li>- balconies;</li> <li>- walkways;</li> <li>- stairs.</li> </ul> <p><i>b) loadbearing elements with a fire separating function, with or without glazing, services and fixtures:</i></p> <ul style="list-style-type: none"> <li>- walls;</li> <li>- floors;</li> <li>- roofs;</li> <li>- raised floors.</li> </ul> <p><i>c) products and systems for protecting elements or parts of the works:</i></p> <ul style="list-style-type: none"> <li>- ceilings with no independent fire resistance;</li> <li>- fire protective coatings, claddings and screens;</li> </ul> <p><i>d) non-loadbearing elements or parts of works, with or without glazing, services and fixtures:</i></p> <ul style="list-style-type: none"> <li>- partitions;</li> <li>- facades (curtain walls) and external walls;</li> <li>- ceilings with independent fire resistance;</li> <li>- raised floors;</li> </ul>



	<ul style="list-style-type: none"> <li>- fire resisting doorsets, shutter assemblies and openable windows and their closing devices;</li> <li>- smoke control doorsets and shutter assemblies and their closing devices;</li> <li>- conveyor systems and their closures;</li> <li>- penetration seals;</li> <li>- linear joint seals;</li> <li>- combined penetration seals;</li> <li>- service ducts and shafts;</li> <li>- air transfer grilles.</li> <li>- chimneys.</li> </ul> <p>e) wall and ceiling coverings with fire protection ability.</p> <p>f) lift landing doors which are tested according to EN 81-58 are excluded from this document. Lift landing doors which are tested in accordance with EN 1634-1 are classified in accordance with 7.5.5.</p> <p>Relevant test methods which have been prepared for these construction products are listed in Clauses 2 and 7.</p>
<p>CEN EN 13501-5:2016</p>	<p><b>Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests</b></p> <p><i>This European Standard provides the fire performance classification procedures for roofs/roof coverings exposed to external fire based on the four test methods given in CEN/TS 1187:2012 and the relevant extended application rules.</i></p> <p><i>For the classification of a roof/roof covering, only those test methods and those application rules need to be applied for which the corresponding classification is envisaged.</i></p> <p><i>Products are considered in relation to their end use application.</i></p> <p><i>NOTE The distinction between roofs with a steep slope and facades, in terms of the test and classification standard to be applied, may be subject to national regulations.</i></p> <p><i>General information on the four test methods in CEN/TS 1187 is given in Annex A.</i></p>
<p>CEN EN 13823:2020 A1:20122</p>	<p><b>Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item</b></p> <p><i>This European Standard specifies a method of test for determining the reaction to fire performance of construction products excluding floorings, and excluding products which are indicated in Table 1 of EC Decision 2000/147/EC, when exposed to thermal attack by a single burning item (SBI). The calculation procedures are given in Annex A. Information on the precision of the test method is given in Annex B.</i></p>

	<p>The calibration procedures are given in Annexes C and D, of which C is a normative annex.</p> <p><i>NOTE</i> This European Standard has been developed to determine the reaction to fire performance of essentially flat products. The treatment of some families of products, e.g. linear products (pipes, ducts, cables etc.), can need special rules.</p>
CEN TS 1187:2012	<p><b>Test methods for external fire exposure to roofs</b></p> <p>This Technical Specification specifies four methods for determining the performance of roofs to external fire exposure. The four methods assess the performance of roofs under the following conditions:</p> <ul style="list-style-type: none"> <li>a) test 1 - with burning brands;</li> <li>b) test 2 - with burning brands and wind;</li> <li>c) test 3 - with burning brands, wind and supplementary radiant heat;</li> <li>d) test 4 - with two stages incorporating burning brands, wind and supplementary radiant heat.</li> </ul> <p>The tests assess the fire spread across the external surface of the roof, the fire spread within the roof (tests 1, 2 and 3), the fire penetration (tests 1, 3 and 4) and the production of flaming droplets or debris falling from the underside of the roof or from the exposed surface (tests 1, 3 and 4).</p> <p>Tests 2 and 3 are not applicable to geometrically irregular roofs or roof mounted appliances, e.g. ventilators and roof lights.</p> <p><i>NOTE</i> The four tests listed above do not imply any ranking order. Each test stands on its own without the possibility to substitute or exchange one for another.</p>
CEN TS 16459:2019	<p><b>External fire exposure of roofs and roof coverings - Extended application of test results from CEN/TS 1187</b></p> <p>This document gives guidance on the process and development of extended fields of application using test results obtained from CEN/TS 1187, tests 1 to 4, and included in test reports, and other relevant information in order to evaluate and classify the performance of roofs/roof coverings. This document provides a methodology to consider the possible effect(s) on classification to EN 13501-5 from single or multiple changes to the individual product and end-use application parameters of the roof/roof covering.</p> <p>Specific application guidance is given in Annex A, Annex B, Annex C and Annex D for CEN/TS 1187, tests 1 to 4 respectively.</p>
EN 50583-1:2016	<p><b>Photovoltaics in buildings - Part 1: BIPV module</b></p> <p>This document applies to photovoltaic modules used as construction products. It focuses on the properties of these photovoltaic modules relevant to essential building requirements as specified in the European Construction Product Regulation CPR 305/2011, and the applicable electro-technical requirements as stated in the Low Voltage</p>



<p>DRAFT prEN 50583-1- December 2023- Enquire deadline 2024- 03-08</p>	<p>Directive 2006/95/EC / or CENELEC standards. This document references international standards, technical reports and guidelines. For some applications in addition national standards (or regulations) for building products may apply in individual countries, which are not explicitly referenced here and for which harmonized European Standards are not yet available. The document is addressed to manufacturers, planners, system designers, installers, testing institutes and building authorities. This document does not apply to concentrating or building-attached photovoltaic modules. This document addresses requirements on the PV modules in the specific ways they are intended to be mounted but not the mounting structure itself, which is within the scope of EN 50583- 2.</p>
<p>EN 50583-2:2016</p>	<p><b>Photovoltaics in buildings - Part 2: BIPV systems</b></p> <p>This document applies to photovoltaic systems that are integrated into buildings with the photovoltaic modules used as construction products. It focuses on the properties of these photovoltaic systems relevant to essential building requirements as specified in the European Construction Product Regulation CPR 89/106/EEC, and the applicable electro-technical requirements as stated in the Low Voltage Directive 2006/95/EC / or CENELEC standards. This document references international standards, technical reports and guidelines. For some applications in addition national standards (or regulations) for building works may apply in individual countries, which are not explicitly referenced here. The document is addressed to manufacturers, planners, system designers, installers, testing institutes and building authorities. This document does not apply to concentrating or building-attached photovoltaic systems. This document addresses requirements on the BIPV systems in the specific ways they are intended to be mounted but not the BIPV modules as construction products, which is the topic of EN 50583-1.</p>
<p>CLC TR 50670:2016</p>	<p><b>External fire exposure to roofs in combination with photovoltaic (PV) arrays - Test method(s)</b></p> <p>This Technical Report provides test methods for the assessment of external fire exposure to roofs in combination with photovoltaic (PV) arrays which characterize potential impacts of PV arrays to an existing fire rating of roofs from an external fire exposure. The performance of roofs without PV to external fire exposure is defined in CEN/TS 1187. The test methods of CLC/prTR 50670 are only applicable to roof added installations. Building integrated PV is not covered by this standard. The test method refers to PV modules as test specimens without a specific mounting system as well as combinations of PV modules with particular mounting systems on tilted roofs and flat roofs.</p>

<p>CEI TS 82-89: 2022 (Italian Standard)</p>	<p>Rischio d'incendio nei sistemi fotovoltaici - Comportamento all'incendio dei moduli fotovoltaici installati su coperture di edifici: protocolli di prova e criteri di classificazione</p> <p><b>Fire Risk of Photovoltaic Systems - Fire behavior of Photovoltaic Modules installed on building roofs: test protocols and rating criteria</b></p> <p>This Technical Specification intends to describe some test protocols developed for the evaluation of the fire behavior of assemblies formed by photovoltaic module samples and roof samples, through some tests and the relative classification criteria.</p> <p>The protocols developed were developed starting from what is contained in CENELEC TR 50670:2016 "External fire exposure to roofs in combination with photovoltaic (PV) arrays - Test method(s)" and in UNI EN 13823:2022 "Prove di reazione al fuoco di prodotti di costruzione - Prodotti di costruzione esclusi pavimenti esposti ad un attacco termico prodotto da un unico oggetto", called SBI (Single Burning Item). In particular, the protocols described here use some test equipment and some measurements and variables already adopted in the context of Regulation (EU) no. 305/2011 of the European Parliament and of the Council, of 9 March 2011 "which sets harmonized conditions for the marketing of construction products and which repeals Council Directive 89/106/EEC" using samples of "PV roof" consisting of a portion of the photovoltaic module of interest installed above a fragment of the roof of a building representative of the same.</p> <p>Finally, the annex summarizes the results of an experimental campaign focused on the development and validation of the aforementioned protocols.</p>
<p>UNI 9176: 1998 (Italian Standard)</p>	<p><b>Preparazione dei materiali per l'accertamento delle caratteristiche di reazione al fuoco</b></p> <p><i>La norma descrive tre metodi di preparazione dei campioni dei materiali per l'accertamento delle loro caratteristiche di reazione al fuoco. La norma si applica a tutti i materiali sui quali si vuole determinare la reazione al fuoco secondo le UNI 8456, UNI 8457, UNI 9175 ed UNI 9796.</i></p>
<p>UNI 8457: 1987 (Italian Standard)</p>	<p><b>Prodotti combustibili suscettibili di essere investiti dalla fiamma su una sola faccia - Reazione al fuoco mediante applicazione di una piccola fiamma</b></p> <p><i>La norma descrive un metodo per la determinazione del tempo di post-combustione, del tempo di post-incandescenza, della zona danneggiata e del gocciolamento di una provetta sottoposta all'azione di una piccola fiamma applicata su una sola faccia.</i></p>

<p>UNI 9174:1987 (Italian Standard)</p>	<p><b>Reazione al fuoco dei prodotti sottoposti all'azione di una fiamma d'innesco in presenza di calore radiante</b></p> <p><i>La norma descrive un metodo per la determinazione della velocità di propagazione della fiamma lungo una superficie, della post-incandescenza, della zona danneggiata e del gocciolamento su una provetta sottoposta all'azione di una fiamma d'innesco in presenza di calore radiante.</i></p>
<p>UNI 9177:2008</p>	<p><b>Classificazione di reazione al fuoco dei prodotti combustibili</b></p> <p><i>La norma definisce la classificazione dei prodotti combustibili in base ai metodi di prova definite dalle UNI 8456, UNI 8457 e UNI 9174.</i></p> <p><b>Fire reaction classification of combustible products</b></p> <p><i>The standard defines the classification of combustible products according to the test methods defined in UNI 8456, UNI 8457 and UNI 9174</i></p>
<p>IEC TR 63226:2021</p>	<p><b>Managing fire risk related to photovoltaic (PV) systems on buildings</b></p> <p><i>IEC TR 63226:2021 is intended for use as guidance for reducing fire risks in general and for site-specific needs for buildings with PV systems. In addition to the general recommendations, technical, installation, and maintenance measures can be selected to reach the intended safety level of the PV system and building, depending on the results of a risk assessment. This document contains general information about building related risks and includes measures for reducing those risks. These measures are not general requirements or recommendations. They are explained as a guide for selecting suitable measures depending on the on-site needs</i></p>

## Photovoltaics in buildings

<p>EN 50583-1:2016</p> <p><b>DRAFT prEN 50583-1- December 2023- Enquire deadline 2024-03-08</b></p>	<p><b>Photovoltaics in buildings - Part 1: BIPV module</b></p> <p>This document applies to photovoltaic modules used as construction products. It focuses on the properties of these photovoltaic modules relevant to essential building requirements as specified in the European Construction Product Regulation CPR 305/2011, and the applicable electro-technical requirements as stated in the Low Voltage Directive 2006/95/EC / or CENELEC standards. This document references international standards, technical reports and guidelines. For some applications in addition national standards (or regulations) for building products may apply in individual countries, which are not explicitly referenced here and for which harmonized European Standards are not yet available. The document is addressed to manufacturers, planners, system designers, installers, testing institutes and building authorities. This document does not apply to concentrating or building-attached photovoltaic modules. This document addresses requirements on the PV modules in the specific ways they are intended to be mounted but not the mounting structure itself, which is within the scope of EN 50583- 2.</p> <p><i>Added: The CE mark of building integrated photovoltaic (BIPV) modules will thus state properties based on both documents as they are both equally applicable.</i></p>
<p>EN 50583-2:2016</p> <p><b>prEN 50583-2 (pr=74288) Photovoltaics in buildings - Part 2: BIPV systems</b></p>	<p><b>Photovoltaics in buildings - Part 2: BIPV systems</b></p> <p>This document applies to photovoltaic systems that are integrated into buildings with the photovoltaic modules used as construction products. It focuses on the properties of these photovoltaic systems relevant to essential building requirements as specified in the European Construction Product Regulation CPR 89/106/EEC, and the applicable electro-technical requirements as stated in the Low Voltage Directive 2006/95/EC / or CENELEC standards. This document references international standards, technical reports and guidelines. For some applications in addition national standards (or regulations) for building works may apply in individual countries, which are not explicitly referenced here. The document is addressed to manufacturers, planners, system designers, installers, testing institutes and building authorities. This document does not apply to concentrating or building-</p>



	<p>attached photovoltaic systems. This document addresses requirements on the BIPV systems in the specific ways they are intended to be mounted but not the BIPV modules as construction products, which is the topic of EN 50583-1.</p> <p><b>Project – under drafting</b></p>
<p>IEC 63092-1:2020</p> <p><i>not implemented</i></p> <p>EN</p>	<p><b>Photovoltaics in buildings - Part 1: Requirements for building-integrated photovoltaic modules</b></p> <p>IEC 63092-1:2020 specifies BIPV (building-integrated photovoltaic) module requirements and applies to photovoltaic modules used as building products. It focuses on the properties of these photovoltaic modules relevant to basic building requirements and the applicable electro-technical requirements. This document addresses requirements on the BIPV modules in the specific ways they are intended to be mounted but not the mounting structure itself, which is within the scope of IEC 63092-2. This document is based on EN 50583-1</p>
<p>IEC 63092-2:2020</p> <p><i>not implemented</i></p> <p>EN</p>	<p><b>Photovoltaics in buildings - Part 2: Requirements for building-integrated photovoltaic systems</b></p> <p>EC 63092-2:2020 specifies BIPV system requirements and applies to photovoltaic systems that are integrated into buildings with the photovoltaic modules used as building products. It focuses on the properties of these photovoltaic systems relevant to basic building requirements and the applicable electrotechnical requirements.</p> <p>This document addresses requirements on the BIPV systems in the specific ways they are intended to be mounted and the mounting structure, but not the BIPV module itself, which is within the scope of IEC 63092-1.</p>
<p>Project</p> <p>IEC 63092-3NP</p> <p>draft</p>	<p><b>PHOTOVOLTAICS IN BUILDINGS 2 Part 3: Evaluation methodology of Solar Heat Gain Coefficient for Building integrated 3 photovoltaic modules with Various Designs</b></p> <p>This document is intended to provide a versatile method to evaluate the solar heat gain coefficient (SHGC) of BIPV modules with a variety of designs. This standard applies to BIPV modules as defined in IEC63092-1 and to different module designs but using identical components such as cells, interconnection, encapsulations and front/back sheets. The BIPV modules are often custom made and the design qualification is complicated. In particular, SHGC measurements for construction components employ a sample with a standard size, being different from IEC standards. Manufacturers and users therefore have intense demands for a simplified method applicable to variety of BIPV modules using identical components. The test method consists of two successive steps, evaluation for BIPV modules with standard size and evaluation for transparent glass samples. By using these data, one can obtain the</p>



	<p>g-values for each PV cell area ratio and can determine the g-value for modules with different sizes and cell configurations. Thus, this standard is mainly applied the determination of g value for BIPV module by using hot box method in accordance with ISO 19467 and ISO 19467-2 The Part 1 and Part 2 of this series describes general requirements for BIPV modules and systems, respectively. The Part 3 describes specific requirements in evaluation of SHGC for various design of BIPV modules and provide a complementary information to Part</p>
<p>82/2194/NP Project TC 82/JWG 11 - IEC CD stage 5-2024</p>	<p><b>Building integrated photovoltaic (BIPV) - Identification code for building-integrated photovoltaic modules</b></p> <p>This document specifies the content and structure of a building-integrated photovoltaic (BIPV) module identification code in order to establish, on a world-wide basis, a uniform identification numbering system for building-integrated photovoltaic modules.</p> <p>This document applies to building-integrated photovoltaic modules as defined in IEC 63092-1.</p>
<p>82/2195/NP Project</p>	<p><b>Supplemental Test requirement of building-integrated photovoltaic (BIPV) module containing an additional glass to a certified PV module</b></p> <p><b>This document defines the approach to maintain type approval</b>, design and safety qualification of building-integrated PV modules including modules with more than two glass panes and insulating glass modules which are made up of a certified glass-glass PV module.</p> <p>The performance of the final BIPV product can be impacted by the change in either the structure or the manufacturing process of the BIPV modules.</p> <p>This document lists typical structure and the retesting requirements on the different test standards.</p> <p>Those products successfully passing the test procedures defined in this standard are considered to be compliant with the standard in a full qualification.</p>

## Normative documents referred to by the EN 50583-1 e EN 50583-2

<p>EN 410</p>	<p><b>Glass in building — Determination of luminous and solar characteristics of glazing</b></p> <p>This European Standard specifies methods of determining the luminous and solar characteristics of glazing in buildings. These characteristics can serve as a basis for lighting, heating and cooling calculations of rooms and permit comparison between different types of glazing.</p> <p>This European Standard applies both to conventional glazing and to absorbing or reflecting solar-control glazing, used as vertical or horizontal glazed apertures. The appropriate formulae for single, double and triple glazing are given.</p> <p>This European Standard is accordingly applicable to all transparent materials except those which show significant transmission in the wavelength region 5 µm to 50 µm of ambient temperature radiation, such as certain plastic materials.</p> <p>Materials with light-scattering properties for incident radiation are dealt with as conventional transparent materials subject to certain conditions (see 5.2).</p> <p>Angular light and solar properties of glass in building are excluded from this Standard. However, research work in this area is summarised in E.1, E.2 and E.3.</p> <p>While this European Standard presents the formulae for the exact calculations of the spectral characteristics of glazing, it does not consider the uncertainty of the measurements necessary to determine the spectral parameters that are used in the calculations. It should be noted that, for simple glazing systems where few measurements are required, the uncertainty of the results will be satisfactory if correct measurements procedures have been followed. When the glazing systems become complex and a large number of measurements are required to determine the spectral parameters, the uncertainty is cumulative with the number of measurements and should be considered in the final results.</p> <p>The term interface used in this European Standard, is considered to be a surface characterized by its transmission and reflections of light intensities.</p>
<p>EN 356</p> <p>In blue lettering: Added in the pr50583-1</p>	<p><b>Glass in building - Security glazing - Testing and classification of resistance against manual attack</b></p> <p>The standard specifies requirements and test methods for safety glass designed to resist actions due to external forces by delaying, for a limited period of time, the access of objects and/or persons to a protected space. The standard classifies safety glass into categories of resistance to external actions.</p>
<p>prEN 410:2023</p>	<p><b>Glass in building - Determination of luminous and solar characteristics of glazing</b></p>
<p>EN 572-9</p>	<p><b>Glass in building - Basic soda lime silicate glass products - Part 9: Evaluation of conformity/Product standard</b></p>



EN 673	<p><b>Glass in building — Determination of thermal transmittance (U value) — Calculation method</b></p> <p>This European Standard specifies a calculation method to determine the thermal transmittance of glazing with flat and parallel surfaces.</p> <p>This European Standard applies to uncoated glass (including glass with structured surfaces, e.g. patterned glass), coated glass and materials not transparent in the far infrared which is the case for soda lime glass products, borosilicate glass and glass ceramic. It applies also to multiple glazing comprising such glasses and/or materials. It does not apply to multiple glazing which include in the gas space sheets or foils that are far infrared transparent. The procedure specified in this European Standard determines the U value ) (thermal transmittance) in the central area of glazing.</p> <p>The edge effects due to the thermal bridge through the spacer of a sealed glazing unit or through the window frame are not included. Furthermore, energy transfer due to solar radiation is not taken into account. The effects of Georgian and other bars are excluded from the scope of this European Standard.</p> <p>The Standard for the calculation of the overall U value of windows, doors and shutters (see A.1) gives normative reference to the U value calculated for the glazing components according to this standard.</p> <p>For the purpose of product comparison, a vertical position of the glazing is specified. In addition, U values are calculated using the same procedure for other purposes, in particular for predicting:</p> <ul style="list-style-type: none"><li>- heat loss through glazing;</li><li>- conduction heat gains in summer;</li><li>- condensation on glazing surfaces;</li><li>- the effect of the absorbed solar radiation in determining the solar factor (see Clause 2).</li></ul> <p>Reference should be made to [3], [4] and [5] or other European Standards dealing with heat loss calculations for the application of glazing U values determined by this standard.</p> <p>A procedure for the determination of emissivity is given in EN 12898.</p> <p>The rules have been made as simple as possible consistent with accuracy.</p>
EN 674	<p><b>Glass in building — Determination of thermal transmittance (U value) — Guarded hot plate method</b></p> <p>This European Standard specifies a measurement method to determine the thermal transmittance of glazing with flat and parallel surfaces. Structured surfaces, e.g. patterned glass, can be considered to be flat.</p> <p>This European Standard applies to multiple glazing with outer panes which are not transparent to far infrared radiation, which is the case for soda lime silicate glass products, borosilicate glass and glass ceramics. Internal elements may be far infrared transparent.</p> <p>The procedure specified in this European Standard determines the U value ) (thermal transmittance) in the central area of glazing. The edge effects, due to the thermal bridge through the spacer of an insulating glass unit or through the window frame are</p>



	<p>not included. Furthermore energy transfer due to solar radiation is not taken into account.</p> <p>The procedure specified in this European Standard should generally only be considered when the calculation method detailed in EN 673 is inappropriate or unsuitable.</p> <p>The document for the calculation of the overall U value of windows, doors and shutters (see [3]) gives normative reference to the U value evaluated for the glazing components according to this standard.</p> <p>A vertical position of the glazing is specified.</p> <p>U values evaluated according to the present standard are used for product comparison as well as for other purposes, in particular for predicting:</p> <ul style="list-style-type: none"><li>- heat loss through glazing;</li><li>- conduction heat gains in summer;</li><li>- condensation on glazing surfaces;</li><li>- the effects of the absorbed solar radiation in determining the solar factor (see [1]).</li></ul> <p>Reference should be made to [4], [5], or other European Standards dealing with heat loss calculations for the application of glazing U values determined by this standard.</p> <p>The determination of the thermal transmittance is performed for conditions which correspond to the average situation for glazing in practice.</p>
EN 675	<p><b>Glass in building — Determination of thermal transmittance (U value) — Heat flow meter method</b></p> <p>This European Standard specifies a measurement procedure to determine the thermal transmittance of glazing with flat and parallel surfaces. For the purpose of this Standard, structured surfaces may be considered to be flat.</p> <p>This European Standard applies to multiple glazing with outer panes which are not transparent to far infrared radiation (in the wavelength range 5 to 50<math>\mu</math>m), which is the case for soda lime silicate glass products, borosilicate glass and glass ceramics. Internal elements can be far infrared transparent.</p> <p>The procedure specified in this European Standard determines the U value (thermal transmittance) in the central area of glazing. The edge effects due to the thermal bridge through the spacer of an insulating glass unit or through the window frame are not included.</p> <p>The edge effects due to the thermal bridge through the spacer of an insulating glass unit or through the window frame are excluded. Energy transfer due to solar radiation is also excluded.</p> <p>The procedure specified in this European Standard should be considered only when the thermal transmittance of the glazing cannot be calculated in accordance with EN 673.</p>

	<p>The determination of the thermal transmittance is performed for conditions which correspond to the average situation for glazing in practice.</p> <p>NOTE Patterned glass is an example of a glass with a structured surface;</p> <p>For the purposes of product comparison, a vertical position of the glazing is specified (see Clause 10).</p> <p>U values evaluated according to the present standard are used for product comparison as well as for other purposes, in particular for predicting:</p> <ul style="list-style-type: none"> <li>- heat loss through glazing;</li> <li>- conduction heat gains in summer;</li> <li>- condensation on glazing surfaces;</li> <li>- the effects of the absorbed solar radiation in determining the solar factor (see A.2).</li> </ul> <p>Reference should be made to A.3, A.4, A.5 or other European Standards dealing with heat loss calculations for the application of glazing U values determined by this Standard.</p> <p>The determination of the thermal transmittance is performed for conditions which correspond to the average situation for glazing in practice.</p> <p>NOTE Patterned glass is an example of a glass with a structured surface.</p>
<b>EN 1063</b>	<b>Glass in building - Security glazing - Testing and classification of resistance against bullet attack</b>
<b>EN 1096-4</b>	<b>Glass in building - Coated glass - Part 4: Product standard</b>  This European Standard covers the evaluation of conformity and the factory production control of coated glass for use in buildings. NOTE For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.
EN 1279-5	<b>Glass in building — Insulating glass units — Part 5: Evaluation of conformity</b>  This document covers the product standard of insulating glass units (IGU) for use in buildings. Units for which the intended use is only artistic and therefore no essential characteristics are required, are not subject to CE marking and are not part of this standard. NOTE For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.
<b>EN 1863-2</b>	<b>Glass in building - Heat strengthened soda lime silicate glass - Part 2: Evaluation of 73 conformity/Product standard</b>  This document covers the evaluation of conformity and the factory production control of flat heat strengthened soda lime silicate glass for use in buildings.

	Note: For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.
EN 1990	Eurocode: Basis of structural design
EN 1991	Eurocode 1: Actions on structures
EN 1993	Eurocode 3: Design of steel structures
EN 1994	(all parts), Eurocode 4 - Design of composite steel and concrete structures
EN 1995	(all parts), Eurocode 5 - Design of timber structures
EN 1998	(all parts), Eurocode 4: - Design of structures for earthquake resistance
EN 1999	Eurocode 9: Design of aluminium structures
EN 1999	Eurocode 9: Design of aluminium structures
<b>EN 12150-2</b>	<p><b>Glass in building - Thermally toughened soda lime silicate safety glass - Part 2: Evaluation of 83 conformity/Product standard</b></p> <p>This document covers the evaluation of conformity and the factory production control of flat thermally toughened soda lime silicate safety glass for use in buildings.</p> <p>Note: For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.</p>
EN 12179	<p><b>Curtain walling — Resistance to wind load — Test method</b></p> <p>This standard defines the method for determining the resistance to wind load of curtain walling, both its fixed and openable parts, under positive and negative static air pressure. NOTE : This standard applies to any curtain walling product as defined in WI 00033238</p>
<b>EN 12337-2</b>	<p><b>Glass in building - Chemically strengthened soda lime silicate glass - Part 2: Evaluation of 85 conformity/Product standard</b></p> <p>This document covers the evaluation of conformity and the factory production control of flat chemically strengthened soda lime silicate glass for use in buildings.</p>
EN 12488	<p><b>Glass in buildings — Glazing recommendations — Assembly principles for vertical and sloping glazing</b></p> <p>This European Standard defines principles of glazing as well as recommendations on the selection of components, e.g. frame sections, beads, drainage holes, etc., for fitting glazing into frames of any material.</p> <p>This European Standard applies to all basic types of edge supported vertical and sloping glazing systems, in all types of fixed or opening frames used in buildings.</p> <p>This European standard specifies also the functions, requirements and installation of glazing blocks within a frame during its manufacturing, transportation, installation and operational life. The standard applies to glazing blocks used for all types of flat or curved glass, as well as to derived processed types of glass.</p> <p>For certain glass products, e.g. fire resistant glazing, security glass, other or additional requirements, rules or recommendations may apply.</p> <p>The standard is applicable to European climate conditions.</p> <p>This European Standard does not apply to the following:</p>

	<ul style="list-style-type: none"> <li>- glass blocks and paver units (EN 1051 1);</li> <li>- channel-shaped glass (EN 572 7);</li> <li>- structural sealant glazing (see EN 13022 1 and EN 13022 2 and ETAG 002);</li> <li>- adhesively bonded glazing in window;</li> <li>- point fixed glazing;</li> <li>- greenhouses (see EN 13031 1).</li> </ul> <p>As this standard gives basic assembly principles only, national requirements, rules or recommendations may also apply.</p>
EN 12519	<p><b>Windows and pedestrian doors — Terminology</b></p> <p>This document specifies general terminology for windows and pedestrian doors. The various terms are illustrated with the aid of figures.</p>
EN 12600	<p><b>Glass in building — Pendulum test — Impact test method and classification for flat glass</b></p> <p>This European Standard specifies a pendulum impact test method for single flat panes of glass for use in buildings. The test is intended to classify flat glass products in three principal classes by performance under impact and by mode of breakage.</p> <p>This standard does not specify requirements for applications, nor does it specify requirements for durability.</p>
EN 12758	<p><b>Glass in building — Glazing and airborne sound insulation — Product descriptions and determination of properties</b></p> <p>This European Standard assigns sound insulation values to all transparent, translucent and opaque glass products, described in the European Standards for basic, special basic or processed glass products, when intended to be used in glazed assemblies in buildings, and which exhibit properties of acoustic protection, either as a prime intention or as a supplementary characteristic.</p> <p>This document outlines the procedure, by which glass products may be rated, according to their acoustic performance which enables assessment of compliance with the acoustic requirements of buildings.</p> <p>Rigorous technical analysis of measurement data remains an option, but this standard is intended to enable the derivation of simpler indices of performance, which can be adopted with confidence by non-specialists.</p> <p>By adopting the principles of this standard the formulation of acoustic requirements in Building Codes and for product specification to satisfy particular needs for glazing is simplified</p>
EN 13022-1 (all parts)	<p><b>Glass in building — Structural sealant glazing</b></p> <p>This European Standard specifies requirements for the suitability for use of supported and unsupported glass products for use in Structural Sealant Glazing (SSG)</p>





<p>EN 13022-2</p>	<p>applications. Four schematic drawings of SSG systems are shown in Figure 1 and three section drawings of an SSG type II system are shown in Figure 2 for illustration purposes. This European Standard on glass products is considered as a supplement to the requirements specified in the corresponding standards with regard to verifying the suitability for use in SSG systems.</p> <p>Only soda lime silicate glasses are taken into consideration in this European Standard.</p> <p>Plastic glazing is excluded from the scope of this European Standard.</p> <p>Any glass products meeting the requirements of this European Standard are suitable for use in SSG systems as defined in ETAG 002 ) Structural sealant glazing system.</p> <p>All glass products are installed and bonded into the support under controlled environmental conditions as described in Clause 5 of FprEN 13022-2:20131.</p> <p>When the outer seal of the insulating glass unit has a structural function and/or is exposed to UV radiation without any protection, only silicone based sealant are permitted in the construction of the unit.</p> <p>This European Standard deals with the assembling and bonding of glass elements in a frame, window, door or curtain walling construction, or directly into the building by means of structural bonding of the glass element into or onto framework or directly into the building.</p> <p>It gives information to the assembler to enable him to organize his work and comply with requirements regarding quality control.</p> <p>Structural sealant glazing can be incorporated into the façades (curtain walls, doors and windows) or roofs as follows:</p> <ul style="list-style-type: none"> <li>- either vertically; or</li> <li>- up to 7° from the horizontal, i.e. 83° from the vertical.</li> </ul> <p>This European Standard only deals with the bonding to glass surfaces, i.e. coated or uncoated or enamelled, and metallic surfaces, i.e. aluminium (anodised or coated), stainless steel, as considered in G.2 of EN 15434:2006+A1:2010.</p>
<p>EN 13116</p>	<p><b>Curtain walling — Resistance to wind load — Performance requirements</b></p> <p>This standard specifies the structural performance requirements of curtain walling under wind load, both its fixed and openable parts, under positive and negative static air pressure.</p> <p>This standard applies to any curtain walling product as defined in prEN 13830.</p>
<p>EN 13119</p>	<p><b>Curtain walling — Terminology</b></p> <p>This European Standard describes terminology used in documents, drawings, specifications etc., when referring to the detailed elements of curtain walling and provides a comprehensive, though not total, list of regular terms.</p>

	<p>It does not set out to repeat those physical definitions properly included within individual curtain walling standards related to performance requirements and associated test methods.</p>
<p>EN 13501-1 (v)</p>	<p><b>Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests</b></p> <p>This document provides the reaction to fire classification procedure for all construction products, including products incorporated within building elements with the exception of power, control and communication cables which are covered by EN 13501-6.</p> <p>Products are considered in relation to their end use application.</p> <p>This document applies to three categories, which are treated separately in this document:</p> <ul style="list-style-type: none"> <li>- construction products, excluding floorings and linear pipe thermal insulation products;</li> <li>- floorings;</li> <li>- linear pipe thermal insulation products.</li> </ul> <p>NOTE For CE marking of construction products under the Construction Product Regulation ((EC) 305/2011) the NPD option can be used when no reaction of fire performance is to be declared.</p>
<p>EN 13501-2 (v)</p>	<p><b>Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services</b></p> <p>This document specifies the procedure for classification of construction products and building elements using data from fire resistance and/or smoke leakage/control tests and/or mechanical tests which are within the direct field of application of the relevant test method. Classification on the basis of extended application of test results is also included in the scope of this document.</p> <p>This document deals with:</p> <p>a) loadbearing elements without a fire separating function:</p> <ul style="list-style-type: none"> <li>- walls;</li> <li>- floors;</li> <li>- roofs;</li> <li>- beams;</li> <li>- columns;</li> <li>- balconies;</li> <li>- walkways;</li> <li>- stairs.</li> </ul> <p>b) loadbearing elements with a fire separating function, with or without glazing, services and fixtures:</p> <ul style="list-style-type: none"> <li>- walls;</li> <li>- floors;</li> <li>- roofs;</li> <li>- raised floors.</li> </ul> <p>c) products and systems for protecting elements or parts of the works:</p> <ul style="list-style-type: none"> <li>- ceilings with no independent fire resistance;</li> </ul>



	<ul style="list-style-type: none"> <li>- fire protective coatings, claddings and screens;</li> <li>d) non-loadbearing elements or parts of works, with or without glazing, services and fixtures:             <ul style="list-style-type: none"> <li>- partitions;</li> <li>- facades (curtain walls) and external walls;</li> <li>- ceilings with independent fire resistance;</li> <li>- raised floors;</li> <li>- fire resisting doorsets, shutter assemblies and openable windows and their closing devices;</li> <li>- smoke control doorsets and shutter assemblies and their closing devices;</li> <li>- conveyor systems and their closures;</li> <li>- penetration seals;</li> <li>- linear joint seals;</li> <li>- combined penetration seals;</li> <li>- service ducts and shafts;</li> <li>- air transfer grilles.</li> <li>- chimneys.</li> </ul> </li> <li>e) wall and ceiling coverings with fire protection ability.</li> <li>f) lift landing doors which are tested according to EN 81-58 are excluded from this document. Lift landing doors which are tested in accordance with EN 1634-1 are classified in accordance with 7.5.5.</li> </ul> <p>Relevant test methods which have been prepared for these construction products are listed in Clauses 2 and 7.</p>
EN 13501-5 (v)	<p><b>Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roofs tests</b></p> <p>This European Standard provides the fire performance classification procedures for roofs/roof coverings exposed to external fire based on the four test methods given in CEN/TS 1187:2012 and the relevant extended application rules.</p> <p>For the classification of a roof/roof covering, only those test methods and those application rules need to be applied for which the corresponding classification is envisaged.</p> <p>Products are considered in relation to their end use application.</p> <p>NOTE The distinction between roofs with a steep slope and facades, in terms of the test and classification standard to be applied, may be subject to national regulations.</p> <p>General information on the four test methods in CEN/TS 1187 is given in Annex A.</p>
EN 13541	<p><b>Glass in building - Security glazing - Testing and classification of resistance against explosion pressure</b></p> <p>This European Standard specifies a test method, performance requirements and classification for explosion pressure resistant glazing for use in buildings.</p> <p>The explosion pressure resistant glazing is intended to offer resistance against explosives with respect to human safety.</p> <p>This European Standard concerns a method of test against blast waves generated using a shock tube or similar facility to simulate a high explosive detonation.</p>

	<p>The classification is only valid for tested glass sizes of about 1 m<sup>2</sup>. Based on theoretical considerations and/or experimental work, the results can be used for estimating the explosion-pressure-resistance of other glass sizes.</p> <p>NOTE 1 The resistance classes are not assigned to specific situations. For each individual case the individual who specifies, if necessary with the help of experts in the field of explosion, should be consulted.</p> <p>NOTE 2 The protection provided by explosion-resistant-glazing not only depends on the product itself, but also on the design and fixing of the glass.</p>
EN 13830	<p><b>Curtain walling — Product standard</b></p> <p>This European Standard specifies requirements of curtain walling kit intended to be used as a building envelope to provide weather resistance, safety in use and energy economy and heat retention and provides test/assessments/calculation methods and compliance criteria of the related performances.</p> <p>The curtain walling kit covered by this standard should fulfil its own integrity and mechanical stability but does not contribute to the load bearing or stability of the main building structure, and could be replaced independently of it.</p> <p>This standard applies to curtain walling kit ranging from a vertical position to <math>\pm 15^\circ</math> from the vertical. Any sloping parts should be contained within the curtain walling kit.</p> <p>This standard is applicable to the whole of the curtain walling kits, including the fixings.</p> <p>Curtain walling according to this standard is intended to be used as part of the building envelope.</p> <p>This European Standard does not include:</p> <ul style="list-style-type: none"> <li>— “Patent glazing” (glazed sloping roofs) kits;</li> <li>— Roof glazing constructions;</li> <li>— Façades made of precast concrete panels as part of the wall (see EN 14992).</li> </ul> <p>NOTE 1 Precast concrete panels may be used in curtain walling kits as infill panels.</p> <p>NOTE 2 Durability of structural sealed glazing infills is not covered by this standard.</p>
EN 13956	<p><b>Flexible sheets for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics</b></p> <p>This European Standard specifies the definitions and characteristics of plastic and rubber sheets including sheets made out of their blends and alloys (thermoplastic rubber) for which the intended use is roof waterproofing. It specifies the requirements and test methods and provides for the evaluation of conformity of the products with the requirements of this European Standard.</p> <p>NOTE For typical materials and applications, see Annex E.</p>
EN 14179-2	<p><b>Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 2: 102 Evaluation of conformity/Product standard</b></p> <p>This document specifies requirements, the evaluation of conformity and the factory production control of flat heat soaked thermally toughened soda lime silicate safety glass for use in buildings.</p>

	<p><b>NOTE</b> For glass products with electrical wiring or connections for, e.g. alarm or heating purposes, other directives, e.g. Low Voltage Directive, may apply.</p>
EN 14351-1	<p><b>Windows and doors — Product standard, performance characteristics — Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics</b></p> <p>This European Standard identifies material independent performance characteristics, except resistance to fire and smoke control characteristics, that are applicable to windows (including roof windows, roof windows with external fire resistance and door height windows), external pedestrian doorsets (and their assemblies, including unframed glass doorsets, escape route doorsets) and screens.</p> <p>Fire resisting and/or smoke control characteristics for pedestrian doorsets and openable windows are covered by EN 16034.</p> <p>This European Standard applies to:</p> <p>a) fixed windows or fixed lights, manually or power operated windows and door height windows, and screens for installation in vertical wall apertures and roof windows for installation in roofs, complete with:</p> <ol style="list-style-type: none"> <li>1) related hardware, if any;</li> <li>2) weather stripping, if any;</li> <li>3) glazed apertures when intended to have glazed apertures;</li> <li>4) with or without incorporated shutters and/or shutter boxes and/or blinds; and manually or power operated windows, roof windows, door height windows and screens that are:</li> <li>5) fully or partially glazed including any non-transparent infill;</li> <li>6) fixed or partly fixed or openable with one or more casements/sashes (e.g. hinged, projecting, pivoted, sliding);</li> </ol> <p>b) manually operated external pedestrian doorsets with flush or panelled leaves, complete with:</p> <ol style="list-style-type: none"> <li>1) integral fanlights, if any;</li> <li>2) adjacent parts that are contained within a single frame for inclusion in a single aperture, if any.</li> </ol> <p>The windows covered by this standard are not assessed regarding their ability to release (to open).</p> <p>The products covered by this European Standard are not assessed for structural applications.</p> <p>This European Standard does not apply to:</p> <ul style="list-style-type: none"> <li>- rooflights according to EN 1873 and EN 14963;</li> <li>- curtain walling according to EN 13830;</li> <li>- industrial, commercial and garage doors and gates according to EN 13241;</li> <li>- internal pedestrian doorsets according to prEN 14351 2;</li> <li>- revolving doorsets;</li> <li>- power operated pedestrian doorsets according to EN 16361;</li> <li>- windows intended to be part of internal partition.</li> </ul>
EN 14449	<p><b>Glass in building — Laminated glass and laminated safety glass — Evaluation of conformity/ Product standard</b></p> <p>This European Standard covers the evaluation of conformity and the factory production control of</p> <ul style="list-style-type: none"> <li>- EN ISO 12543-2: Laminated safety glass;</li> <li>- EN ISO 12543-3: Laminated glass;</li> </ul> <p>inclusive laminated (safety) glass with fire resistant properties.</p>

	<p>For glass products with electrical wiring or connections for e.g. alarm or heating purposes, this standard covers only wiring subject for electrical potential difference to earth less than 50 V a.c. or less than 75 V d.c.</p>
EN 14500	<p><b>Blinds and shutters — Thermal and visual comfort — Test and calculation methods</b></p> <p>This document defines test and calculation methods for the determination of the reflection and transmission characteristics to be used to determine the thermal and visual comfort performance classes of external blinds, internal blinds and shutters, as specified in EN 14501:2021.</p> <p>This document also specifies the method to determine the darkening performance of external blinds, internal blinds and shutters, as specified in EN 14501:2021.</p> <p>This document applies to the whole range of shutters, awnings and blinds defined in EN 12216, described as solar protection devices in this document. Some of the characteristics (e.g. g<sub>tot</sub>) are not applicable when products are not parallel to the glazing (e.g. folding-arm awnings).</p> <p>NOTE 1 Informative Annex D presents an approach for the determination of characteristics in case of projectable products.</p> <p>Retro-reflecting products are outside the scope of this document for reflectance measurements.</p> <p>NOTE 2 Retro-reflecting products refer to products for which the reflected radiation comes back to the light source in the same direction.</p> <p>Products using a significant amount of fluorescent are outside the scope of this document.</p> <p>NOTE 3 "Significant amount" refers to materials which are designed to be fluorescent or retroreflective and marketed as such. It does not refer to trace amounts of materials exhibiting fluorescence, e.g. for colour or identification purposes. Small amounts of materials such as titanium dioxide, which are not primarily included to achieve fluorescence, can be present.</p>
EN 14782	<p><b>Self-supporting metal sheet for roofing, external cladding and internal lining — Product specification and requirements</b></p> <p>This European Standard specifies the terminology, requirements and test methods for factory made self-supporting metal sheets and tiles (for non-structural applications) delivered in the form of manufactured pieces for roofing and wall cladding and lining.</p> <p>This standard also covers ceiling (including internal metal sheet) and soffit applications and cassettes (see Figure 1).</p> <p>This standard covers self-supporting copper, zinc, steel, aluminium and stainless steel sheet with or without coatings, e.g. metallic, organic, inorganic or multi-layer (see Annex A). A moisture retaining layer may be present on the reverse side of the product.</p> <p>This standard also includes rules for marking, labelling and evaluation of conformity.</p> <p>This standard does not cover products for structural purposes, i.e. it does not cover products intended to contribute to the global or partial stability of the building structure by providing racking resistance or resistance to permanent static loads (excluding self-weight of the metal sheet).</p> <p>Requirements concerning acoustical and thermal insulation properties are not considered in this standard.</p>

	<p>This standard does not include calculation or design requirements with regards to the works, installation techniques or the performance of the installed products.</p>
EN 14783	<p><b>Fully supported metal sheet and strip for roofing, external cladding and internal lining — Product specification and requirements</b></p> <p>This European Standard specifies the terminology, requirements and test methods for metal coil, strip, and flat sheets and factory-made pieces intended for fully supported applications in roofing and wall cladding or lining. It does not apply to products manufactured on site.</p> <p>This European Standard covers fullysupported aluminium, copper, lead, steel, stainless steel and zinc products with or without coatings, e.g. metallic, organic, inorganic or multi-layer (see Annex A).</p> <p>This European Standard also includes rules for marking, labelling and evaluation of conformity.</p> <p>Requirements concerning acoustical and insulation properties are not considered in this European Standard.</p> <p>This European Standard does not include calculation or design requirements with regards to the works, installation techniques or the performance of the installed products.</p>
EN 15804	<p><b>Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products</b></p> <p>This European standard provides core product category rules (PCR) for Type III environmental declarations for any construction product and construction service.</p> <p>NOTE The assessment of social and economic performances at product level is not covered by this standard.</p> <p>The core PCR:</p> <ul style="list-style-type: none"> <li>- defines the parameters to be declared and the way in which they are collated and reported,</li> <li>- describes which stages of a product’s life cycle are considered in the EPD and which processes are to be included in the life cycle stages,</li> <li>- defines rules for the development of scenarios,</li> <li>- includes the rules for calculating the Life Cycle Inventory and the Life Cycle Impact Assessment underlying the EPD, including the specification of the data quality to be applied,</li> <li>- includes the rules for reporting predetermined, environmental and health information, that is not covered by LCA for a product, construction process and construction service where necessary,</li> <li>- defines the conditions under which construction products can be compared based on the information provided by EPD.</li> </ul> <p>For the EPD of construction services the same rules and requirements apply as for the EPD of construction products.</p>
prEN 15941	<p><b>Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data</b></p>



	<p>This document supports the data quality assessment and selection of data for product-level Environmental Product Declarations (EPD) according to the core product category rules of EN 15804 and for the environmental performance assessment of buildings according to prEN 15978 1 in a consistent way. It can also be used to assess and select data for the environmental assessment of civil engineering works according to EN 17472.</p> <p>It defines data quality requirements with respect to temporal, technological and geographical representativeness for the data used to calculate the Life Cycle Assessment (LCA) based indicator results of the EPD and for construction works when applying EPD, life cycle inventory data or other LCA based information, and generates a hierarchy to support the selection of the most appropriate data with regard to data quality. It also addresses the reporting of data quality at product and building level.</p>
EN 15942	<p><b>Sustainability of construction works — Environmental product declarations — Communication format business-to-business</b></p> <p>This document is applicable to all construction products and services related to buildings and construction works. It specifies and describes the communication format for the information defined in EN 15804 for business-to-business communication to ensure a common understanding through consistent communication of information.</p> <p>NOTE This document does not deal with business-to-consumer communication and is not intended for that purpose. Business-to-consumer communication format is planned to be the subject of a future document.</p>
EN 15978	<p><b>Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method</b></p> <p>This European Standard specifies the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the outcome of the assessment. The standard is applicable to new and existing buildings and refurbishment projects.</p> <p>The standard gives:</p> <ul style="list-style-type: none"> <li>- the description of the object of assessment;</li> <li>- the system boundary that applies at the building level;</li> <li>- the procedure to be used for the inventory analysis;</li> <li>- the list of indicators and procedures for the calculations of these indicators;</li> <li>- the requirements for presentation of the results in reporting and communication;</li> <li>- and the requirements for the data necessary for the calculation.</li> </ul> <p>The approach to the assessment covers all stages of the building life cycle and is based on data obtained from Environmental Product Declarations (EPD), their "information modules" (prEN 15804) and other information necessary and relevant for carrying out the assessment. The assessment includes all building related construction products, processes and services, used over the life cycle of the building.</p> <p>The interpretation and value judgments of the results of the assessment are not within the scope of this European Standard.</p>



EN 16002	<p><b>Flexible sheets for waterproofing — Determination of the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing</b></p> <p>This document specifies a test method to determine the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing.</p> <p>The assessment is limited to the performance of the mechanically fastened flexible sheets only. The test method does not include the determination of the performance of the mechanical fastener and/or the combination of the mechanical fastener and the substrate</p>
EN 16612:2019	<p><b>Glass in building - Determination of the lateral load resistance of glass panes by calculation</b></p> <p>This document gives a method of determining the design value of the bending strength of glass. It gives: the general method of calculation, and guidance for lateral load resistance of linearly supported glazed elements used as infill panels</p> <p>NOTE Examples of lateral loads are wind loads, snow loads, self weight of sloping glass, and cavity pressure variations on insulating glass units.</p> <p>This document gives recommended values for the following factors for glass as a material:</p> <ul style="list-style-type: none"> <li>- material partial factors, <math>M;A</math> and <math>M;v</math> ;</li> <li>- factors for the load duration, <math>k_{mod}</math> ;</li> <li>- factor for stressed edges, <math>k_e</math>.</li> </ul> <p>Most glass in buildings is used as infill panels. This document covers those infill panels that are in a class of consequence lower than those covered in EN 1990, so proposed values for the partial load factors, <math>\gamma_Q</math> and <math>\gamma_G</math>, are given for these infill panels.</p> <p>The action of cavity pressure variations on insulating glass units is not covered by Eurocodes, so this document also gives proposed values of partial factors, 0, 1 and 2, for this action.</p> <p>This document does not determine suitability for purpose. Resistance to lateral loads is only one part of the design process, which could also need to take into account:</p> <ul style="list-style-type: none"> <li>- in-plane loading, buckling, lateral torsional buckling, and shear forces,</li> <li>- environmental factors (e.g. sound insulation, thermal properties),</li> <li>- safety characteristics (e.g. fire performance, mode of breakage in relation to human safety, security).</li> </ul> <p>This document does not apply to channel shaped glass, glass blocks and pavers, or vacuum insulated glass units.</p>
CEN/TS 19100	<p><b>(all parts), Design of glass structures</b></p> <p>1.1 Scope of CEN/TS 19100 3</p> <p>(1) This document gives design rules for mechanically supported glass components primarily subjected to in-plane loading. It also covers construction rules for mechanical joints for in-plane loaded glass components.</p>



	<p>NOTE In-plane loaded glass elements are primarily subjected to in-plane loads, e.g. transferred from adjacent parts of a structure. They can also be subjected to out-of-plane loading.</p> <p>1.2 Assumptions</p> <p>(1) The assumptions of EN 1990 apply to this document.</p> <p>(2) This document is intended to be used in conjunction with EN 1990, EN 1991 (all parts), EN 1993-1-1, EN 1995 1 1, EN 1998 1, EN 1999 1 1 and EN 12488.</p>
EN 50380	<p><b>Marking and documentation requirements for Photovoltaic Modules</b></p> <p><b>Datasheet and nameplate information for photovoltaic modules</b></p> <p>This European Standard describes marking, including nameplate and documentation requirements for non-concentrating photovoltaic modules. This European Standard provides mandatory information that needs to be included in the product documentation or affixed to the product to ensure safe and proper use. Best practices are included in this document giving guidance on additional information, for example module's performance at different irradiance levels. Markings, including nameplates, are permanently affixed information on the PV modules, which indelibly states the rating and other information as required by the relevant standard for safe use and maintenance. While, documentation information is a technical description separate from the photovoltaic module. This European Standard is based on IEC and EN standards defining marking, nameplate and documentation requirements for PV modules.</p>
HD 60364-7-12	<p>Low-voltage electrical installations - Part 7-712: Requirements for special installations or locations - Photovoltaic (PV) systems</p> <p>This section applies to the electrical installation of PV generator intended to supply all or part of an installation and feeding of electricity into the public grid or local distribution. In this section, the electrical equipment of a PV generator, like any other item of electrical equipment, is dealt with only so far as its selection and application in the installation is concerned. The electrical installation of a PV generator starts from a PV module or a set of PV modules connected in series with their cables, provided by the PV module manufacturer, up to the user installation or the utility supply point. Requirements of this document apply to – PV generators for supply to an installation which is not connected to a system for distribution of electricity to the public, – PV generators for supply to an installation in parallel with a system for distribution of electricity to the public, – PV generators for supply to an installation as an alternative to a system for distribution of electricity to the public, – appropriate combination of the above. Requirements for PV generators with batteries or other energy storage methods are under consideration.</p>
EN 61082-1 (v)	<p><b>Preparation of documents used in electrotechnology — Part 1: Rules</b></p>

	<p>IEC 61082-1:2014 establishes general rules and guidelines for the presentation of information in documents, and specific rules for diagrams, drawings and tables used in electrotechnology. This third edition cancels and replaces the second edition published in 2006. It constitutes a technical revision and includes the following changes: - inclusion of presentation rules for wireless interconnections; - description of exceptional cases for the application of rules for positioning of reference designations in diagrams; - correction of errors and update of the normative references; - harmonization of definitions with respect to referenced publications. This horizontal standard is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.</p>
<p>EN 61215-1  (see all the series)</p>	<p><b>Crystalline silicon terrestrial photovoltaic (PV) modules — Design qualification and type approval (IEC 61215)</b></p> <p>IEC 61215-1:2016 lays down requirements for the design qualification and type approval of terrestrial photovoltaic (PV) modules suitable for long-term operation in general open-air climates, as defined in IEC 60721-2-1. This standard is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules. The objective of this test sequence is to determine the electrical and thermal characteristics of the module and to show, as far as possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure in climates described in the scope. This edition of IEC 61215-1 includes the following significant technical changes with respect to the second edition of IEC 61215:2005: new standard series structure consistent with other IEC standards: Part 1 lists general requirements, Part 1-x specifics for each PV technology and Part 2 defines testing. All tests defined in Part 2 are MQTs (module quality tests)</p>
<p>EN 61730-1</p>	<p><b>Photovoltaic (PV) module safety qualification — Part 1: Requirements for construction (IEC 61730-1)</b></p> <p>IEC 61730-1:2016 specifies and describes the fundamental construction requirements for photovoltaic (PV) modules in order to provide safe electrical and mechanical operation. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses. This part of IEC 61730 pertains to the particular requirements of construction. IEC 61730-2 defines the requirements of testing. This International Standard series lays down IEC requirements of terrestrial photovoltaic modules suitable for long-term operation in open-air climates. This standard is intended to apply to all terrestrial flat plate module materials such as crystalline silicon module types as well as thin-film modules. This new edition includes the following significant technical changes with respect to the previous edition: - adaption of horizontal standards and inclusion of IEC 60664 and IEC 61140; - implementation of insulation coordination, overvoltage category, classes, pollution degree and material groups definition of creepage, clearance and distance through insulation.</p>
<p>EN 61730-2</p>	<p><b>Photovoltaic (PV) module safety qualification — Part 2: Requirements for testing (IEC 61730-2)</b></p>



	<p>IEC 61730-2:2023 RLV contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition.</p> <p>IEC 61730-2:2023 lists the tests a PV module is required to fulfil for safety qualification. This document applies for safety qualification only in conjunction with IEC 61730-1. The objective of this document is to provide the testing sequence intended to verify the safety of PV modules whose construction has been assessed by IEC 61730-1. The test sequence and pass criteria are designed to detect the potential breakdown of internal and external components of PV modules that would result in fire, electric shock, and/or personal injury. This document defines the basic safety test requirements and additional tests that are a function of the PV module end-use applications. The additional testing requirements outlined in relevant ISO documents, or the national or local codes which govern the installation and use of these PV modules in their intended locations, are considered in addition to the requirements contained within this document.</p>
CLC/TS 61836	<p><b>Solar photovoltaic energy systems — Terms, definitions, symbols</b></p> <p>IEC TS 61836:2016(E) deals with the terms, definitions and symbols from national and international solar photovoltaic standards and relevant documents used within the field of solar photovoltaic (PV) energy systems. It includes the terms, definitions and symbols compiled from the published IEC technical committee 82 standards. The main technical change with regard to the previous edition consists of adding / revising terms and definitions which have been discussed and agreed on during recent meetings of the TC 82 terminology working group</p>
EN 62446-1	<p><b>Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 1: Grid connected systems - Documentation, commissioning tests and inspection</b></p> <p>IEC 62446-1:2016 defines the information and documentation required to be handed over to a customer following the installation of a grid connected PV system. It also describes the commissioning tests, inspection criteria and documentation expected to verify the safe installation and correct operation of the system. It is for use by system designers and installers of grid connected solar PV systems as a template to provide effective documentation to a customer. This new edition cancels and replaces IEC 62446 published in 2009 and includes the following significant technical change with respect to IEC 62446:2009: expansion of the scope to include a wider range of system test and inspection regimes to encompass larger and more complex PV systems.</p>
EN 62446-2: 2016	<p><b>Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 2: Grid connected systems - Maintenance of PV systems</b></p> <p>IEC 62446-2:2020 describes basic preventive, corrective, and performance related maintenance requirements and recommendations for grid-connected PV systems. The maintenance procedures cover: -</p>

	<p>Basic maintenance of the system components and connections for reliability, safety and fire prevention - Measures for corrective maintenance and troubleshooting - Worker safety This document also addresses maintenance activities for maximizing anticipated performance such as module cleaning and upkeep of vegetation. Special considerations unique to rooftop or ground-mounted systems are summarized.</p>
IEC 62548-1: 2023 PRV	<p><b>Photovoltaic (PV) arrays - Part 1: Design requirements</b></p> <p><i>IEC 62548-1:2023 sets out design requirements for photovoltaic (PV) arrays including DC array wiring, electrical protection devices, switching and earthing provisions. The scope includes all parts of the PV array and final power conversion equipment (PCE), but not including energy storage devices, loads or AC or DC distribution network supplying loads. The object of this document is to address the design safety requirements arising from the particular characteristics of photovoltaic systems. This document also includes extra protection requirements of PV arrays when they are directly connected with batteries at the DC level.</i></p> <p><i>This first edition cancels and replaces IEC 62548 published in 2016. This edition includes the following significant technical changes with respect to the previous edition:</i></p> <ul style="list-style-type: none"> <li><i>a) Revised provisions for systems including DC to DC conditioning units.</i></li> <li><i>b) Revision of mounting structure requirements.</i></li> <li><i>c) Revised cable requirements.</i></li> <li><i>d) Revision of Clause 6 on safety issues which includes provisions for protection against electric shock including array insulation monitoring and earth fault detection.</i></li> <li><i>e) Revision of 7.2.7 and 7.3 with respect to isolation means.</i></li> <li><i>f) Provisions for use of bifacial modules and modules mounted in non-optimal orientations.</i></li> <li><i>g) New Annex F containing: KI factor calculations for bifacial and non-optimally oriented systems; anti-PID equipment and arc flash</i></li> </ul>
IEC/IEEE 82079-1	<p><b>Preparation of instructions for use — Structuring, content and presentation — Part 1: General principles and detailed requirements (IEC 82079-1)</b></p> <p>IEC/IEEE 82079-1:2019 is jointly developed and published by IEC, IEEE, and ISO and provides general principles and detailed requirements for the design and formulation of all types of instructions for use that will be necessary or helpful for users of products of all kinds, ranging from a tin of paint to large or highly complex products, such as large industrial machinery, turnkey based plants or buildings.</p> <p>IEC/IEEE 82079-1:2019 cancels and replaces the first edition IEC 82079-1:2012. This edition constitutes a technical revision. It includes the following significant technical changes with respect to the previous edition:</p> <ul style="list-style-type: none"> <li>a) The structure of this document has been rearranged in order to facilitate application of the standard and to make it easier to find information. Where possible, the language has been simplified.</li> </ul>



	<p>b) Information for use is introduced as a generic term. Instructions for use is a synonym for information for use. Step-by-step instructions is used as a subset of information for use.</p> <p>c) Clause 5 (principles) is revised and focuses on the purpose of information for use, the quality of information and the process for management of information.</p> <p>d) The process for preparation of information for use is integrated in the normative part and addressed comprehensively.</p> <p>e) Empirical methods for the evaluation of information for use are described in the normative part.</p> <p>f) The professional competencies needed for the preparation of information for use are addressed more comprehensively.</p> <p>g) Some aspects have been added to general requirements for information for use for complex systems of systems.</p> <p>h) Consideration is given to instructions for self-assembly products.</p> <p>i) An informative annex providing guidance on the fulfilment of specified requirements is introduced.</p> <p>IEC/IEEE 82079-1:2019 has the status of a horizontal standard in accordance with IEC Guide 108. It is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 108.</p> <p>One of the responsibilities of a technical committee is, wherever applicable, to make use of horizontal standards in the preparation of its publications. The contents of this horizontal standard will not apply unless specifically referred to or included in the relevant publications.</p>
<b>EN IEC 60904-9:2020</b>	<p><b>Photovoltaic devices - Part 9: Classification of solar simulator characteristics</b></p> <p>IEC standards for photovoltaic devices require the use of specific classes of solar simulators deemed appropriate for specific tests. Solar simulators can be either used for performance measurements of PV devices or endurance irradiation tests. This part of IEC 60904 provides the definitions of and means for determining simulator classifications at the required irradiance levels used for electrical stabilization and characterisation of PV devices.</p> <p>This document is applicable for solar simulators used in PV test and calibration laboratories and in manufacturing lines of solar cells and PV modules. The A+ category is primarily intended for calibration laboratories and is not considered necessary for power measurements in PV manufacturing and in qualification testing. Class A+ has been introduced because it allows for reduction in the uncertainty of secondary reference device calibration, which is usually performed in a calibration laboratory. Measurement uncertainty in PV production lines</p> <p>will directly benefit from a lower uncertainty of calibration, because production line measurements are performed using secondary reference devices.</p> <p>In the case of PV performance measurements, using a solar simulator of a particular class does not eliminate the need to quantify the influence of the simulator on the measurement by making spectral mismatch corrections and analysing the influences</p>



	<p>of spatial non-uniformity of irradiance in the test plane and temporal stability of irradiance on that measurement. Test reports for PV devices tested with the simulator report the class of simulator used for the measurement and the method used to quantify the simulator’s effect on the results.</p> <p>The purpose of this document is to define classifications of solar simulators for use in indoor measurements of terrestrial photovoltaic devices. Solar simulators are classified as A+, A, B or C based on criteria of spectral distribution match, irradiance non-uniformity in the test plane and temporal instability of irradiance. This document provides the required methodologies for determining the classification of solar simulators in each of the categories.</p> <p>A solar simulator which does not meet the minimum requirements of class C cannot be classified according to this document.</p> <p>For spectral match classification a new procedure has been added. This procedure addresses the actual need for an extended wavelength range, which is arising from advances in solar cell technology (such as increased spectral responsivity below 400 nm) as well as solar simulator technology (use of component LEDs). The procedure of the second edition of this standard is still valid, but is only applied if backward compatibility of classification for solar simulators already in use and for solar simulators in production/sale is required. This document is referred to by other IEC standards, in which class requirements are laid down for the use of solar simulators. The solar simulator characteristics described in this document are not used in isolation to imply any level of measurement confidence or measurement uncertainty for a solar simulator application (for example, PV module power measurement).</p> <p>Measurement uncertainties in each application depend on many factors, several of which are outside the scope of this document:</p> <ul style="list-style-type: none"> <li>• Characteristics of the solar simulator, possibly including characteristics not covered by this document;</li> <li>• Methods used to calibrate and operate the solar simulator;</li> <li>• Characteristics of the device(s) under test (for example, size and spectral responsivity);</li> <li>• Quantities measured from the device(s) under test, including equipment and methods used for measurement;</li> <li>• Possible corrections applied to measured quantities.</li> </ul> <p>When applications require a certain solar simulator characteristic, it is preferable to specify a numerical value rather than a letter classification (for example, “≤ 5 % non-uniformity of irradiance” rather than “C</p>
EN ISO 12543-1	<p><b>Glass in building - Laminated glass and laminated safety glass</b></p> <p><b>Part 1: Vocabulary and description of component parts (ISO 12543 1)</b></p> <p>This document defines terms and describes component parts for laminated glass and laminated safety glass for use in building.</p>
EN ISO 12543-2	<p><b>Glass in building -Laminated glass and laminated safety glass</b></p>

	<p><b>Part 2: Laminated safety glass (ISO 12543 2)</b></p> <p>This document specifies performance requirements for laminated safety glass as defined in ISO 12543-1.</p> <p>NOTE Any defects that are found in installed laminated safety glass are dealt with in ISO 12543-6</p>
EN ISO 12543-3	<p><b>Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass (ISO 12543 3)</b></p> <p>This document specifies performance requirements for laminated glass as defined in ISO 12543-1.</p> <p>NOTE Any defects that are found in installed laminated safety glass are dealt with in ISO 12543-6.</p>
EN ISO 12543-4	<p>Glass in building — Laminated glass and laminated safety glass — Part 4: Test methods for durability (ISO 12543 4)</p>
EN ISO 12543-5	<p><b>Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing (ISO 12543 5)</b></p> <p>This document specifies test methods relating to resistance to high temperature, humidity and radiation for laminated glass and laminated safety glass for use in building.</p>
EN ISO 12543-6	<p><b>Glass in building — Laminated glass and laminated safety glass — Part 6: Appearance (ISO 12543 6)</b></p> <p>This document specifies defects of finished sizes and test methods with regard to the appearance of laminated glass and laminated safety glass when looking through the glass.</p> <p>All references to laminated glass in this document refer to both laminated glass and laminated safety glass.</p> <p>NOTE Special attention is paid to acceptability criteria in the vision area.</p> <p>This document is applicable to finished sizes at the time of supply.</p>
EN 16613:2020	<p><b>Glass in building - Laminated glass and laminated safety glass - Determination of interlayer viscoelastic properties</b></p> <p>This European Standard specifies a test method for determining the mechanical viscoelastic properties of interlayer materials. The interlayers under examination are those used in the production of laminated glass and/or laminated safety glass. The interlayer properties are needed in order to determine the load resistance of laminated glass in accordance with prEN 16612 [1].</p> <p>From the tensile modulus in particular conditions of temperature and load duration, an interlayer can be placed into a family that relates to a specific interlayer shear transfer coefficient, . This value can be used in the simplified calculation method described in prEN 16612 [1].</p>



	An informative annex explains the background to the determination of families relating to a specific interlayer shear transfer coefficient.
Project ISO 18178 (ISO/TC 160/SC 1)	<b>Glass in building — Laminated solar photovoltaic glass for BIPV system</b>  This document specifies requirements of appearance, durability and safety, test methods and designation for laminated solar photovoltaic (PV) glass for use in buildings. This document is applicable to building-integrated photovoltaics (BIPV) system. The additional testing requirements outlined in relevant IEC standards, or the national or local codes which govern the installation and use of these PV modules in their intended locations, should be considered in addition to the requirements contained within this standard
Project ISO xxxxx	<b>Glass in Building - Technical Assessment for Scrap Judgment of Building Integrated Photovoltaic Component</b>  This standard specifies the technical assessment for BIPV components waste treatment in terms of structural safety and electrical safety.  This standard applies to determine whether the BIPV components in use should be scrapped.
EN ISO 12631	Thermal performance of curtain walling — Calculation of thermal transmittance (ISO 12631)  ISO 12631:2017 specifies a method for calculating the thermal transmittance of curtain walls consisting of glazed and/or opaque panels fitted in, or connected to, frames.  The calculation includes: <ul style="list-style-type: none"> <li>- different types of glazing, e.g. glass or plastic; single or multiple glazing; with or without low emissivity coating; with cavities filled with air or other gases;</li> <li>- frames (of any material) with or without thermal breaks;</li> <li>- different types of opaque panels clad with metal, glass, ceramics or any other material.</li> </ul> Thermal bridge effects at the rebate or connection between the glazed area, the frame area and the panel area are included in the calculation.  The calculation does not include: <ul style="list-style-type: none"> <li>- effects of solar radiation;</li> <li>- heat transfer caused by air leakage;</li> <li>- calculation of condensation;</li> <li>- effect of shutters;</li> <li>- additional heat transfer at the corners and edges of the curtain walling;</li> <li>- connections to the main building structure nor through fixing lugs;</li> <li>- curtain wall systems with integrated heating.</li> </ul>



	<p>NOTE Table 1 in the Introduction shows the relative position of ISO 12631:2017 within the set of EPB standards in the context of the modular structure as set out in ISO 52000-1.</p>
<p><b>EN ISO 52022-3,</b></p>	<p><b>Energy performance of buildings - Thermal, solar and daylight properties of building 126 components and elements - Part 3: Detailed calculation method of the solar and daylight characteristics for solar 127 protection devices combined with glazing</b></p> <p>This document specifies a detailed method, based on the spectral transmission data of the materials, comprising the solar protection devices and the glazing, to determine the total solar energy transmittance and other relevant solar-optical data of the combination. If spectral data are not available the methodology can be adapted to use in-tegrated data.</p> <p>The method is valid for all types of solar protection devices parallel to the glazing such as louvres, or venetian, or roller blinds. The blind may be located internally, externally, or enclosed between the panes of the glazing. Ventilation of the blind is allowed for in each of these positions in determining the solar energy absorbed by the glazing or blind components, for vertical orientation of the glazing.</p> <p>The blind component materials may be transparent, translucent or opaque, combined with glazing components with known solar transmittance and reflectance and with known emissivity for thermal radiation.</p> <p>The method is based on a normal incidence of radiation and does not take into account an angular dependence of transmittance or reflectance of the materials. Diffuse irradiation or radiation diffused by solar protection devices is treated as if it were direct. Louvres or venetian blinds are treated as homogenous materials by equivalent solar optical characteristics, which may depend on the angle of the incidence radiation. For situations outside the scope of this document; ISO 15099 covers a wider range of situations.</p> <p>The document also gives certain normalised situations, additional assumptions and necessary boundary conditions.</p> <p>No change to the scope is expected. There will be editorial revision (new structure) in the context of Mandate M/480 and maybe minor technical changes due to inconsistency to other standards under Mandate M/480</p>
<p>EN 1027</p>	<p><b>Windows and doors — Water tightness — Test method</b></p> <p>This European Standard defines the test method to be used to determine the watertightness of completely assembled windows and doorsets of any materials. This test method is designed to take account of conditions in use, when the window or doorset is installed in accordance with the manufacturer’s specification and the requirements of relevant European Standards and codes of practice.</p> <p>This European Standard does not apply to the joints between the window or doorset frame and the building construction.</p>
<p>EN 13363-1 Withdrawn</p>	<p>Solar protection devices combined with glazing — Calculation of solar and light transmittance — Part 1: Simplified method</p>

EN 13363-2 Withdrawn	Solar protection devices combined with glazing — Calculation of total solar energy transmittance and light transmittance — Part 2: Detailed calculation method
HD 60364-7-712	<p><b>Electrical installations of buildings — Part 7 712: Requirements for special installations or locations — Solar photovoltaic (PV) power supply systems</b></p> <p>IEC 60364-7-712:2017 applies to the electrical installation of PV systems intended to supply all or part of an installation. The equipment of a PV installation, like any other item of equipment, is dealt with only so far as its selection and application in the installation is concerned. This new edition includes significant revisions and extensions, taking into account experience gained in the construction and operation of PV installations, and developments made in technology, since the first edition of this standard was published</p>
EN ISO 6946,	<p><b>Building components and building elements — Thermal resistance and thermal transmittance — Calculation method (ISO 6946)</b></p> <p>ISO 6946:2017 provides the method of calculation of the thermal resistance and thermal transmittance of building components and building elements, excluding doors, windows and other glazed units, curtain walling, components which involve heat transfer to the ground, and components through which air is designed to permeate.</p> <p>The calculation method is based on the appropriate design thermal conductivities or design thermal resistances of the materials and products for the application concerned.</p> <p>The method applies to components and elements consisting of thermally homogeneous layers (which can include air layers).</p> <p>ISO 6946:2017 also provides an approximate method that can be used for elements containing inhomogeneous layers, including the effect of metal fasteners, by means of a correction term given in Annex F. Other cases where insulation is bridged by metal are outside the scope of ISO 6946:2017.</p> <p>NOTE Table 1 in the Introduction shows the relative position of ISO 6946:2017 within the set of EPB standards in the context of the modular structure as set out in ISO 52000-1.</p>
prEN ISO 14439	<p><b>Glass in building — Glazing requirements — Use of glazing blocks (ISO/DIS 14439)</b></p> <p>This European Standard applies to all the basic types of flat glass (sheet, plate and float, cast, wired and not-wired, clear and tinted), as well as to all the derived processed flat glasses (laminated, toughened, coated and insulated glasses) such as are defined in appropriate European Standards. For certain glass products additional considerations may apply. The Standard does not apply to certain other products such as curved, corrugated or channel-shaped glasses. Structural glazing is excluded.</p>
ETAG 002	<p>Guideline for European Technical Approval for Structural Sealant Glazing Systems – SSGS</p> <p><a href="http://www.sgpstandard.cz/editor/files/stav_vyr/dok_es/eta/etag/002_1_en.pdf">http://www.sgpstandard.cz/editor/files/stav_vyr/dok_es/eta/etag/002_1_en.pdf</a></p>

<p>N 0068/CEN-TC128-WG3-N0068</p> <p>CEN/TR 16999:2019</p>	<p>TR Renewable energy systems for roof structural connections</p> <p><b>Solar energy systems for roofs - Requirements for structural connections to solar panels</b></p> <p>This Technical Report provides guidance on the principles and requirements of structural design for the safety and serviceability of the structural connection between solar energy panels (thermal or photovoltaic) that are mounted on flat or pitched roofs.</p> <p>This Technical Report does not include requirements for:</p> <ul style="list-style-type: none"> <li>- weather tightness of the roof, solar panels and connections;</li> <li>- electrical, thermal or mechanical characteristics of the solar panels;</li> <li>- precautions against fire of the installation.</li> </ul>

### Bibliography

EN 572-9, Glass in building — Basic soda lime silicate glass products — Part 9: Evaluation of conformity/Product standard

EN 1096-4, Glass in building — Coated glass — Part 4: Evaluation of conformity/Product standard

EN 1279-1, Glass in building — Insulating glass units — Part 1: Generalities, dimensional tolerances and rules for the system description

EN 1279-2, Glass in building — Insulating glass units — Part 2: Long term test method and requirements for moisture penetration

EN 1279-3, Glass in building — Insulating glass units — Part 3: Long term test method and requirements for gas leakage rate and for gas concentration tolerances

EN 1279-4, Glass in building — Insulating glass units — Part 4: Methods of test for the physical attributes of edge seals

EN 1863-2, Glass in building — Heat strengthened soda lime silicate glass — Part 2 Evaluation of conformity/Product standard

EN 12150-2, Glass in building — Thermally toughened soda lime silicate safety glass — Part 2: Evaluation of conformity/Product standard

EN 14179 2, Glass in building — Heat soaked thermally toughened soda lime silicate safety glass — Part 2: Evaluation of conformity/Product standard

CEN/TR 15601:2012, Hygrothermal performance of buildings — Resistance to wind-driven rain of roof coverings with discontinuously laid small elements — Test method





## Overview of normative documents affecting photovoltaic systems

### Solar energy

UNI EN ISO 9488	<p><b>Solar energy - Vocabulary</b></p> <p>This document defines basic terms relating to the work of ISO/TC 180. The committee covers standardization in the field of the measurement of solar radiation and solar energy utilization in space and water heating, cooling, industrial process heating and air conditioning. Consequently, the vocabulary within this document is focussed on definitions relating to those measurement and utilisation technologies.</p> <p>Since the 1999 version of this document there has been considerable development in solar photovoltaic technologies and high temperature solar thermal technologies that use heat to produce electricity or to provide high temperatures for processes that require elevated temperatures. This standard has some definitions that are useful also for those technologies; however, there are other documents that cover vocabulary for these technologies in more detail.</p>
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### Terminology

IEC TS 61836 (v)	<p><b>Solar photovoltaic energy systems – Terms, definitions and symbols</b></p> <p><i>Already described; see above</i></p>
IEC 60050	<p><i>International Electrotechnical Vocabulary (IEV)</i></p>

<p>CEI 82-25/1 (Italian standard)</p>	<p>Guida alla progettazione, realizzazione e gestione di sistemi di generazione fotovoltaica - Parte 1: Generalità - Acronimi, Definizioni e Principali Leggi, Deliberazioni e Norme</p> <p><b>Guide for design, installation and operation of photovoltaic (PV) generation system - Part 1: General - Acronyms, Definitions and Main Laws, Deliberation and Standards</b></p> <p>This document constitutes Part 1 of the IEC 82-25 Technical Guide "Guide to Design, implementation and operation of photovoltaic generation systems" which consists of the following parts:</p> <ul style="list-style-type: none"> <li>- Part 1: General - Acronyms, Definitions and Main Laws, Resolutions and Standards;</li> <li>- Part 2: Photovoltaic Modules;</li> <li>- Part 3: BOS of the PV system;</li> <li>- Part 4: Design;</li> <li>- Part 5: Installation;</li> <li>- Part 6: Monitoring, operation and maintenance.</li> </ul> <p>The purpose of this Guide is to provide generalities regarding the Regulatory treatment of components and photovoltaic generation systems (or PV systems) contained in the various Parts of the Guide.</p> <p>The Guide applies to photovoltaic generation systems intended to operate in parallel with the grid of the Medium- and low-voltage distributor's grid, taking into account the current legislative provisions and the indications contained in the relevant CEI, UNI and CENELEC and IEC standards; it deals with systems stationary and solar tracking photovoltaic systems, including those with concentrated solar rays</p>
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### Photovoltaic modules

<p>EN 50380 (v)</p>	<p>Datasheet and nameplate information for photovoltaic modules</p> <p><i>Already described; see above</i></p>
<p>EN 50461</p>	<p><b>Solar cells - Datasheet information and product data for crystalline silicon solar cells</b></p> <p>This European Standard describes data sheet and product data information for crystalline silicon solar cells. The intent of this standard is to provide minimum information required to configure safe and optimal photovoltaic modules. In this context, data sheet information is a technical description separate from the photovoltaic module. Product data information concerns the packaging, marking, storage and containing a commitment to inform about major changes on product and on process. These data are needed for further processing of solar cells to photovoltaic modules.</p>

EN IEC 60891	<p><b>Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics</b></p> <p>IEC 60891:2021 defines procedures to be followed for temperature and irradiance corrections to the measured I-V (current-voltage) characteristics (also known as I-V curves) of photovoltaic (PV) devices. It also defines the procedures used to determine factors relevant to these corrections. Requirements for I-V measurement of PV devices are laid down in IEC 60904-1 and its relevant subparts.</p> <p>.</p>
EN IEC 60904-1	<p><b>Photovoltaic devices - Part 1: Measurement of photovoltaic current-voltage characteristics</b></p> <p>IEC 60904-1:2020 describes procedures for the measurement of current-voltage characteristics (I-V curves) of photovoltaic (PV) devices in natural or simulated sunlight. These procedures are applicable to a single PV solar cell, a sub-assembly of PV solar cells, or a PV module. This document is applicable to non-concentrating PV devices for use in terrestrial environments, with reference to (usually but not exclusively) the global reference spectral irradiance AM1.5 defined in IEC 60904-3.</p>
IEC TS 60904-1-2	<p><b>Photovoltaic devices - Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices</b></p> <p>IEC TS 60904-1-2:2019 describes procedures for the measurement of the current-voltage (I-V) characteristics of bifacial photovoltaic devices in natural or simulated sunlight. It is applicable to single PV cells, sub-assemblies of such cells or entire PV modules.</p> <p>This document may be applicable to PV devices designed for use under concentrated irradiation if they are measured without the optics for concentration, and irradiated using direct normal irradiance and a mismatch correction with respect to a direct normal reference spectrum is performed. This document describes the additional requirements for the measurement of I-V characteristics of bifacial PV devices</p>
EN IEC 60904-2	<p><b>Photovoltaic devices - Part 2: Requirements for photovoltaic reference devices</b></p> <p>IEC 60904-2:2023 gives requirements for the classification, selection, packaging, marking, calibration and care of photovoltaic reference devices. This document applies to photovoltaic (PV) reference devices that are used to measure the irradiance of natural or simulated sunlight for the purpose of quantifying the electrical performance of photovoltaic devices (cells, modules and arrays). It does not cover photovoltaic reference devices for use under concentrated sunlight.</p>



EN IEC 60904-3	<p><b>Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data</b></p> <p>IEC 60904-3:2019 describes basic measurement principles for determining the electrical output of PV devices. The principles given in this document are designed to relate the performance rating of PV devices to a common reference terrestrial solar spectral irradiance distribution. The reference terrestrial solar spectral irradiance distribution is given in this document in order to classify solar simulators according to the spectral performance requirements contained in IEC 60904-9. The principles contained in this standard cover testing in both natural and simulated sunlight.</p>
EN IEC 60904-4	<p><b>Photovoltaic devices - Part 4: Photovoltaic reference devices - Procedures for establishing calibration traceability</b></p> <p>IEC 60904-4:2019 sets the requirements for calibration procedures intended to establish the traceability of photovoltaic (PV) reference devices to SI units as required by IEC 60904-2. This document applies to PV reference devices that are used to measure the irradiance of natural or simulated sunlight for the purpose of quantifying the performance of PV devices. The use of a PV reference device is required in many standards concerning PV (e.g. IEC 60904-1 and IEC 60904-3). This document has been written with single-junction PV reference devices in mind, in particular crystalline silicon, but it is sufficiently general to include other single-junction technologies.</p>
EN IEC 60904-5	<p><b>Photovoltaic devices - Part 5: Determination of the equivalent cell temperature (ECT) of photovoltaic (PV) devices by the open-circuit voltage method</b></p> <p>IEC 60904-5:2011+AMD1:2022 describes the preferred method for determining the equivalent cell temperature (ECT) of PV devices (cells, modules and arrays of one type of module), for the purposes of comparing their thermal characteristics, determining NOCT (nominal operating cell temperature) and translating measured I-V characteristics to other temperatures. The main technical changes with regard to the previous edition are as follows:</p> <ul style="list-style-type: none"> <li>- added method on how to extract the input parameters;</li> <li>- rewritten method on how to calculate ECT;</li> <li>- reworked formulae to be in line with IEC 60891</li> </ul>



EN IEC 60904-7	<p><b>Photovoltaic devices - Part 7: Computation of the spectral mismatch correction for measurements of photovoltaic devices</b></p> <p>IEC 60904-7:2019 describes the procedure for correcting the spectral mismatch error introduced in the testing of a photovoltaic device, caused by the mismatch between the test spectrum and the reference spectrum (e.g. AM1.5 spectrum) and by the mismatch between the spectral responsivities (SR) of the reference device and of the device under test and therewith reduce the systematic uncertainty. This procedure is valid for single-junction devices but the principle may be extended to cover multi-junction devices. The purpose of this document is to give guidelines for the correction of the spectral mismatch error, should there be a spectral mismatch between the test spectrum and the reference spectrum as well as between the reference device SR and the device under test SR. The calculated spectral mismatch correction is only valid for the specific combination of test and reference devices measured with a particular test spectrum. This fourth edition cancels and replaces the third edition published in 2008.</p>
EN IEC 60904-8	<p><b>Photovoltaic devices - Part 8: Measurement of spectral responsivity of a photovoltaic (PV) device</b></p> <p>IEC 60904-8:2014 specifies the requirements for the measurement of the spectral responsivity of both linear and non-linear photovoltaic devices. The spectral responsivity of a photovoltaic device is used in cell development and cell analysis, as it provides a measure of recombination and other processes occurring inside the semiconductor or cell material system. The main technical changes with respect to the previous edition are listed below:</p> <ul style="list-style-type: none"><li>- re-writing of the clause on testing;</li><li>- addition of a new clause for the measurement of series-connected modules;</li><li>- addition of the requirements of ISO/IEC 17025.</li></ul> <p><b>IEC 60904-8-1: Photovoltaic devices - Part 8-1: Measurement of spectral responsivity of multi-junction photovoltaic (PV) devices</b></p>

EN IEC 60904-9	<p><b>Photovoltaic devices - Part 9: Classification of solar simulator characteristics</b></p> <p>IEC 60904-9:2020 is applicable for solar simulators used in PV test and calibration laboratories and in manufacturing lines of solar cells and PV modules. This document define classifications of solar simulators for use in indoor measurements of terrestrial photovoltaic devices. Solar simulators are classified as A+, A, B or C based on criteria of spectral distribution match, irradiance non-uniformity in the test plane and temporal instability of irradiance. This document provides the required methodologies for determining the classification of solar simulators in each of the categories. A solar simulator which does not meet the minimum requirements of class C cannot be classified according to this document. This document is used in combination with IEC TR 60904-14, which deals with best practice recommendations for production line measurements of single-junction PV module maximum power output and reporting at standard test conditions.</p>
EN IEC 60068-2-21	<p><b>Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices</b></p> <p>IEC 60068-2-21:2021 is applicable to all electrical and electronic components whose terminations or integral mounting devices are liable to be submitted to stresses during normal assembly or handling operations and is also applicable to surface mount devices (SMDs).</p>
EN IEC 61215-1 (v)	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements</p> <p><i>Already described; see above</i></p>
EN IEC 61215-1-1	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules</p>
EN IEC 61215-1-2	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules</p>
EN IEC 61215-1-3	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules</p>
EN IEC 61215-1-4	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-4: Special requirements for testing of thin-film Cu(In,Ga)(S,Se)<sub>2</sub> based photovoltaic (PV) modules</p>
EN IEC 61215-2 (v)	<p>Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 2: Test procedures</p> <p><i>Already described; see above</i></p>

EN IEC 61683	<p><b>Photovoltaic systems - Power conditioners - Procedure for measuring efficiency</b></p> <p>IEC 61683:1999 Describes guidelines for measuring the efficiency of power conditioners used in stand-alone and utility-interactive photovoltaic systems, where the output of the power conditioner is a stable a.c. voltage of constant frequency or a stable d.c. voltage.</p>
EN IEC 61701	<p><b>Photovoltaic (PV) modules - Salt mist corrosion testing</b></p> <p>IEC 61701:2020 describes test sequences useful to determine the resistance of different PV modules to corrosion from salt mist containing Cl (NaCl, MgCl<sub>2</sub>, etc.). All tests included in the sequences are fully described in IEC 61215-2, IEC 62108, IEC 61730-2 and IEC 60068-2-52. The bypass diode functionality test in this document is modified from its description in IEC 61215-2. They are combined in this document to provide means to evaluate possible faults caused in PV modules when operating under wet atmospheres having high concentration of dissolved salt (NaCl). Depending on the specific nature of the surrounding atmosphere to which the module is exposed in real operation several testing methods can be applied, as defined in IEC 60068-2-52. Guidance for determining the applicability of this document and selecting an appropriate method is provided in Annex A.</p>
EN IEC 61730-1 (v)	<p>Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction</p> <p><i>Already described; see above</i></p>
EN IEC 61730-2	<p>Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing</p> <p><i>Already described; see above</i></p>
EN IEC 61829	<p><b>Photovoltaic (PV) array - On-site measurement of current-voltage characteristics</b></p> <p>IEC 61829:2015 specifies procedures for on-site measurement of flat-plate photovoltaic (PV) array characteristics, the accompanying meteorological conditions, and use of these for translating to standard test conditions (STC) or other selected conditions.</p>
EN 50513	<p><b>Solar wafers - Data sheet and product information for crystalline silicon wafers for solar cell manufacturing</b></p> <p>This document describes data sheet and product information for crystalline silicon (Si) – solar wafers and measurement methods for wafer properties. The document intends to provide the minimum information required for an optimal use of crystalline silicon wafers in solar cell manufacturing. Clauses 5 to 7 describe the data sheet information with technical specifications of the silicon solar wafer with all essential characteristics. The product information concerns packaging, labelling and storage, and implies the commitment to inform about major changes of the product and in the manufacturing process. This data is needed for the processing of silicon solar wafers</p>

	to solar cells. Clauses 8 to 16 describe measurement methods for the characteristic properties specified in the data sheet.
EN IEC 60904-10	<p><b>Photovoltaic devices - Part 10: Methods of linear dependence and linearity measurements</b></p> <p>IEC 60904-10:2020 describes the procedures used to measure the dependence of any electrical parameter (Y) of a photovoltaic (PV) device with respect to a test parameter (X) and to determine the degree at which this dependence is close to an ideal linear (straight-line) function. It also gives guidance on how to consider deviations from the ideal linear dependence and in general on how to deal with non-linearities of PV device electrical parameters.</p>
EN IEC 62716	<p><b>Photovoltaic (PV) modules - Ammonia corrosion testing</b></p> <p>IEC 62716:2013 describes test sequences useful to determine the resistance of PV modules to ammonia (NH<sub>3</sub>). All tests included in the sequences, except the bypass diode functionality test, are fully described in IEC 61215, IEC 61646 and IEC 61730-2. They are combined in this standard to provide means to evaluate possible faults caused in PV modules when operating under wet atmospheres having high concentration of dissolved ammonia (NH<sub>3</sub>). The contents of the corrigendum of May 2014 have been included in this copy.</p>
EN IEC 62788-1-2	<p><b>Measurement procedures for materials used in photovoltaic modules - Part 1-2: Encapsulants - Measurement of volume resistivity of photovoltaic encapsulants and other polymeric materials</b></p> <p>IEC 62788-1 2:2016 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.</p>
EN IEC 62788-1-4	<p><b>Measurement procedures for materials used in photovoltaic modules - Part 1-4: Encapsulants - Measurement of optical transmittance and calculation of the solar-weighted photon transmittance, yellowness index, and UV cut-off wavelength solar.</b></p> <p>IEC 62788-1-4:2016+A1:2020 provides a method for measurement of the optical transmittance of encapsulation materials used in photovoltaic (PV) modules. The standardized measurements in this procedure quantify the expected transmittance of the encapsulation to the PV cell. Subsequent calculation of solar-weighted transmittance allows for comparison between different materials. The results for unweathered material may be used in an encapsulation manufacturer's datasheets, in manufacturer's material or process development, in manufacturing quality control (material acceptance), or applied in the</p>

	analysis of module performance. This measurement method can also be used to monitor the performance of encapsulation materials after weathering, to help assess their durability.
EN IEC 62788-1-5	<p><b>Measurement procedures for materials used in photovoltaic modules - Part 1-5: Encapsulants - Measurement of change in linear dimensions of sheet encapsulation material resulting from applied thermal conditions</b></p> <p>IEC 62788-1-5:2016 provides a method for measuring the maximum representative change in linear dimensions of encapsulation sheet material in an unrestricted thermal exposure as might or might not be seen during photovoltaic (PV) module fabrication. Data obtained using this method may be used by encapsulation material manufacturers for the purpose of quality control of their encapsulation material as well as for reporting in product datasheets. Data obtained using this method may be used by PV module manufacturers for the purpose of material acceptance, process development, design analysis, or failure analysis.</p>
EN IEC 62941	<p>Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing</p> <p>IEC 62941:2019 is applicable to organizations manufacturing photovoltaic (PV) modules certified to IEC 61215 series and IEC 62108 for design qualification and type approval and IEC 61730 for safety qualification and type approval. The design qualification and type approval of PV modules depend on appropriate methods for product and process design, as well as appropriate control of materials and processes used to manufacture the product. This document lays out best practices for product design, manufacturing processes, and selection and control of materials used in the manufacture of PV modules that have met the requirements of IEC 61215 series, IEC 61730, or IEC 62108. These standards also form the basis for factory audit criteria of such sites by various certifying and auditory bodies.</p> <p>The object of this document is to provide a framework for the improved confidence in the ongoing consistency of performance and reliability of certified PV modules. The requirements of this document are defined with the assumption that the quality management system of the organization has already fulfilled the requirements of ISO 9001 or equivalent quality management system. This document is not intended to replace or remove any requirements of ISO9001 or equivalent quality management system. By maintaining a manufacturing system in accordance with this document, PV modules are expected to maintain their performance as determined from the test sequences in IEC 61215 series, IEC 62108, or IEC 61730.</p>

## Solar concentrating solar power modules and systems (CPV)

(not of interest to BIPV and INCREASE)

EN IEC 62108	<i>Concentrator photovoltaic (CPV) modules and assemblies - Design qualification and type approval</i>
EN IEC 62670-1	<i>Photovoltaic concentrators (CPV) - Performance testing - Part 1: Standard conditions</i>
EN IEC 62670-2	<i>Photovoltaic concentrators (CPV) - Performance testing - Part 2: Energy measurement</i>
EN IEC 62670-3	<i>Photovoltaic concentrators (CPV) - Performance testing - Part 3: Performance measurements and power rating</i>
EN IEC 62688	<i>Photovoltaic concentrators (CPV) - Performance testing - Part 3: Performance measurements and power rating</i>
EN IEC 62787	<i>Concentrator photovoltaic (CPV) solar cells and cell on carrier (CoC) assemblies - Qualification</i>
IEC TS 62789	<i>Photovoltaic concentrator cell documentation</i>
EN IEC 62925	Concentrator photovoltaic (CPV) modules - Thermal cycling test to differentiate increased thermal fatigue durability
IEC TS 62989	<i>Primary optics for concentrator photovoltaic systems</i>

## Monitoring, Measurement Systems and Performance

EN IEC 61724-1	<p>Photovoltaic system performance - Part 1: Monitoring</p> <p>IEC 61724-1:2021 outlines terminology, equipment, and methods for performance monitoring and analysis of photovoltaic (PV) systems. It also serves as a basis for other standards which rely upon the data collected. This document defines classes of photovoltaic (PV) performance monitoring systems and serves as guidance for monitoring system choices.</p>
IEC TS 61724-2	<p><b>Photovoltaic system performance - Part 2: Capacity evaluation method</b></p> <p>IEC TS 61724-2:2016 defines a procedure for measuring and analyzing the power production of a specific photovoltaic system with the goal of evaluating the quality of the PV system performance. The test is intended to be applied during a relatively short time period (a few relatively sunny days). The intent of this document is to specify a framework procedure for comparing the measured power produced against the expected power from a PV system on relatively sunny days.</p>
IEC TS 61724-3	<p>Photovoltaic system performance - Part 3: Energy evaluation method</p> <p>IEC TS 61724-3:2016 defines a procedure for measuring and analyzing the energy production of a specific photovoltaic system relative to expected electrical energy production for the same system from actual weather conditions as defined by the stakeholders of the test. The energy production is characterized specifically for times when the system is operating (available); times when the system is not operating (unavailable) are quantified as part of an availability metric. The aim of this technical specification is to define a procedure for comparing the measured electrical energy with the expected electrical energy of the PV system.</p>

	<b><i>For the following standards relating to energy meters, only the titles are given</i></b>
EN 62052-11	Electricity metering equipment - General requirements, tests and test conditions - Part 11: Metering equipment
EN 62053-11	Electricity metering equipment (a.c.) - Particular requirements - Part 11: Electromechanical meters for active energy (classes 0,5, 1 and 2)
EN 62053-21	Electricity metering equipment - Particular requirements - Part 21: Static meters for AC active energy (classes 0,5, 1 and 2)
EN 62053-22	Electricity metering equipment - Particular requirements - Part 22: Static meters for AC active energy (classes 0,1S, 0,2S and 0,5S)
EN 50470-1	Electricity metering equipment (a.c.) - Part 1: General requirements, tests and test conditions - Metering equipment (class indexes A, B and C)
EN 50470-2	Electricity metering equipment (a.c.) - Part 2: Particular requirements - Electromechanical meters for active energy (class indexes A and B)
EN 50470-3	Electricity metering equipment - Part 3: Particular requirements - Static meters for AC active energy (class indexes A, B and C)
EN 62059-31-1	Electricity metering equipment - Dependability - Part 31-1: Accelerated reliability testing - Elevated temperature and humidity
EN 61853-1	<b>Photovoltaic (PV) module performance testing and energy rating - Part 1: Irradiance and temperature performance measurements and power rating</b> IEC 61853-1:2011 describes requirements for evaluating PV module performance in terms of power (watts) rating over a range of irradiances and temperatures. The object is to define a testing and rating system, which provides the PV module power (watts) at maximum power operation for a set of defined conditions. A second purpose is to provide a full set of characterization parameters for the module under various values of irradiance and temperature.
EN 61853-2	<b>Photovoltaic (PV) module performance testing and energy rating - Part 2: Spectral responsivity, incidence angle and module operating temperature measurements</b> IEC 61853-2:2016 defines measurement procedures for measuring the effects of angle of incidence of the irradiance on the output power of the device, determines the operating temperature of a module for a given set of ambient and mounting conditions and measure spectral responsivity of the module. A second purpose is to provide a characteristic set of parameters which will be useful for detailed energy predictions. The described measurements are required as inputs into the module energy rating procedure described in IEC 61853-3.
EN 61853-3	<b>Photovoltaic (PV) module performance testing and energy rating - Part 3: Energy rating of PV modules</b>



	IEC 61853-3:2018 describes the calculation of PV module energy rating values. The purpose of this document is to define a methodology to determine the PV module energy output (watt-hours), and the climatic specific energy rating (dimensionless) for a complete year at maximum power operation for the reference climatic profile(s) given in IEC 61853-4. It is applied to determine a specific module output in a standard reference climatic profile for the purposes of comparison of rated modules
EN 61853-4	<b>Photovoltaic (PV) module performance testing and energy rating - Part 4: Standard reference climatic profiles</b> IEC 61853-4:2018 describes the standard reference climatic profiles used for calculating energy ratings.
EN 62759-1	<b>Photovoltaic (PV) modules - Transportation testing - Part 1: Transportation and shipping of module package units</b> IEC 62759-1:2022 describes methods for the simulation of transportation of complete package units of modules and combined subsequent environmental impacts.
EN 62790	<b>Junction boxes for photovoltaic modules - Safety requirements and tests</b> IEC 62790:2020 describes safety requirements, constructional requirements and tests for junction boxes up to 1 500 V DC for use on photovoltaic modules in accordance with class II of IEC 61140:2016. This document applies also to enclosures mounted on PV-modules containing electronic circuits for converting, controlling, monitoring or similar operations. Additional requirements concerning the relevant operations are applied under consideration of the environmental conditions of the PV-modules. This document does not apply to the electronic circuits of these devices, for which other IEC standards apply. This second edition cancels and replaces the first edition published in 2014
EN 60904-1-1	<b>Photovoltaic devices - Part 1-1: Measurement of current-voltage characteristics of multi-junction photovoltaic (PV) devices</b> IEC 60904-1-1:2017 describes procedures for the measurement of the current-voltage characteristics of multi-junction photovoltaic devices in natural or simulated sunlight. It is applicable to single PV cells, sub-assemblies of such cells or entire PV modules. It is principally intended for non-concentrating devices, but parts may be applicable also to concentrating multi-junction PV devices. An essential prerequisite is the spectral responsivity of the multi-junction devices, whose measurement is covered by IEC 60904-8-1.
EN 60904-8-1	<b>Photovoltaic devices - Part 8-1: Measurement of spectral responsivity of multi-junction photovoltaic (PV) devices</b> IEC 60904-8-1:2017 gives guidance for the measurement of the spectral responsivity of multi-junction photovoltaic devices. It is principally intended for non-concentrating devices, but parts may be applicable also to concentrating multi-junction PV devices. The SR is

	required for analysis of measured current-voltage characteristics of multi-junction PV devices as described in IEC 60904-1-1
EN 62920	<p><b>Photovoltaic power generating systems - EMC requirements and test methods for power conversion equipment</b></p> <p>IEC 62920:2017+A1:2021 specifies electromagnetic compatibility (EMC) requirements for DC to AC power conversion equipment (PCE) for use in photovoltaic (PV) power systems. The PCE covered by this document can be grid-interactive or stand-alone. It can be supplied by single or multiple photovoltaic modules grouped in various array configurations, and can be intended for use in conjunction with batteries or other forms of energy storage. This document covers not only PCE connected to a public low voltage AC mains network or other low voltage AC mains installation, but also PCE connected to a medium or high voltage AC network with or without step-down power transformers</p>
EN 62979	<p><b>Photovoltaic modules - Bypass diode - Thermal runaway test</b></p> <p>IEC 62979:2017 provides a method for evaluating whether a bypass diode as mounted in the module is susceptible to thermal runaway or if there is sufficient cooling for it to survive the transition from forward bias operation to reverse bias operation without overheating. This test methodology is particularly suited for testing of Schottky barrier diodes, which have the characteristic of increasing leakage current as a function of reverse bias voltage at high temperature, making them more susceptible to thermal runaway</p>
EN 62805-1	<p><b>Method for measuring photovoltaic (PV) glass - Part 1: Measurement of total haze and spectral distribution of haze</b></p> <p>IEC 62805-1:2017 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.</p>
EN 62805-2	<p><b>Method for measuring photovoltaic (PV) glass - Part 2: Measurement of transmittance and reflectance</b></p> <p>IEC 62805-2:2017 specifies methods for measuring the transmittance and reflectance of glass used in photovoltaic (PV) modules and provides instructions on how to calculate the effective hemispherical transmittance and reflectance of this glass. This document is applicable to PV glasses used in PV modules, including ultra-clear patterned glass, anti-reflective coated (AR) glass, transparent conductive oxide coated (TCO) glass and other kinds of PV glass used in PV modules. These test methods are designed to provide reproducible data appropriate for comparison of results among laboratories or at different times by the same laboratory and for comparison of data obtained on different PV glasses</p>
EN 62892	<p><b>Extended thermal cycling of PV modules - Test procedure</b></p> <p>IEC 62892:2019 defines a test sequence that extends the thermal cycling test of IEC 61215-2. It is intended to differentiate PV modules with improved durability to thermal cycling and evaluate modules for</p>



	<p>deployment in locations most susceptible to thermal cycling type stress. This document is based on the ability for 95 % of the modules represented by the samples submitted for this test to pass an equivalency of 500 thermal cycles, as defined in IEC 61215-2:2016, 4.11.3, with a maximum power degradation of less than 5 %.</p> <p>Provisions are also provided to reduce overall test time by increasing the maximum cycle temperature and/or the number of modules submitted for test.</p> <p>The test procedure in this document was developed based on analysis of the stress on tin-lead solder bonds on crystalline silicon solar cells in a glass superstrate type package. Changes to lead-free solder have an effect on the acceleration factors but not enough to change the overall results of this test. Monolithic type modules with integral cell interconnection do not suffer from this specific type of stress but there are still electrical connections within the module, for example between the integrated cell circuit and the module bus bars, that may be subject to wear out from thermal cycling. Flexible modules (without glass) are not stressed in the same way as those with glass superstrates or substrates, therefore use of the equivalency factor employed in this document may not be applicable to these modules.</p>
EN 63202-1	<p><b>Photovoltaic cells - Part 1: Measurement of light-induced degradation of crystalline silicon photovoltaic cells</b></p> <p>IEC 63202-1:2019 describes procedures for measuring the light-induced degradation (LID) of crystalline silicon photovoltaic (PV) cells in simulated sunlight. The magnitude of LID in a crystalline silicon PV cell is determined by comparing maximum output power at Standard Test Conditions (STC) before, and after, exposure to simulated sunlight at a specified temperature and irradiance.</p> <p>The purpose of this document is to provide standardized PV cell LID information to help PV module manufacturers in minimizing the mismatch between cells within the same module, thereby maximizing power yield.</p>

## Inverter

EN 50524	Data sheet for photovoltaic inverters
EN 50530	Overall efficiency of grid connected photovoltaic inverters
EN 62109-1	<p><b>Safety of power converters for use in photovoltaic power systems - Part 1: General requirements</b></p> <p>IEC 62109-1:2010 applies to the power conversion equipment (PCE) for use in photovoltaic systems where a uniform technical level with respect to safety is necessary. Defines the minimum requirements for the design and manufacture of PCE for protection against electric shock, energy, fire, mechanical and other hazards. Provides general requirements applicable to all types of PV PCE.</p>
EN 62109-2	<p><b>Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters</b></p>

	IEC 62109-2:2011 covers the particular safety requirements relevant to d.c. to a.c. inverter products as well as products that have or perform inverter functions in addition to other functions, where the inverter is intended for use in photovoltaic power systems. Inverters covered by this standard may be grid-interactive, stand-alone, or multiple mode inverters, may be supplied by single or multiple photovoltaic modules grouped in various array configurations, and may be intended for use in conjunction with batteries or other forms of energy storage. This standard must be used jointly with IEC 62109-1.
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### Module support structures (fixed or solar tracking)

EN 62817	Photovoltaic systems - Design qualification of solar trackers
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### Other components of the BOS

EN IEC 62093	Photovoltaic system power conversion equipment - Design qualification and type approval
EN IEC 62509	Battery charge controllers for photovoltaic systems - Performance and functioning
EN IEC 62852	Connectors for DC-application in photovoltaic systems - Safety requirements and tests

### PV Installations or Systems

EN IEC 62124	<p><b>Photovoltaic (PV) stand alone systems - Design verification</b></p> <p>Verifies system design and performance of stand-alone photovoltaic systems. The performance test consists of a check of the functionality, the autonomy and ability to recover after periods of low state-of-charge of the battery, and hence gives reasonable assurance that the system will not fail prematurely. The testing conditions are intended to represent the majority of climatic zones for which these systems are designed.</p>
EN IEC 62253	<p><b>Photovoltaic pumping systems - Design qualification and performance measurements</b></p> <p>IEC 62253:2011 defines the requirements for design, qualification and performance measurements of photovoltaic (PV) pumping systems in stand-alone operation. The outlined measurements are applicable for either indoor tests with PV generator simulator or outdoor tests using a real PV generator. This standard applies to systems with motor pump sets connected to the PV generator directly or via a converter (DC to DC or DC to AC).</p>

EN IEC 62116	<p>Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures</p> <p>IEC 62116:2014 provides a test procedure to evaluate the performance of islanding prevention measures used with utility-interconnected PV systems. This standard describes a guideline for testing the performance of automatic islanding prevention measures installed in or with single or multi-phase utility interactive PV inverters connected to the utility grid. The test procedure and criteria described are minimum requirements that will allow repeatability. Major changes with respect to the previous edition concern the DC power source and test conditions.</p>
EN IEC 62446-1 (v)	<p>Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 1: Grid connected systems - Documentation, commissioning tests and inspection</p> <p><i>Already described; see above</i></p>
EN IEC 62446-2 (v)	<p>Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 2: Grid connected systems - Maintenance of PV systems</p> <p><i>Already described; see above</i></p>
IEC TS 62446-3	<p><b>Photovoltaic (PV) systems - Requirements for testing, documentation and maintenance - Part 3: Photovoltaic modules and plants - Outdoor infrared thermography</b></p> <p>IEC TS 62446-3:2017(E) defines outdoor thermographic (infrared) inspection of PV modules and plants in operation. This inspection supports the preventive maintenance for fire protection, the availability of the system for power production, and the inspection of the quality of the PV modules. This document lays down requirements for the measurement equipment, ambient conditions, inspection procedure, inspection report, personnel qualification and a matrix for thermal abnormalities as a guideline for the inspection.</p>

## Design criteria and documentation

ISO/IEC 17025:2018	<p>General requirements for the competence of testing and calibration laboratories</p> <p>ISO/IEC 17025:2017 specifies the general requirements for the competence, impartiality and consistent operation of laboratories. ISO/IEC 17025:2017 is applicable to all organizations performing laboratory activities, regardless of the number of personnel. Laboratory customers, regulatory authorities, organizations and schemes using peer-assessment, accreditation bodies, and others use ISO/IEC 17025:2017 in confirming or recognizing the competence of laboratories.</p>
EN IEC 60445	<p><b>Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors</b></p> <p>IEC 60445:2021 applies to the identification and marking of terminals of electrical equipment such as resistors, fuses, relays, contactors, transformers, rotating machines and, wherever applicable, to</p>

	<p>combinations of such equipment (e.g. assemblies), and also applies to the identification of terminations of certain designated conductors. It also provides general rules for the use of certain colours or alphanumeric notations to identify conductors with the aim of avoiding ambiguity and ensuring safe operation. These conductor colours or alphanumeric notations are intended to be applied in cables or cores, busbars, electrical equipment and installations. This basic safety publication is primarily intended for use by technical committees in the preparation of standards in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51. It has the status of a basic safety publication in accordance with IEC Guide 104.</p>
IEC TR 63149:2018	<i>Land usage of photovoltaic (PV) farms - Mathematical models and calculation examples</i>

### Grid connection and electrical safety

EN 50549-1	<p><b>Requirements for generating plants to be connected in parallel with distribution networks - Part 1: Connection to a LV distribution network - Generating plants up to and including Type B</b></p> <p>The purpose of this document is to provide technical guidance for tests on generating units and interface protection to evaluate their electrical characteristics.</p> <p>NOTE 1 Mechanical issues are taken into account as far as they influence the electrical characteristics. The evaluation results are intended to be used to demonstrate conformity of generating units to technical requirements for grid connection. In this context the evaluation results can also be used as part of a certification programme.</p> <p>NOTE 2 Besides the type test results of the generating unit all additional elements for connection to the grid (e.g. transformer, cabling, multiple units) are considered in the evaluation of the final installation of a generating plant.</p> <p>The requirements to be evaluated are covered in the following standardization documents: – EN 50549 1:2019: Requirements for generating plants to be connected in parallel with distribution networks - Part 1: connection to a LV distribution network - Generating plants up to and including Type B – EN 50549 2:2019: Requirements for generating plants to be connected in parallel with distribution networks - Part 2: Connection to a MV distribution network - Generating plants up to and including Type B If grid connection requirements are dealt with in other documents or for other generating module types, where no specific testing procedure is provided, testing methods of this document can be used if applicable. This document provides evaluation criteria for the conformity assessment of generating units with respect to the abovementioned standardization documents, based on type testing. However, some requirements are applicable on the generating plant level. The assessment of the conformity to these plant requirements are out of the scope of this document. Nevertheless, this document may be used to show the capabilities of a generating unit to be used in a plant. As a</p>
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	<p>consequence, it is possible that the conformity assessment of a generating unit does not cover all aspects of the above-mentioned standardization documents, typically when a requirement is evaluated on a plant level. Therefore, the conformity assessment report indicates clearly which clauses of this document are covered and which clauses are not covered. This document recognizes the existence of specific technical test requirements within several member states that must be complied with</p>
CEI 0-21 Italian Standard	<p>Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive users to the LV electrical Utilities</p>
CEI 0-16 Italian standard	<p>Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti AT ed MT delle imprese distributrici di energia elettrica Reference technical rules for the connection of active and passive users to the MV electrical Utilities</p>
EN 50110-1	<p><b>Operation of electrical installations - Part 1: General requirements</b> This document is applicable to all operation of and work activity on, with, or near electrical installations. These are electrical installations operating at voltage levels from and including extra-low voltage up to and including high voltage. This latter term includes those levels commonly referred to as medium and extra-high voltage. These electrical installations are designed for the generation, transmission, conversion, distribution and use of electrical power. Some of these electrical installations are permanent and fixed, such as a distribution installation in a factory or office complex, others are temporary, such as on construction sites and others are mobile or capable of being moved either whilst energised or whilst not energised nor charged. Examples are electrically driven excavating machines in quarries or open-cast coal sites. This document sets out the requirements for the safe operation of and work activity on, with, or near these electrical installations. The requirements apply to all operational, working and maintenance procedures. They apply to all non-electrical work such as building work near to overhead lines or underground cables as well as electrical work, when there is a risk of electrical danger. This document does not apply to ordinary persons when using installations and equipment, provided that the installations and equipment comply with relevant standards and are designed and installed for use by ordinary persons. This document has not been developed specifically to apply to the electrical installations listed below. However, if there are no other rules or procedures, the principles of this document could be applied to them: - on any aircraft and hovercraft moving under its own power, (these are subject to International Aviation laws which take precedence over national laws in these situations); - on any sea going ship moving under its own power, or under the direction of the master, (these are subject to International Marine laws which take precedence over national laws in these situations); - electronic telecommunications and information systems; - electronic</p>

	instrumentation, control and automation systems; - at coal or other mines; - on off-shore installations subject to International Marine laws; - on vehicles; - on electric traction systems; - on experimental electrical research work.
EN 50160	<b>Voltage characteristics of electricity supplied by public electricity networks</b>
IEC/HD 60364  <i>See all standards in the series</i>	<p><b>Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions</b></p> <p>Gives the rules for the design, erection, and verification of electrical installations. The rules are intended to provide for the safety of persons, livestock and property against dangers and damage which may arise in the reasonable use of electrical installations and to provide for the proper functioning of those installations. IEC 60364-1 applies to the design, erection and verification of electrical installations such as those of a) residential premises; b) commercial premises; c) public premises; d) industrial premises; e) agricultural and horticultural premises; f) prefabricated buildings; g) caravans, caravan sites and similar sites; h) construction sites, exhibitions, fairs and other installations for temporary purposes; i) marinas; j) external lighting and similar installations; k) medical locations; l) mobile or transportable units; m) photovoltaic systems; n) low-voltage generating sets. IEC 60364-1 covers a) circuits supplied at nominal voltages up to and including 1 000 V a.c. or 1 500 V d.c.; b) circuits, other than the internal wiring of apparatus, operating at voltages exceeding 1 000 V and derived from an installation having a voltage not exceeding 1 000 V a.c., for example, discharge lighting, electrostatic precipitators; c) wiring systems and cables not specifically covered by the standards for appliances; d) all consumer installations external to buildings; e) fixed wiring for information and communication technology, signalling, control and the like (excluding internal wiring of apparatus); f) the extension or alteration of the installation and also parts of the existing installation affected by the extension or alteration.</p>
IEC/HD 60364-7-712	<p><b>Low-voltage electrical installations - Part 7-712: Requirements for special installations or locations - Photovoltaic (PV) systems</b></p> <p>This section applies to the electrical installation of PV generator intended to supply all or part of an installation and feeding of electricity into the public grid or local distribution. In this section, the electrical equipment of a PV generator, like any other item of electrical equipment, is dealt with only so far as its selection and application in the installation is concerned. The electrical installation of a PV generator starts from a PV module or a set of PV modules connected in series with their cables, provided by the PV module manufacturer, up to the user installation or the utility supply point. Requirements of this document apply to – PV generators for supply to an installation which is not connected to a system for distribution of</p>



	electricity to the public, – PV generators for supply to an installation in parallel with a system for distribution of electricity to the public, – PV generators for supply to an installation as an alternative to a system for distribution of electricity to the public, – appropriate combination of the above. Requirements for PV generators with batteries or other energy storage methods are under consideration.
EN IEC 60529	<b>Degrees of protection provided by enclosures (IP Code)</b> IEC 60529:1989+A1:1999+A2:2013 Applies to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72,5 kV. The contents of the corrigenda of January 2003, September 2007, October 2009, October 2013, May 2015 and January 2019 have been included in this copy.

### Electrical assembly/boards

IEC EN 61439-1 <i>See all standards in the series</i>	Low-voltage switchgear and controlgear assemblies - Part 1: General rules  IEC 61439-1:2020 lays down the general definitions and service conditions, construction requirements, technical characteristics and verification requirements for low-voltage switchgear and controlgear assemblies. NOTE Throughout this document, the term assembly(s) (see 3.1.1) is used for a low-voltage switchgear and controlgear assembly(s). For the purpose of determining assembly conformity, the requirements of the relevant part of the IEC 61439 series, Part 2 onwards, apply together with the cited requirements of this document. For assemblies not covered by Part 3 onward, Part 2 applies.
IEC 61439-8 (project)	Low-voltage switchgear and controlgear assemblies - Part 8: Assemblies for use in photovoltaic installations

### Cables, conduits and accessories

	<b>European regulations "Construction Products Regulations" (305/2011) apply to electrical cables installed in buildings</b>
EN 13501-6	<b>Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on power, control and communication cables</b>  This document provides the reaction to fire classification procedure for electric cables.  NOTE For the purpose of this document, the term "electric cables" covers all power, control and communication cables, including optical fibre cables.
EN 50399	<b>Common test methods for cables under fire conditions - Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results</b>

EN 50575	Power, control and communication cables - Cables for general applications in construction works subject to reaction to fire requirements
IEC EN 60332-1-2	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame
IEC EN 60754-2	Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity
IEC EN 61034-2	Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements
CEI-UNEL 35016 (italian standard)	Classe di Reazione al fuoco dei cavi in relazione al Regolamento EU "Prodotti da Costruzione" (305/2011)  Class of fire reaction of cables in relation to the EU "Construction Products" Regulation (305/2011)
EN 50618	<b>Electric cables for photovoltaic systems</b> This European Standard applies to low smoke halogen-free, flexible, single-core power cables with cross-linked insulation and sheath. In particular for use at the direct current (d.c.) side of photovoltaic systems, with a nominal d.c. voltage of 1,5 kV between conductors and between conductor and earth. The cables are suitable to be used with Class II equipment. The cables are designed to operate at a normal maximum conductor temperature of 90 °C, but for a maximum of 20 000 hours a max. conductor temperature of 120 °C at a max. ambient temperature of 90 °C is permitted. NOTE The expected period of use under normal usage conditions as specified in this standard is at least 25 years.
EN IEC 61386-1	<b>Conduit systems for cable management - Part 1: General requirements</b> IEC 61386-1:2008+A1:2017 specifies requirements and tests for conduit systems, including conduits and conduit fittings, for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1 000 V a.c. and/or 1 500 V d.c. This second edition cancels and replaces the first edition published in 1996, and its Amendment 1 (2000), and it constitutes a technical revision.

EN 60423	<p><b>Conduit systems for cable management - Outside diameters of conduits for electrical installations and threads for conduits and fittings</b></p> <p>This International Standard specifies outside diameters for conduits used in electrical installations or in communication systems and the dimensional requirements for threads. It also specifies the dimensional requirements for threads used in associated fittings. It is not applicable to extra heavy-duty electrical rigid steel conduits specified in IEC 60981. This third edition cancels and replaces the second edition published in 1993. This edition constitutes a technical revision. The following main changes have been made to the second edition: -revised figures and tables plus editorial and normative reference updates -conduit range increased to 110 mm outside diameter</p>
EN 61386-21	<p><b>Conduit systems for cable management - Part 21: Particular requirements - Rigid conduit systems</b></p> <p>IEC 61386-21:2021 specifies the requirements for rigid conduit systems. This document is to be used in conjunction with IEC 61386-1:2008 and IEC 61386-1:2008/AMD1:2017.</p>
EN 61386-22	<p><b>Conduit Systems for cable management - Part 22: Particular requirements - Pliable conduit systems</b></p> <p>IEC 61386-22:2021 specifies the requirements for pliable conduit systems including self-recovering conduit systems</p>
EN 61386-23	<p><b>Conduit systems for cable management - Part 23: Particular requirements - Flexible conduit systems</b></p> <p>IC 61386-23:2021 specifies the requirements for flexible conduit systems. This document is to be used in conjunction with IEC 61386-1:2008 and IEC 61386-1:2008/AMD1:2017.</p>

## Atmospheric discharges and overvoltages

CEI IEC 62561-1	<p><b>Lightning protection system components (LPSC) - Part 1: Requirements for connection components</b></p> <p>IEC 62561-1:2023 specifies the requirements and tests for metallic connection components that form part of a lightning protection system (LPS). Typically, these can be connectors, clamps, bonding and bridging components, expansion pieces and test joints. This third edition cancels and replaces the second edition published in 2017. This edition constitutes a technical revision.</p>
EN IEC 61643-11	<p><b>Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods</b></p> <p>IEC 61643-11:2011 is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages. These devices are packaged to be connected to 50/60 Hz a.c. power circuits, and equipment rated up to 1 000 V r.m.s. Performance characteristics, standard methods for testing and ratings are established. These devices contain at least one nonlinear</p>

	component and are intended to limit surge voltages and divert surge currents.
EN IEC 62305-1	<p><b>Protection against lightning - Part 1: General principles</b></p> <p>IEC 62305-1:2010 provides general principles to be followed for protection of structures against lightning, including their installations and contents, as well as persons. This second edition cancels and replaces the first edition, published in 2006, and constitutes a technical revision.</p>
EN IEC 62305-2	<p><b>Protection against lightning - Part 2: Risk management</b></p> <p>IEC 62305-2:2010 is applicable to risk assessment for a structure due to lightning flashes to earth. Its purpose is to provide a procedure for the evaluation of such a risk. Once an upper tolerable limit for the risk has been selected, this procedure allows the selection of appropriate protection measures to be adopted to reduce the risk to or below the tolerable limit</p>
EN IEC 62305-3	<p><b>Protection against lightning - Part 3: Physical damage to structures and life hazard</b></p> <p>IEC 62305-3:2010 provides the requirements for protection of a structure against physical damage by means of a lightning protection system (LPS), and for protection against injury to living beings due to touch and step voltages in the vicinity of an LPS (see IEC 62305-1).</p>
EN IEC 62305-4	<p><b>Protection against lightning - Part 4: Electrical and electronic systems within structures</b></p> <p>IEC 62305-4:2010 provides information for the design, installation, inspection, maintenance and testing of electrical and electronic system protection (SPM) to reduce the risk of permanent failures due to lightning electromagnetic impulse (LEMP) within a structure</p>

## Electromagnetic compatibility

EN IEC 61000-6-1	<p><b>Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments</b></p> <p>IEC 61000-6-1:2016 for EMC immunity requirements applies to electrical and electronic equipment intended for use in residential, commercial, public and light-industrial locations. Immunity requirements in the frequency range 0 Hz to 400 GHz are covered. No tests need to be performed at frequencies where no requirements are specified. This generic EMC immunity standard is applicable if no relevant dedicated product or product-family EMC immunity standard exists. This third edition cancels and replaces the second edition published in 2005. This edition constitutes a technical revision.</p>
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<p>EN IEC 61000-6-3</p>	<p><b>Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for equipment in residential environments</b></p> <p>IEC 61000-6-3:2020 is a generic EMC emission standard applicable only if no relevant dedicated product or product family EMC emission standard has been published. This part of IEC 61000 for emission requirements applies to electrical and electronic equipment intended for use at residential (see 3.1.14) locations. This part of IEC 61000 also applies to electrical and electronic equipment intended for use at other locations that do not fall within the scope of IEC 61000-6-8 or IEC 61000-6-4. The intention is that all equipment used in the residential, commercial and light-industrial environments are covered by IEC 61000-6-3 or IEC 61000-6-8. If there is any doubt the requirements in IEC 61000-6-3 apply. The conducted and radiated emission requirements in the frequency range up to 400 GHz are considered essential and have been selected to provide an adequate level of protection of radio reception in the defined electromagnetic environment. Not all disturbance phenomena have been included for testing purposes but only those considered relevant for the equipment intended to operate within the locations included within this document. The emission requirements in this document are not intended to be applicable to the intentional transmissions and their harmonics from a radio transmitter as defined by the ITU.</p>
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### Life cycle assessment

<p>CEN EN ISO 14025:2010</p>	<p><b>Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006)</b></p> <p>ISO 14025:2006 establishes the principles and specifies the procedures for developing Type III environmental declaration programmes and Type III environmental declarations. It specifically establishes the use of the ISO 14040 series of standards in the development of Type III environmental declaration programmes and Type III environmental declarations.</p> <p>ISO 14025:2006 establishes principles for the use of environmental information, in addition to those given in ISO 14020:2000</p> <p>Type III environmental declarations as described in ISO 14025:2006 are primarily intended for use in business-to-business communication, but their use in business-to-consumer communication under certain conditions is not precluded.</p>
<p>EN 15978:2011</p>	<p><b>Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method</b></p> <p>This European Standard specifies the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the</p>

	<p>outcome of the assessment. The standard is applicable to new and existing buildings and refurbishment projects.</p> <p>The standard gives:</p> <ul style="list-style-type: none"> <li>- the description of the object of assessment;</li> <li>- the system boundary that applies at the building level;</li> <li>- the procedure to be used for the inventory analysis;</li> <li>- the list of indicators and procedures for the calculations of these indicators;</li> <li>- the requirements for presentation of the results in reporting and communication;</li> <li>- and the requirements for the data necessary for the calculation.</li> </ul> <p>The approach to the assessment covers all stages of the building life cycle and is based on data obtained from Environmental Product Declarations (EPD), their "information modules" (prEN 15804) and other information necessary and relevant for carrying out the assessment. The assessment includes all building related construction products, processes and services, used over the life cycle of the building.</p> <p>The interpretation and value judgments of the results of the assessment are not within the scope of this European Standard.</p>
<p>EN 15804:2012 +A2:2019/AC:2021</p>	<p>Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products</p>

<p>IEC/HD 60364-7-712</p>	<p><b>Low-voltage electrical installations - Part 7-712: Requirements for special installations or locations - Photovoltaic (PV) systems</b></p> <p>This section applies to the electrical installation of PV generator intended to supply all or part of an installation and feeding of electricity into the public grid or local distribution. In this section, the electrical equipment of a PV generator, like any other item of electrical equipment, is dealt with only so far as its selection and application in the installation is concerned. The electrical installation of a PV generator starts from a PV module or a set of PV modules connected in series with their cables, provided by the PV module manufacturer, up to the user installation or the utility supply point. Requirements of this document apply to – PV generators for supply to an installation which is not connected to a system for distribution of electricity to the public, – PV generators for supply to an installation in parallel with a system for distribution of electricity to the public, – PV generators for supply to an installation as an alternative to a system for distribution of electricity to the public, – appropriate combination of the above. Requirements for PV generators with batteries or other energy storage methods are under consideration.</p>
<p>EN IEC 60529</p>	<p><b>Degrees of protection provided by enclosures (IP Code)</b></p>

	IEC 60529:1989+A1:1999+A2:2013 Applies to the classification of degrees of protection provided by enclosures for electrical equipment with a rated voltage not exceeding 72,5 kV. The contents of the corrigenda of January 2003, September 2007, October 2009, October 2013, May 2015 and January 2019 have been included in this copy.
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### Electrical assembly/boards

IEC EN 61439-1 <i>See all standards in the series</i>	Low-voltage switchgear and controlgear assemblies - Part 1: General rules  IEC 61439-1:2020 lays down the general definitions and service conditions, construction requirements, technical characteristics and verification requirements for low-voltage switchgear and controlgear assemblies. NOTE Throughout this document, the term assembly(s) (see 3.1.1) is used for a low-voltage switchgear and controlgear assembly(s). For the purpose of determining assembly conformity, the requirements of the relevant part of the IEC 61439 series, Part 2 onwards, apply together with the cited requirements of this document. For assemblies not covered by Part 3 onward, Part 2 applies.
IEC 61439-8 (project)	Low-voltage switchgear and controlgear assemblies - Part 8: Assemblies for use in photovoltaic installations

### Cables, conduits and accessories

	<b>European regulations "Construction Products Regulations" (305/2011) apply to electrical cables installed in buildings</b>
EN 13501-6	<b>Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on power, control and communication cables</b>  This document provides the reaction to fire classification procedure for electric cables.  NOTE For the purpose of this document, the term "electric cables" covers all power, control and communication cables, including optical fibre cables.
EN 50399	<b>Common test methods for cables under fire conditions - Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results</b>
EN 50575	Power, control and communication cables - Cables for general applications in construction works subject to reaction to fire requirements
IEC EN 60332-1-2	Tests on electric and optical fibre cables under fire conditions - Part 1-2: Test for vertical flame propagation for a single insulated wire or cable - Procedure for 1 kW pre-mixed flame

IEC EN 60754-2	Test on gases evolved during combustion of materials from cables - Part 2: Determination of acidity (by pH measurement) and conductivity
IEC EN 61034-2	Measurement of smoke density of cables burning under defined conditions - Part 2: Test procedure and requirements
CEI-UNEL 35016 (italian standard)	Classe di Reazione al fuoco dei cavi in relazione al Regolamento EU "Prodotti da Costruzione" (305/2011)  Class of fire reaction of cables in relation to the EU "Construction Products" Regulation (305/2011)
EN 50618	<b>Electric cables for photovoltaic systems</b>  This European Standard applies to low smoke halogen-free, flexible, single-core power cables with cross-linked insulation and sheath. In particular for use at the direct current (d.c.) side of photovoltaic systems, with a nominal d.c. voltage of 1,5 kV between conductors and between conductor and earth. The cables are suitable to be used with Class II equipment. The cables are designed to operate at a normal maximum conductor temperature of 90 °C, but for a maximum of 20 000 hours a max. conductor temperature of 120 °C at a max. ambient temperature of 90 °C is permitted. NOTE The expected period of use under normal usage conditions as specified in this standard is at least 25 years.
EN IEC 61386-1	<b>Conduit systems for cable management - Part 1: General requirements</b>  IEC 61386-1:2008+A1:2017 specifies requirements and tests for conduit systems, including conduits and conduit fittings, for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1 000 V a.c. and/or 1 500 V d.c. This second edition cancels and replaces the first edition published in 1996, and its Amendment 1 (2000), and it constitutes a technical revision.
EN 60423	<b>Conduit systems for cable management - Outside diameters of conduits for electrical installations and threads for conduits and fittings</b>  This International Standard specifies outside diameters for conduits used in electrical installations or in communication systems and the dimensional requirements for threads. It also specifies the dimensional requirements for threads used in associated fittings. It is not applicable to extra heavy-duty electrical rigid steel conduits specified in IEC 60981. This third edition cancels and replaces the second edition published in 1993. This edition constitutes a technical revision. The following main changes have been made to the second edition: -revised figures and tables plus editorial and normative reference updates -conduit range increased to 110 mm outside diameter



EN 61386-21	<p><b>Conduit systems for cable management - Part 21: Particular requirements - Rigid conduit systems</b></p> <p>IEC 61386-21:2021 specifies the requirements for rigid conduit systems. This document is to be used in conjunction with IEC 61386-1:2008 and IEC 61386-1:2008/AMD1:2017.</p>
EN 61386-22	<p><b>Conduit Systems for cable management - Part 22: Particular requirements - Pliable conduit systems</b></p> <p>IEC 61386-22:2021 specifies the requirements for pliable conduit systems including self-recovering conduit systems</p>
EN 61386-23	<p><b>Conduit systems for cable management - Part 23: Particular requirements - Flexible conduit systems</b></p> <p>IC 61386-23:2021 specifies the requirements for flexible conduit systems. This document is to be used in conjunction with IEC 61386-1:2008 and IEC 61386-1:2008/AMD1:2017.</p>

### Atmospheric discharges and overvoltages

EN IEC 62561-1	<p><b>Lightning protection system components (LPSC) - Part 1: Requirements for connection components</b></p> <p>IEC 62561-1:2023 specifies the requirements and tests for metallic connection components that form part of a lightning protection system (LPS). Typically, these can be connectors, clamps, bonding and bridging components, expansion pieces and test joints. This third edition cancels and replaces the second edition published in 2017. This edition constitutes a technical revision.</p>
EN IEC 61643-11	<p><b>Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods</b></p> <p>IEC 61643-11:2011 is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages. These devices are packaged to be connected to 50/60 Hz a.c. power circuits, and equipment rated up to 1 000 V r.m.s. Performance characteristics, standard methods for testing and ratings are established. These devices contain at least one nonlinear component and are intended to limit surge voltages and divert surge currents.</p>
EN IEC 62305-1	<p><b>Protection against lightning - Part 1: General principles</b></p> <p>IEC 62305-1:2010 provides general principles to be followed for protection of structures against lightning, including their installations and contents, as well as persons. This second edition cancels and replaces the first edition, published in 2006, and constitutes a technical revision.</p>
EN IEC 62305-2	<p><b>Protection against lightning - Part 2: Risk management</b></p> <p>IEC 62305-2:2010 is applicable to risk assessment for a structure due to lightning flashes to earth. Its purpose is to provide a procedure for the evaluation of such a risk. Once an upper tolerable limit for</p>

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EN IEC 62305-4	<p><b>Protection against lightning - Part 4: Electrical and electronic systems within structures</b></p> <p>IEC 62305-4:2010 provides information for the design, installation, inspection, maintenance and testing of electrical and electronic system protection (SPM) to reduce the risk of permanent failures due to lightning electromagnetic impulse (LEMP) within a structure</p>

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6	IBS	Institute of Baltic Studies
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