

Bridging two worlds – Standards for BIPV

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Online, 8th September 2020. IEA-PVPS Task 15 parallel event at EU-PVSEC

Motivation

Why do we need standards specifically for BIPV?

Photovoltaic Technology



Buildings



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The first BIPV standard: EN 50583:2016

Photovoltaics in buildings - Part 1: BIPV Modules; Part 2: BIPV Systems

- **Currently valid BIPV standard in Europe**
- **Compiles electro-technical and building-related requirements**

EN 50583: Electrical requirements

- Electrical requirements

  EN 61215 for crystalline silicon terrestrial PV modules, or
  EN 61646 for thin-film terrestrial PV modules

  EN 61730 for PV module safety qualification

  … no special requirements for BIPV.

EN 50583: Building-related requirements

- General requirements
  - Mechanical resistance and stability
  - Safety in case of fire
  - Hygiene, health and the environment
  - Safety in use
  - Protection against noise
  - Energy economy and heat retention
  - Sustainable use of natural resources

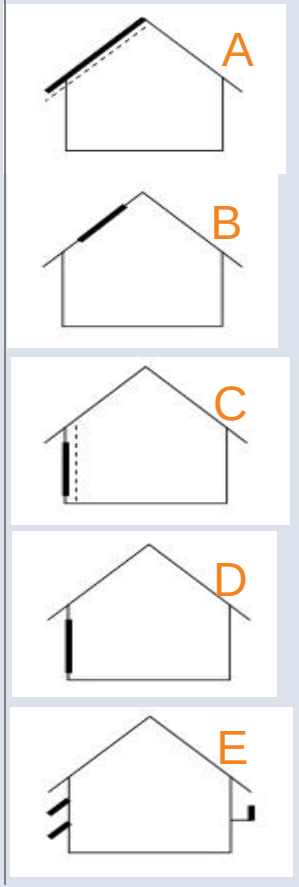
- Requirements specific to different building products
  - BIPV modules containing glass panes
  - BIPV modules not containing glass panes

EN 50583: Building-related requirements

- Application-based differentiation for BIPV modules containing glass panes

Five categories:

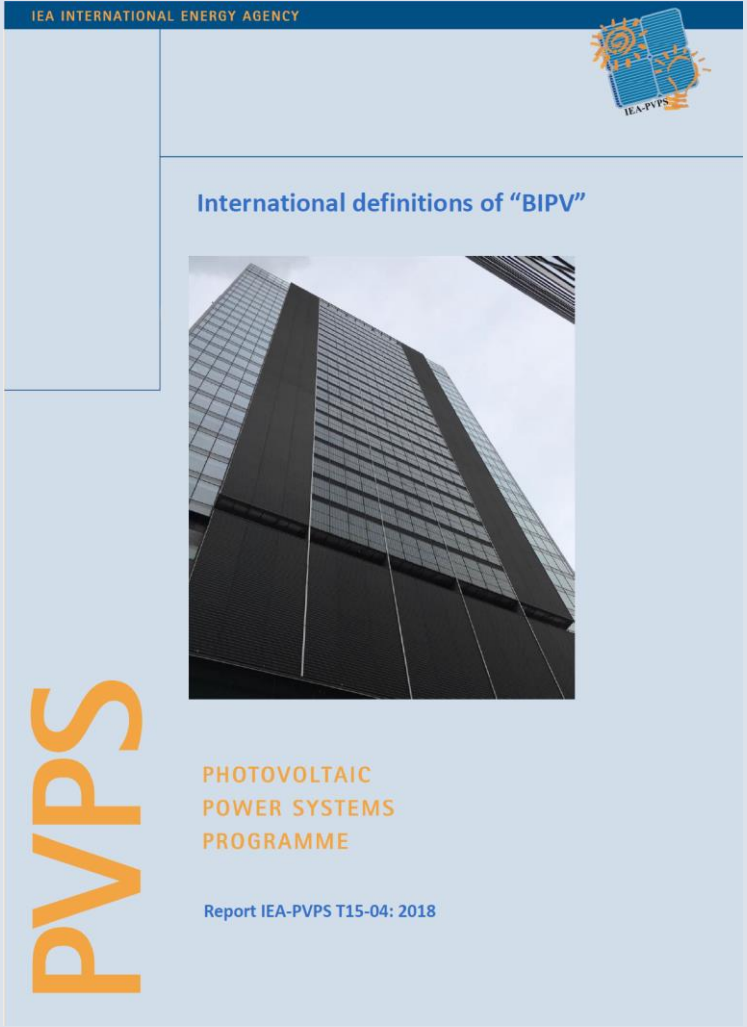
A: Sloped, roof-integrated, not accessible from within the building
B: Sloped, roof-integrated, accessible from within the building
C: Non-sloped (vertically) mounted, not accessible f. w. t. building
D: Non-sloped (vertically) mounted accessible f. w. t. building
E: Externally integrated, accessible or not accessible f. w. t. building



IEA-PVPS Task 15, Phase 1, Subtask C International framework for BIPV specifications (2016 - 2019)

Deliverables:

- International definition of »BIPV« (Activity C.0)
- Analysis of user needs for BIPV & BIPV functions (Activity C.1)
- BIPV technical requirements overview (Activity C.2)
- Multifunctional BIPV evaluation (Activity C.3)
- Suggest topics for exchange between different standardization activities on international level (Activity C.4)

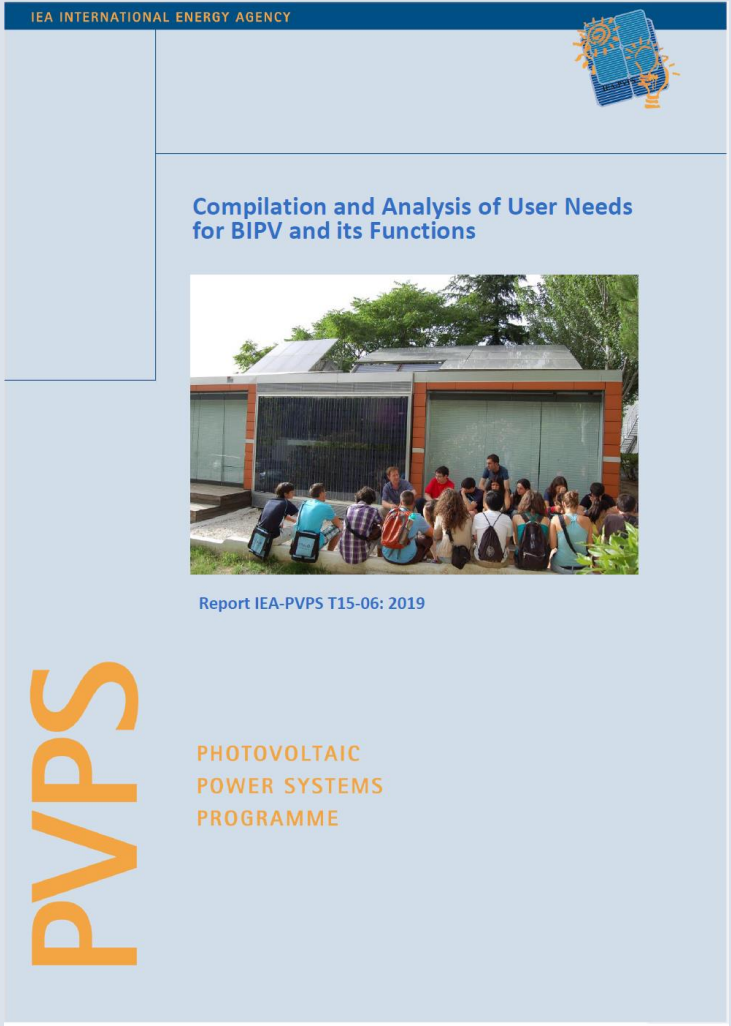


IEA-PVPS Task 15: Report C0

International definitions of "BIPV"

- Provides an overview of current building-integrated photovoltaic (BIPV) definitions
- Draws on current standards, PV funding programmes and research projects/programmes
- Recommends a BIPV definition for use in IEA-PVPS Task 15 in the context of standardisation

https://iea-pvps.org/key-topics/international-definitions-of-bipv/



IEA-PVPS Task 15: Report C1

Compilation and Analysis of User Needs for BIPV and its Functions

- Compiles needs for BIPV from the user's perspective
  - building owner
  - building occupants
  - planning and construction professionals
- Analysis focusses on classifying needs according to their suitability for international standardisation

https://iea-pvps.org/key-topics/compilation-and-analysis-of-user-needs-for-bipv-and-its-functions/



https://iea-pvps.org/key-topics/analysis-of-requirements-specifications-regulation-of-bipv/

IEA-PVPS Task 15: Report C2

Analysis of requirements, specifications and regulation of BIPV

- Presents a comprehensive list of possible requirement items
- Analyses specifications and regulations related to BIPV
- Provides information and proposals to support the development of international BIPV standards
- Used in preparation of IEC 63092

IEA-PVPS Task 15: Report C2
- Requirements, specifications and regulation of BIPV

Overview of specifications and regulations

- International standardisation of BIPV and related standards
- EN 50583 and the equivalent international standards

Requirement analysis

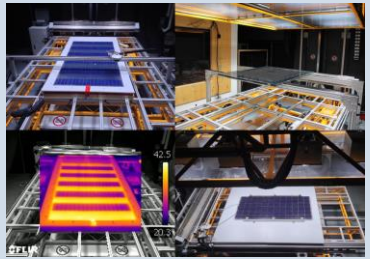
- Items for BIPV
- Categorization
- Level for international standardization of BIPV

IEA INTERNATIONAL ENERGY AGENCY

IEA-PVPS Task 15: Report C3/C4

Multifunctional Characterisation of BIPV – Proposed Topics for Future International Standardisation Activities

Multifunctional Characterisation of BIPV
–
Proposed Topics for Future International Standardisation Activities



PVPS
PHOTOVOLTAIC
POWER SYSTEMS
PROGRAMME

- Identifies areas needing international standardisation on multifunctional characterisation of BIPV modules and systems
- Recommends approaches to meet this need
- Identifies features of BIPV which require modifications to existing testing procedures
- Provides an overview of testing types and proposes test modifications

https://iea-pvps.org/key-topics/multifunctional-characterisation-of-bipv/

IEA-PVPS Task 15: Report C3/C4

Multifunctional Characterisation of BIPV – Proposed Topics for Future International Standardisation Activities

Features of BIPV which require changes to existing testing procedure

- Related to „conventional“ building components
- Related to „conventional“ PV modules
- Effect of installation in the built environment

Types of testing and proposed test modifications to account for BIPV features

- Electrical
- Mechanical
- Fire safety
- Optical and thermal
- Durability and reliability
- Curved elements

Multifunctional BIPV evaluation

(prev. C3)

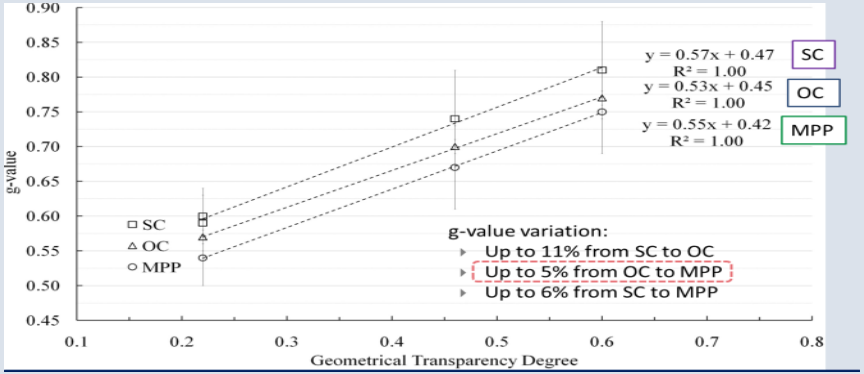
- Experience with application of EN 50583
- Standards not covered in EN 50583
- Normative references for EN 50583

IEA-PVPS Task 15: Report C3/C4

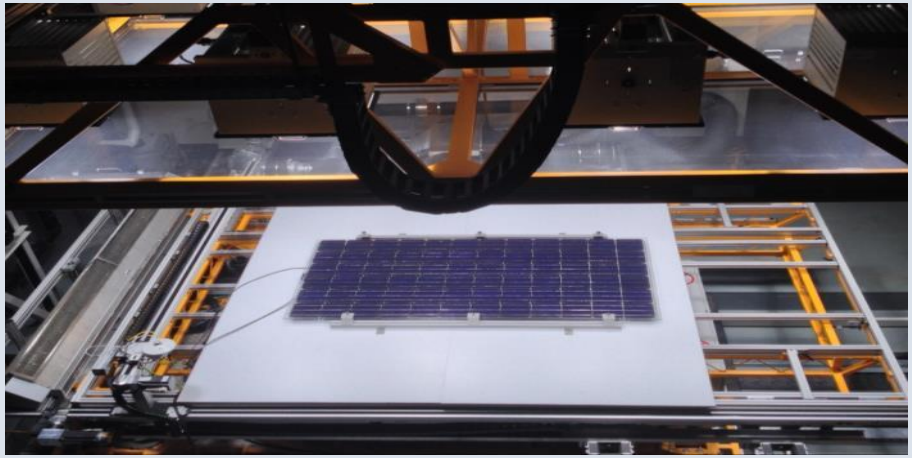
Multifunctional Characterisation of BIPV – Proposed Topics for Future International Standardisation Activities

Example

- Calorimetric determination of g value/SHGC with BIPV module under open-circuit and MPP conditions



L. Olivieri, F. Frontini, et al.; G-value indoor characterization of semi-transparent photovoltaic elements for building integration: New equipment and methodology, Energy and Building, vol 101, 2015



Concordia University's Solar Simulator and Environmental Chamber (SSEC) laboratory. Source and copyright: K. Kapsis, 2019.

Interaction with IEC/TC82 PT 63092

Development of an International BIPV Standard

IEC 63092 Photovoltaics in buildings –
Part 1: Building-Integrated Modules
Part 2: Building-Integrated Systems

Breaking news!
IEC 63092 should be published in October 2020

- Some participants of T15.1, STC and T15.2 STE are members of IEC PT 63092
- The analysis of equivalence of EN and international standards in T15.1, STC, Activity C2 was used in preparing IEC 63092

IEC 63092 Photovoltaics in buildings

- Same structure as EN 50583
  - Part 1 BIPV modules, Part 2 BIPV Systems
- Compiles electro-technical and building-related requirements
- References **international** standards, technical reports and guidelines
- Does not replace EN 50583 within Europe, but provides useful technical extensions and clarification

IEA Task 15, Phase 2, Subtask E –

Pre-normative international research on BIPV characterisation methods

Objectives

- Carry out pre-normative international research to develop **new and optimised characterisation methods** for BIPV modules and systems
- Facilitate local/national building component approval of BIPV
- Contribute to **international alignment of normative requirements** on BIPV products and system

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IEA Task 15, Phase 2, Subtask E –

Pre-normative international research on BIPV characterisation methods



Approach

- Use topics identified IEA-PVPS Task 15.1, Subtask C and by analysis of national building codes as a basis
  - Report C2: Analysis of requirements, specifications and regulation of BIPV (IEA-PVPS T15-08: 2019)
  - Report C4/C3: Multifunctional Characterisation of BIPV – Proposed Topics for Future International Standardisation Activities (IEA-PVPS T15-11: 2020)
- Pursue experimental and model-based approaches
- Focus on characterisation approaches suitable for proposal to international standardisation organisations such as IEC and ISO

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IEA Task 15, Phase 2, Subtask E –

Pre-normative international research on BIPV characterisation methods

- **Subtask E - Activities**
  - E1: Determination of **SHGC/g value**, taking generated and extracted electricity into account – laboratory / outdoor
    (Hisashi Ishii, LIXIL / Patrick Hendrick, ULB)
  - E3: **Fire safety** (Veronika Shabunko, SERIS)
  - E4: **Reliability and safety** of BIPV, including accelerated aging
    (Fabio Parolini, SUPSI)
  - E5: Standardised procedures to quantify the **annual electricity yield** of installed BIPV systems – laboratory / outdoor
    (Jun-Tae Kim / Fred Edmond Boafo, Konju National University)
- Anyone interested in participating, please contact Helen Rose Wilson

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Thank you to all contributors from IEA-PVPS Task 15 - and to you for your attention!

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