Composite PV modules samples for laboratory testing

Appealing monolithic composite-based BIPV click-&-go envelope solutions

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Executive Summary

This document addresses the technical specifications and detailed designs of BIPV samples selected for laboratory testing, based on the solutions selected for the demo sites from the proposed options of the composite based crystalline silicon BIPV modules designs.

The document is organised as follows. First, the composite PV modules selected for each demo site are summarised. Then, the testing plan designed, and the number and characteristics of the samples required for performing those tests are presented. Finally, the designs of the samples are provided.

Pictures of all the samples manufactured for testing purposes will be included in a different document, with the results of the laboratory testing performed for the PV click-&-go envelope solutions.

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1. Selected composite PV modules for each demo site

In order to understand the testing plan that will be carried out, in the following table the composite based PV modules designed and selected for each demo are summarised.

Table 1: Selected composite PV modules for demo sites

Selected PV modules for demo sites	PV module configuration			Location					
	PV module material	Technology Cells	Color	Ludvika (SWE)		Campi Bisenzio (IT)		Saint Aubin (FR)	
				Roof	Façade	Roof	Façade	Roof	Façade
890 mm x 900 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	Fibre-reinforced composite technology	Mono crystalline Si	Black						

As it can be seen, composite based PV modules will be implemented in one demo site and in one specific area. As a result, only one modulation is needed. The summary of samples needed for testing is provided in the following section.

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2. Summary of composite PV samples for testing

The summary of composite based PV samples classified per test are provided in the tables below.

Table 2: Summary of roof composite PV samples needed for testing based on construction standards

Summary of samples needed for testing	Testing on roof		
	Reaction to Fire (classification tests)	Wind load resistance	Impact resistance (Hail impact)
	CEN TS 1187	Internal procedure based on EAD 090062-00-0404	61215-2:2016
890 mm x 900 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	**3**	**2**
TOTAL UNITS	**5**		

In addition to construction tests, there are also tests related to PV standards (IEC 61215) that are applicable. The summary of those tests and the PV samples needed are provided in the following table.

Table 3: Summary of composite PV samples needed for general testing

Summary of samples needed for testing	General testing								
	Reaction to Fire (Ignitability of products)	Impact resistance test	Resistance against manual attack	Humidity test	High temperature test	UV preconditioning test (MQT10)	Thermal cycling (TC) (MQT11)	Humidity freeze (HF) (MQT12)	Damp Heat (DH) (MQT13)
	EN 11925-2	EN 12600	EN 356	ISO 12543-Part 4	ISO 12543-Part 4	61215-2:2016			
200 mm x 200 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	-	-	-	-	**3**	-	-	-
360 mm x 360 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	-	-	-	-	-	**4**	**3**	**3**
Total by type	**0**	0				**13**			
TOTAL UNITS	**13**								

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3. Total composite PV samples for testing

In the following tables, the compilation of all the composite based PV samples necessary for laboratory testing and the complete description of each sample are presented.

Table 4: Total composite PV samples for testing

Samples for testing PV composite modules for demo sites	Type of testing			
	Fire reaction	Mechanical resistance of system	Mechanical resistance of glass	Ageing test and PV performance
890 mm x 900 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	**3**	**2**	-
Samples for testing, requirements set by standards				
200 mm x 200 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	-	-	**3**
360 mm x 360 mm Fibre-reinforced composite + monocrystalline Si technology + Click & GO	-	-	-	**10**
Total by type	**0**	**3**	**2**	**13**
SUMMARY OF SAMPLES	**18**			

Table 5: Samples complete description

Dimensions (mm)	PV module material	Active module	cells per module	Junction box + glass-hole	Structure
Samples for testing, Demo site designs					
890 mm x 900 mm	composite	Yes	5x4	Yes	Yes, 1 system per module
Samples for testing, requirements set by standards					
200 mm x 200 mm	composite	Yes	1	Yes	No
200 mm x 200 mm	composite	Yes	1	Yes	No
360 mm x 360 mm	composite	Yes	2x2	Yes	No
360 mm x 360 mm	composite	Yes	2x2	Yes	No

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4. Samples designs

Two batches of samples are designed for testing, small size samples for PV testing based on IEC 61215 and real size prototypes for testing based on construction standards.

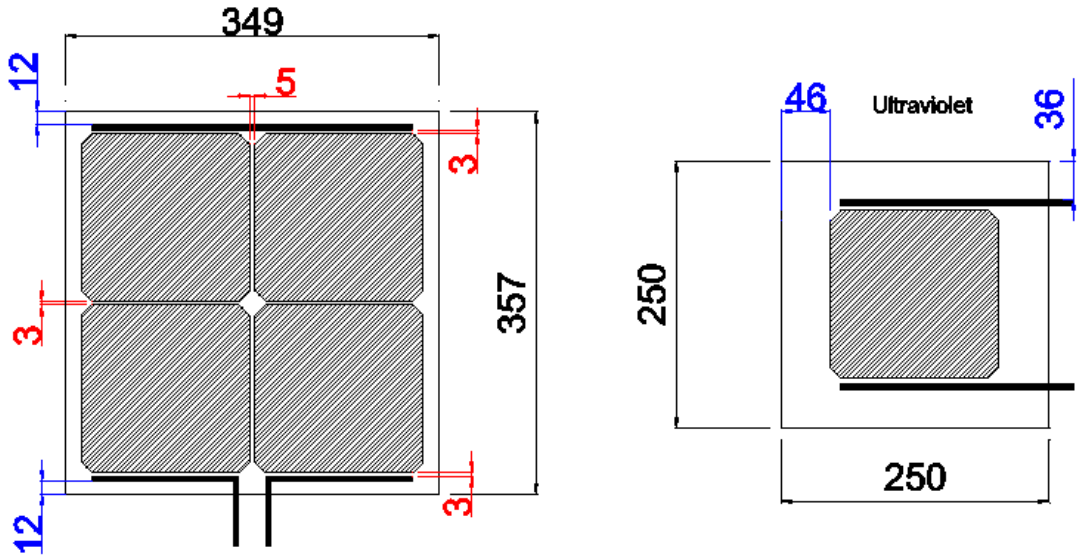

Figure 1. Small size samples for PV testing based on IEC 61215

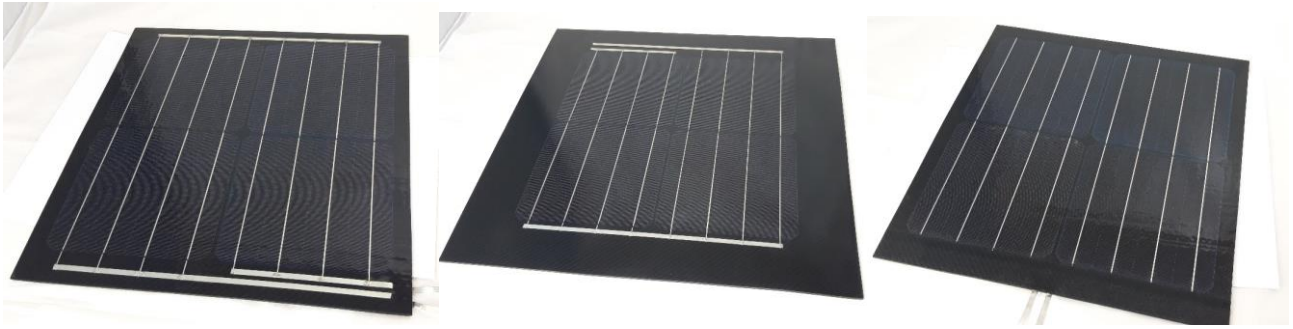

Figure 2. Small size samples manufactured for the Damp Heat test

Figure 3. Small size samples manufactured for the Humidity Freeze test

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Figure 4. Small size samples manufactured for the Thermal Cycling test

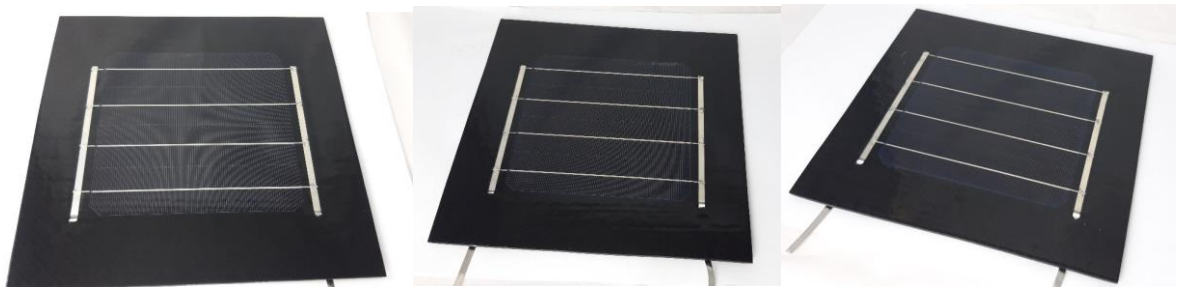

Figure 5. Small size samples manufactured for the UV test

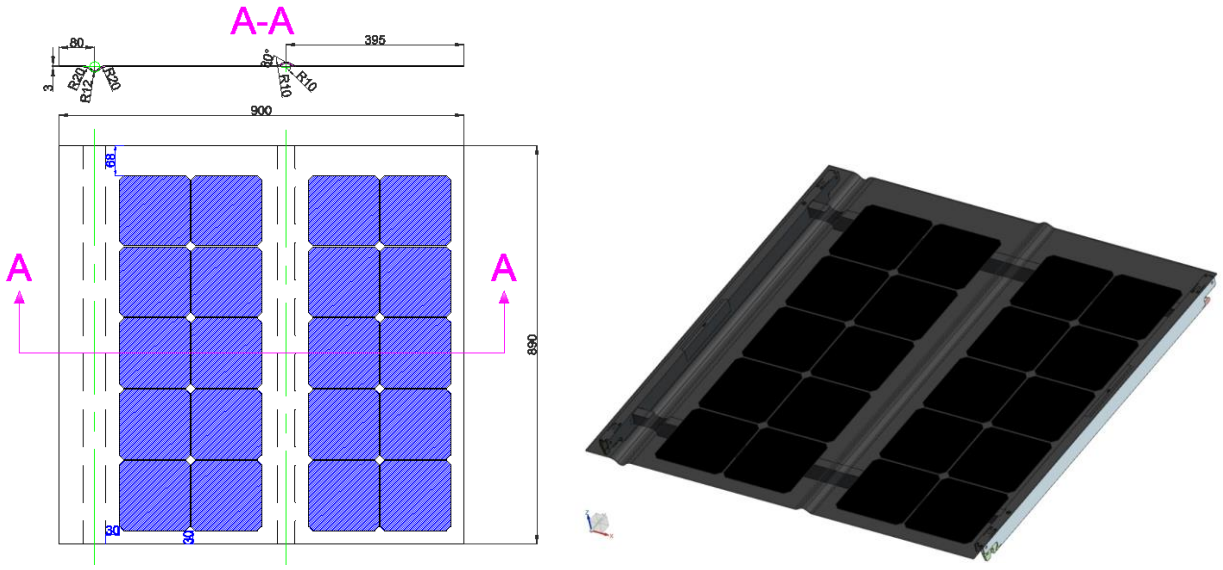

Figure 6. Geometry and dimensions of the real size prototype for testing based on construction standards

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Technical references

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