



# SLOVENSKI STANDARD

## SIST EN 50583-2:2016

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### Fotonapetostni elementi v stavbah - 2. del: Fotonapetostni sistemi, vgrajeni v konstrukcijo (BIPV)

Photovoltaics in buildings - Part 2: BIPV systems

Photovoltaik im Bauwesen - Teil 2: BIPV-Anlagen

Systemes photovoltaïques dans la construction - Partie 2: Systemes photovoltaïques incorporés au bâti

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EUROPEAN STANDARD

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**Photovoltaics in buildings - Part 2: BIPV systems**Systèmes photovoltaïques dans la construction - Partie 2:  
Systèmes photovoltaïques incorporés au bâti

Photovoltaik im Bauwesen - Teil 2: BIPV-Anlagen

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

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## European foreword

This document (EN 50583-2:2016) has been prepared by CLC/TC 82 "Solar photovoltaic energy systems".

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-10-12
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2018-10-12

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**EN 50583-2:2016 (E)****1 Scope**

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.<sup>1</sup>

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.

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 410, *Glass in building — Determination of luminous and solar characteristics of glazing*

EN 1027, *Windows and doors — Watertightness — Test method*

EN 1990, *Eurocode: Basis of structural design*

EN 1991 (all parts), *Eurocode 1: Actions on structures*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*

EN 12179, *Curtain walling — Resistance to wind load — Test method*

prEN 12488, *Glass in buildings — Glazing recommendations — Assembly principles for vertical and sloping glazing*

EN 12519, *Windows and pedestrian doors — Terminology*

EN 12600, *Glass in building — Pendulum test — Impact test method and classification for flat glass*

EN 12758, *Glass in building — Glazing and airborne sound insulation — Product descriptions and determination of properties*

EN 13022 (all parts), *Glass in building — Structural sealant glazing*

EN 13116, *Curtain walling — Resistance to wind load — Performance requirements*

EN 13119, *Curtain walling — Terminology*

EN 13363-1, *Solar protection devices combined with glazing — Calculation of solar and light transmittance — Part 1: Simplified method*

<sup>1</sup> For the definition building-attached photovoltaic systems refer to 3.2

- EN 13363-2, *Solar protection devices combined with glazing — Calculation of total solar energy transmittance and light transmittance — Part 2: Detailed calculation method*
- EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*
- EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roofs tests*
- EN 13830, *Curtain walling — Product standard*
- EN 13956, *Flexible sheets for waterproofing — Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*
- EN 14351-1, *Windows and doors — Product standard, performance characteristics — Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics*
- EN 14500, *Blinds and shutters — Thermal and visual comfort — Test and calculation methods*
- EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining — Product specification and requirements*
- EN 14783, *Fully supported metal sheet and strip for roofing, external cladding and internal lining — Product specification and requirements*
- EN 15804, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*
- CEN/TR 15941, *Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data* (standards.iteh.ai)
- EN 15942, *Sustainability of construction works — Environmental product declarations — Communication format business-to-business*
- EN 15978, *Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method*
- EN 16002, *Flexible sheets for waterproofing — Determination of the resistance to wind load of mechanically fastened flexible sheets for roof waterproofing*
- EN 50583-1, *Photovoltaics in buildings – Part 1: BIPV modules*
- HD 60364-7-712, *Electrical installations of buildings — Part 7-712: Requirements for special installations or locations — Solar photovoltaic (PV) power supply systems (IEC 60364-7-712)*
- CLC/TS 61836, *Solar photovoltaic energy systems — Terms, definitions, symbols (IEC/TS 61836)*
- EN 62446, *Grid connected photovoltaic systems — Minimum requirements for system documentation, commissioning tests and inspection (IEC 62446)*
- EN ISO 6946, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method (ISO 6946)*
- EN ISO 12543-1, *Glass in building — Laminated glass and laminated safety glass — Part 1: Definitions and description of component parts (ISO 12543-1)*
- EN ISO 12543-2, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass (ISO 12543-2)*
- EN ISO 12543-3, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass (ISO 12543-3)*

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EN ISO 12543-4, *Glass in building — Laminated glass and laminated safety glass — Part 4: Test methods for durability (ISO 12543-4)*

EN ISO 12543-5, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finish (ISO 12543-5)*

EN ISO 12543-6, *Glass in building — Laminated glass and laminated safety glass — Part 6: Appearance (ISO 12543-6)*

prEN ISO 14439, *Glass in building — Glazing requirements — Use of glazing blocks (ISO/DIS 14439)*

EN ISO 12631, *Thermal performance of curtain walling — Calculation of thermal transmittance (ISO 12631)*

ETAG 002, *Guideline for European Technical Approval for Structural Sealant Glazing Systems – SSGS*

N 0068/CEN-TC128-WG3-N0068 TR *Renewable energy systems for roof structural connections*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 1990, EN ISO 12543 (Parts 1 to 6), EN 12519, EN 13119, EN 13956, EN 14782, EN 14783, EN 13022, EN 16002, CLC/TS 61836, and the following apply.

Annex-specific definitions are included in the annexes themselves.

NOTE Additional information are provided in the Low Voltage Directive 2006/95/EC, the Construction Product Regulation 305/2011 and the Electromagnetic Compatibility Directive ECD 2004/108/EC.

**3.1****Building-Integrated Photovoltaic system****BIPV system**

photovoltaic systems are considered to be building-integrated, if the PV modules they utilize fulfil the criteria for BIPV modules as defined in EN 50583-1 and thus form a construction product providing a function as defined in the European Construction Product Regulation CPR 305/2011

**3.2****Building Attached Photovoltaic system****BAPV system**

photovoltaic systems are considered to be building attached, if the PV modules they utilize do not fulfil the criteria for BIPV modules as defined in EN 50583-1

Note 1 to entry: Further important information on this type of photovoltaic system on roofs is provided by the Technical Report by CEN/TC 128/WG3 - Solar energy systems for roofs: Requirements for structural connections to solar panels.

**4 Requirements****4.1 General**

As BIPV systems contain electrical components, the systems are subject to the applicable electro-technical requirements as stated in the Low Voltage Directive 2006/95/EC / or CENELEC standards. BIPV systems shall be designed such that they do not contradict the requirements of HD 60364-7-712 for PV systems.

The essential requirements defined in the LVD 2006/95/EC are:

1. Protection against hazards arising from the electrical equipment,
2. Protection against hazards which may be caused by external influences on the electrical equipment.

As electrical systems, BIPV systems are subject to the applicable electro-technical requirements as stated in the Electromagnetic Compatibility Directive ECD 2004/108/EC / or CENELEC standards.

The essential requirements defined in the ECD 2004/108/EC are:



## 3 Protection requirements:

Equipment shall be so designed and manufactured, having regard to the state of the art, as to ensure that:

- (a) the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended;
- (b) it has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use.

## 4 Specific requirements for fixed installations:

Installation and intended use of components

A fixed installation shall be installed applying good engineering practices and respecting the information on the intended use of its components, with a view to meeting the protection requirements set out in Point 1. Those good engineering practices shall be documented and the documentation shall be held by the person(s) responsible at the disposal of the relevant national authorities for inspection purposes for as long as the fixed installation is in operation.

As BIPV systems contain components that are used as construction products, these components are subject to the Essential Requirements as specified in the European Construction Product Regulation CPR 305/2011.

The essential requirements defined in the CPR 305/2011 are:

- 5. Mechanical resistance and stability;
- 6. Safety in case of fire;
- 7. Hygiene, health and the environment<sup>2</sup>;
- 8. Safety and accessibility in use;
- 9. Protection against noise;
- 10. Energy economy and heat retention;
- 11. Sustainable use of natural resources.

The specific requirements on BIPV modules, which arise from these general CPR requirements, are treated in EN 50583-1.

The integration of photovoltaics into an existing construction product to create a BIPV module necessarily changes the properties with respect to the original construction product. New evaluation of a BIPV system containing the BIPV module with respect to a basic requirement of the CPR is necessary only if an essential characteristic of the BIPV module needed to meet this basic requirement is changed with respect to the original construction product.

As construction products, BIPV modules and their mounting structure, frame and fastenings have to be designed to comply with the wind, snow and mechanical loads as well as other requirements set out in the Eurocodes EN 1990, EN 1991, EN 1993, EN 1995 and EN 1999.<sup>3</sup>

This standard distinguishes between BIPV systems with modules that contain at least one pane of glass and those that do not. In addition to naming the general requirements, this standard classifies BIPV systems with modules containing glass into five different categories (depending on the intended mounting type). Specific normative references are listed for each category.

<sup>2</sup> As per Directive 2011/65/EU of the European parliament from 8th June 2011, photovoltaic modules have been exempted from the ROHS directive.

<sup>3</sup> Note the findings of CEN/TC128 WG3 – N0068 – TR renewable energy systems for roof structural connections.

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## 4.2 BIPV Systems with modules containing glass pane(s)

## 4.2.1 General

Additional clauses from EN 13022-1 or ETAG 002 apply to BIPV modules that are used as part of a structural sealant glazing system.

**Table 1 — General requirements for all BIPV systems with modules containing glass panes**

CPR Requirement	Standards, guidelines, test methods	Comment
1. Mechanical resistance and stability	prEN 12488	Basis of assembly rules for glazing
2. Safety in case of fire	EN 13501-2	Fire classification standards
3. Hygiene, health and the environment		
4. Safety and accessibility in use	EN 13022-2	Only applicable for BIPV systems consisting of BIPV modules or PV insulating glass units to be bonded adhesively which are sold separately from the framework and installed under the responsibility of the designer and assembler. National regulations may define restrictions or additional requirements. <sup>4)</sup>
	ETAG 002	Applicable for structural sealant glazing systems put on the market as a "kit" of components; specified by European Technical Approval or National Approval
	prEN ISO 14439	Applicable if contact of glass and frame cannot be excluded
5. Protection against noise	EN 12758	
6. Energy economy and heat retention		
7. Sustainable use of natural resources	EN 15804 CEN/TR 15941 EN 15942 EN 15978	Additional information is provided in the final Report of IEA-PVPS Task 12

## 4.2.2 Mounting categories

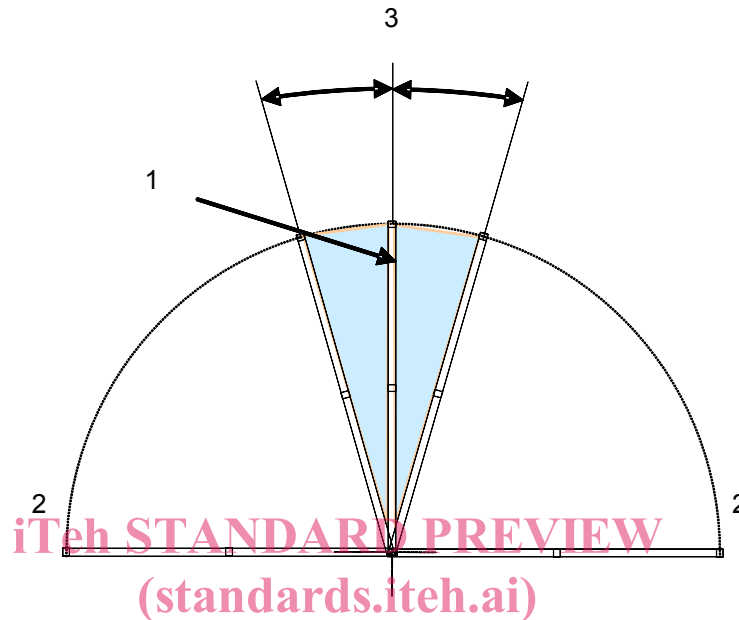
Additional requirements depend on the type of mounting. This standard differentiates five categories - A to E - of mounting according to combinations of the following criteria:

<sup>4)</sup> Structural sealant glazing systems (SSGS) or kits comprising PV modules are in the first consideration a matter of Technical Approvals which set out the requirements for the complete product to be fulfilled by the manufacturer. In the second consideration, PV modules as glass products to be sold separately and installed into or onto a framework or into or onto the building using a structural glazing technique are specified in EN 13022-1. Meeting the requirements of this standard, they are suitable for use in SSGS as defined in ETAG 002 and EN 13022-2.

1. integrated into the building envelope: yes/no
2. accessible yes/no
3. sloped: yes/no

“Not accessible” means that another construction product still provides protection against mechanical impact, even if the PV module has been damaged or removed.

The definition of “sloped glazing” is derived from EN 13830 and prEN 12488 and illustrated below (see Figure 1).



#### Key

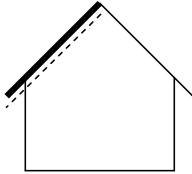
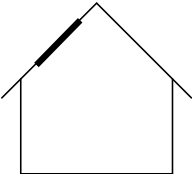
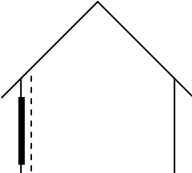
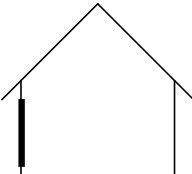
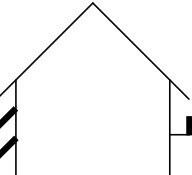
- 1 vertical glazing
- 2 angle of glazing considered sloped
- 3 angle of glazing considered non-sloped  $\pm 15^\circ$  from vertical

**Figure 1 — Angle of glazing considered sloped and non-sloped as per EN 13830 and prEN 12488**

Stated explicitly, “non-sloped” refers to the following angles:

$$75^\circ \leq \text{angle} \leq 90^\circ \text{ or } 90^\circ \leq \text{angle} \leq 105^\circ \text{ from horizontal.}$$

Table 2 — Mounting categories A – E

<b>Category A:</b>	<b>Sloped, roof-integrated, not accessible from within the building</b>	
	The PV modules are mounted in the building envelope at an angle between 0° and 75° (see Fig. 1) with a barrier underneath preventing large pieces of glass falling onto accessible areas below	
<b>Category B:</b>	<b>Sloped, roof-integrated, accessible from within the building</b>	
	The PV modules are mounted in the building envelope at an angle between 0° and 75° (see Fig. 1)	
<b>Category C:</b>	<b>Non-sloped (vertically) mounted not accessible from within the building</b>	
	The PV modules are mounted in the building envelope at an angle of between and including both 75° and 90° (see Fig. 1) with a barrier behind preventing large pieces of glass or persons falling to an adjacent lower area inside the building.	
<b>Category D:</b>	<b>Non-sloped (vertically) mounted accessible from within the building</b>	
	The PV modules are mounted in the building envelope at an angle of between and including both 75° and 90° (see Fig. 1)	
<b>Category E:</b>	<b>Externally integrated, accessible or not accessible from within the building</b>	
	The PV modules are mounted onto the building and form an additional functional layer (as defined in 3.1) exterior to its envelope (e.g. balconies, balustrades, shutters, awnings, louvres, brise soleil etc.).	