PROGRESS IN EUROPEAN BIPV STANDARDIZATION WORK – DEFINITION OF TEST SEQUENCES AND TEST REQUIREMENTS

Motivated by the fact that BIPV modules and systems are not yet regulated through any European harmonized standard, several research projects co-funded by the EU, such as PV Performance, were established. Considering PV integrated into buildings as construction products makes project realization much easier, but requires detailed knowledge of various international and national building codes. The present draft standard was conceived to provide a harmonized normative basis for the application of BIPV in Europe. It incorporates applicable existing codes and standards, but also proposes new test methods and adapted requirements. Since in Europe BIPV has to comply with the normative framework of CENELEC as well as CEN, technical prerequisites such as the low voltage and building construction directive / regulation form the technical background to specify the requirements for such products. This publication shall give an overview of the current status on this European standardization work, which – once in force – will provide guidelines to manufacturers, planners, system designers and installers for the application of BIPV products.

DEFINITION

One of the first but also most challenging tasks of the working group developing the current draft standard, recently submitted to CEN and CENELEC as ‘prEN 50583 Photovoltaics in Buildings’ was the definition of the terms BIPV and BAPV:

‘Building-integrated photovoltaics - BIPV’ – Photovoltaic modules are considered to be building-integrated, if the PV modules form a building component providing a function as defined in the European Construction Product Directive CPD 89/106/EEC. Thus the BIPV module is a prerequisite for the integrity of the building’s functionality (if the integrated module is dismounted it has to be replaced by an appropriate building component).

‘Building attached photovoltaics - BAPV’ – Photovoltaic modules are considered to be building attached, if the PV modules are mounted on a building envelope and do not fulfil the above criteria for building integration.

The draft standard furthermore defines several application categories and subdivides these into the essential requirements of the European Construction Product Directive (Fig. 1):

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

REQUIREMENTS

prEN 50583 assigns application-specific requirements to PV modules – divided into the main categories “containing”- and “not containing glass panes”. It further differentiates general requirements that have to be fulfilled by all products (el. and building-related requirements) and such that only have to be fulfilled depending on the constructional set-up (e.g. fire resistance classification acc. to EN 13501-1).

BIPV MODULES CONTAINING GLASS PANES

For BIPV products with glass the structural safety is mainly dependent on its rigidity and environmental influences during operation. Glass modules as building products can be glassed as ‘laminated glass’ and hence the requirements from EN 14449 apply. For BIPV with safety glazing functions, EN 12600 applies, where the pendulum test is required to determine the resistivity of the glass to withstand a body impact by accident.

For the determination of the system performance, in terms of water tightness and mechanical uplift behaviour of a roof integrated module assembly, two new test methods were derived from commonly used methods (Eurocodes for wind and snow resistance and a wind-driven rain penetration test).

BIPV MODULES WITHOUT GLASS PANES

Flexible modules often are glued on top of an existing roofing structure on site. In the context of the before given definition, these do not fulfill at least one functional integrational aspect of the building. Therefore BIPV modules that do not contain glass panes have to be prefabricated for the use in a roof that typically includes a polymer waterproofing sheet as back cover or metal sheet as being a permanent structurally bonded building component. For all waterproofing sheets as substrate, EN 13966 applies for flexible plastic and rubber sheets. Safety in use has to be maintained by tests of the European technical approval in accordance with ETAG 006.

CONCLUSION

As the presented work points out, prEN 50583 is attempting to summarize existing requirements for the implementation of PV into the building shell and closing the gaps of inapplicable requirements. The aim of the document is to assist planners, installers and manufacturers to see through the wide range of relevant regulations from the electro-technical and the constructional world.

Newly developed tests shall further provide additional confidence in the products to promote it to a mass product.