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Photovoltaics in buildings - Part 2: Systems

Photovoltaik im Bauwesen - Teil 2: Systeme

Photovoltaïque dans la construction - Partie 2: Systèmes

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Photovoltaïque dans la construction - Partie 2: Systèmes

Photovoltaik im Bauwesen - Teil 2: Systeme

This draft European Standard is submitted to CENELEC members for enquiry.
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It has been drawn up by CLC/TC 82.

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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52 **Foreword**

53 This document [prEN 50583-2:2014] has been prepared by CLC/TC 82 "Solar photovoltaic energy
54 systems".

55 This document is currently submitted to the CEN Enquiry.

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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 systems¹⁾.

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 prEN 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 1027:2000, *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 ISO 6946, *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method (ISO 6946)*

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

prEN 12488, *Glass in building – Glazing requirements – Assembly rules for vertical glazing*

EN 12519, *Windows and pedestrian doors – Terminology*

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)*

1) For the definition building-attached photovoltaic systems refer to 3.2.

- 91 EN ISO 12543-4, *Glass in building – Laminated glass and laminated safety glass – Part 4: Test methods*
 92 *for durability (ISO 12543-4)*
- 93 EN ISO 12543-5, *Glass in building – Laminated glass and laminated safety glass – Part 5: Dimensions*
 94 *and edge finish (ISO 12543-5)*
- 95 EN ISO 12543-6, *Glass in building – Laminated glass and laminated safety glass – Part 6: Appearance*
 96 *(ISO 12543-6)*
- 97 EN 12600, *Glass in building – Pendulum test – Impact test method and classification for flat glass*
- 98 EN 12758, *Glass in building – Glazing and airborne sound insulation – Product descriptions and*
 99 *determination of properties*
- 100 EN 13022 (all parts), *Glass in building – Structural sealant glazing*
- 101 EN 13116, *Curtain walling – Resistance to wind load – Performance requirements*
- 102 EN 13119, *Curtain walling – Terminology*
- 103 EN 13363-1, *Solar protection devices combined with glazing – Calculation of solar and light*
 104 *transmittance – Part 1: Simplified method*
- 105 EN 13363-2, *Solar protection devices combined with glazing – Calculation of total solar energy*
 106 *transmittance and light transmittance – Part 2: Detailed calculation method*
- 107 EN 13501-2, *Fire classification of construction products and building elements – Part 2: Classification*
 108 *using data from fire resistance tests, excluding ventilation services*
- 109 EN 13501-5, *Fire classification of construction products and building elements – Part 5: Classification*
 110 *using data from external fire exposure to roofs tests*
- 111 EN 13830, *Curtain walling – Product standard*
- 112 EN 13947, *Thermal performance of curtain walling – Calculation of thermal transmittance*
- 113 EN 13956, *Flexible sheet for waterproofing – Plastic and rubber sheets for roof waterproofing –*
 114 *Definitions and characteristics*
- 115 EN 14351-1, *Windows and doors – Product standard, performance characteristics – Part 1: Windows and*
 116 *external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics but including*
 117 *external fire performance for roof windows*
- 118 prEN ISO 14439²⁾, *Glass in building — Glazing requirements — Use of glazing blocks (ISO 14439)*
- 119 EN 14500, *Blinds and shutters – Thermal and visual comfort – Test and calculation methods*
- 120 EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining – Product*
 121 *specification and requirements*
- 122 EN 14783, *Fully supported metal sheet and strip for roofing, external cladding and internal lining –*
 123 *Product Specification and requirements*
- 124 CEN/TR 15601:2012, *Hygrothermal performance of buildings – Resistance to wind-driven rain of roof*
 125 *coverings with discontinuously laid small elements – Test method*

2) Abandoned project.

prEN 50583-2:2014 (E)

- 126 EN15804:2012, *Sustainability of construction works; Environmental product declarations - Core rules for*
 127 *the product category of construction products*
- 128 EN15941:2010, *Sustainability of construction works; Environmental product declarations - Methodology*
 129 *for selection and use of generic data*
- 130 EN15942:2011, *Sustainability of construction works; Environmental product declarations -*
 131 *Communication format business-to-business*
- 132 EN15978:2012, *Sustainability of construction works; Assessment of environmental performance of*
 133 *buildings - Calculation method*
- 134 prEN 50583-1, *Photovoltaics in buildings – Part 1: Modules*
- 135 HD 60364-7-712, *Electrical installations of buildings – Part 7-712: Requirements for special installations*
 136 *or locations - Solar photovoltaic (PV) power supply systems (IEC 60364-7-712)*
- 137 EN 16002:2010, *Flexible sheets for waterproofing - Determination of the resistance to wind load of*
 138 *mechanically fastened flexible sheets for roof waterproofing*
- 139 CLC/TS 61836, *Solar photovoltaic energy systems – Terms, definitions, symbols (IEC/TS 61836)*
- 140 EN 62079, *Preparation of instructions – Structuring, content and presentation (IEC 62079:2001)*
- 141 EN 62446, *Grid connected photovoltaic systems – Minimum requirements for system documentation,*
 142 *commissioning tests and inspection (IEC 62446)*
- 143 ETAG 002, *Guideline for European Technical Approval for Structural Sealant Glazing Systems – SSGS*
- 144 ETAG 006, *Guideline for European Technical Approval of Systems of Mechanically Fastened Flexible*
 145 *Waterproofing Membranes*
- 146 N 0068/CEN-TC128-WG3-N0068 TR *Renewable energy systems for roof structural connections*
- 147 **3 Terms and definitions**

148 For the purposes of this document, the terms and definitions given in in the Low Voltage Directive
 149 2006/95/EC, the Construction Product Regulation 305/2011, the Electromagnetic Compatibility Directive
 150 ECD 2004/108/EC /, EN 1990, EN ISO 12543 (Parts 1-6), EN 12519, EN 13119, EN 13956, EN 14782,
 151 EN 14783, EN 13022, EN 16002, CLC/TS 61836, and the following apply.

152 Annex-specific definitions are included in the annexes themselves.

153 **3.1**
 154 **building-integrated photovoltaic system**
 155 **BIPV-system**

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

159 **3.2**
 160 **building attached photovoltaic system**
 161 **BAPV-systems**

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

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

- Protection against hazards arising from the electrical equipment,
- 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:

– 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.

– 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:

1. Mechanical resistance and stability
2. Safety in case of fire
3. Hygiene, health and the environment ³⁾
4. Safety and accessibility in use
5. Protection against noise
6. Energy economy and heat retention
7. Sustainable use of natural resources

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

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

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

212 As building construction products, BIPV modules and their mounting structure frame and fastenings have
 213 to be designed to comply with the wind, snow and mechanical loads as well as other requirements set out
 214 in the Eurocodes EN 1990, EN 1991, EN 1993, EN 1995 and EN 1999⁴⁾.

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

219 **4.2 BIPV Systems with modules containing glass pane(s)**

220 **4.2.1 General**

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

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4) Note the findings of CEN TC128 WG3 – N0068 – TR renewable energy systems for roof structural connections.

223 **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		
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. ⁵⁾
	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 EN 15941 EN 15942 EN 15978	Additional information is provided in the final Report of IEA PVPS Task 12

224

225 **4.2.2 Mounting categories**

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

228 1. integrated into the building envelope: yes/no

229 2. accessible yes/no

230 3. sloped: yes/no

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

5) Structural sealant glazing systems 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.