

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 691768



PVsites

Report - Prototypes for test benches and experimental building

Project Report

Summary

This document describes and demonstrates how the manufacturing of the necessary samples for test benches (CIGS curved glass) and commercial installation (CIGS roofing elements) have been completed.

Although this deliverable is submitted in December 2019, M48, instead of M40 according to the last amendment approved in June 2019, the prototypes were manufactured on time and all of them are already installed as it is shown by the photographs of the figures along the document.

Acknowledgements

The work described in this publication has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 691768.

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1 EXECUTIVE SUMMARY

1.1 Description of the deliverable content and purpose

This deliverable sums up the delivered CIGS-based prototypes for test benches, experimental buildings and demo sites. An overview on the type of modules delivered, number of modules and delivery month is given. The changes compared to the initial proposal (estimation at proposal stage) are summed up.

Six products were developed. More than 800 prototypes were delivered to testing at demo sites and installed.

Although this deliverable is submitted in M48 instead of M40, according to the last amendment approved in June 2019, the prototypes were manufactured on time and all of them are already installed in the demo sites (work belonging to task T8.3) as the photographs of the figures along the document show.

Table 1.1 depicts the main links of this deliverable to other activities (work packages, tasks, deliverables, etc.) within PVSITES project. The table should be considered along with the current document for a better understanding of the deliverable contents and purpose.

Table 1.1 Relation between current deliverable and other activities in the project

Project activity	Relation with current deliverable
D4.1	This deliverable shows the prototypes developed in T4.1 and reported in <i>D4.1 Roofing tiles and façade elements prototypes</i> with 10%-14% efficiency modules of 0.5x1 m ² and 1x1 m ² area
D4.2	This deliverable shows the prototypes developed in T4.1 and reported in <i>D4.2 Large area roofing and façade elements</i> of 0.5x2-3 m ² or 1x2-3m ² using 10%-14% efficiency modules
T8.3	The prototypes shown in this deliverable have already been installed in T8.3 in demo sites as shown in <i>D8.6 Results of installation and commissioning for every demonstration site</i>

2 PRODUCTS AND DEMO SITES

Compared to the initial estimation for products samples and demosites at the proposal stage (2016), several upgrades have been made. Below a recap of these changes. In Table 2.1 Link between Product groups and products. Table adapted from Table 4, page 12 of the proposal stage SEP-210258385 it is shown which products belong to which group and where they are demonstrated.

- **CIGS roofing shingle on metal substrate**

Instead of refurbishing one carport as initially proposed, 2 new carports have been built. For the single house and the carports 2 different shingles were developed, based on metal substrate.

- **CIGS large area elements on metal substrate**

Instead of a warehouse the hotel school of Geneva was chosen. The Building in Barcelona was kept as it is. 2 products were developed for each demo site one.

- **CIGS large area flexible roofing membrane and bendable elements:**

Bendable modules are now demonstrated on the carports, using flexible metal sheets. The total length of the module was increased from planned 3 m to now 5 m. The roofing membrane, which is a self-gluing peel and stick module, was foreseen to be tested on the experimental building NEST and is being finally tested on the façade of Surber Metallbau.

Table 2.1 Link between Product groups and products. Table adapted from Table 4, page 12 of the proposal stage SEP-210258385

BIPV Product	TRL and MRL after PVSITES	Product breakdown Demosite / product
Curved glass-glass, CIGS technology	TRL6, MRL7 <i>Tested in CEA test benches</i>	Test bench CEA France / P5
CIGS roofing shingle on metal substrate	TRL7, MRL7 <i>Demonstrated in single-detached dwelling – Belgium and Carport - Switzerland</i>	Rooftop Belgium / P1 2 Carports Switzerland / P2
CIGS large area elements on metal substrate	TRL7, MRL7 <i>Demonstrated in tertiary building in Switzerland (façade) and industrial building in Spain (roof)</i>	Rooftop Cricursa Spain / P3 Facade school at Ecole Hoteliere Geneva / P4
CIGS large area flexible roofing membrane and bendable elements	TRL7, MRL7 <i>Demonstrated in industrial rooftop-Switzerland</i>	2 Carports Switzerland / P2 Experimental building / P6

3 PROTOTYPES DELIVERED

Table 3.1 depicts the number and nature of the prototypes delivered by FLISOM within PVSITES project for testing at test benches, experimental buildings and demosites.

Table 3.1 Delivered prototypes for test benches, experimental building and demosites

Product number	Demo Project		Number of modules delivered	Module Power [W]	Total Power [kW]	Delivered [project month]
P1	Roof-tile @ Stambruges Belgium		150	55	9.0	40
P2a	Carport	EKZ	39	110	8.2	30
P2b			39	85		30
P2a		EMPA	37	110	7.8	25
P2b			37	85		25
P3	CRICURSA Barcelona		336	55	20.0	39
P4	EHG Façade @ Geneve		146	55	9.0	41
P5	Curved glass		24	30	0.7	25
P6	Experimental building (Surber replacement)		240	275	13.0	39

4 PRODUCT PICTURES AND DESCRIPTION

In this section pictures of the 5 products are shown to illustrate how they are mounted. Detail on the products can be found in D4.2, D4.3, already submitted in previous months.



Figure 4.1 P1 mounted on the roof in Belgium (left) and P3 mounted in Spain on CRICURSA building (right)



Figure 4.2 P2 on the carport in EKZ (left) and P4 being mounted in Geneva (right)



Figure 4.3 P5, curved glass module mounted in test bench at INES, France

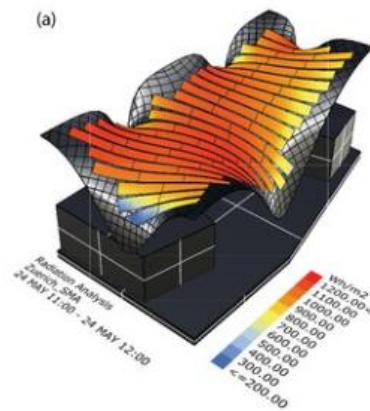


Figure 4.4 Planned installation on experimental building HiLo NEST at EMPA with P6 (Project not realized)

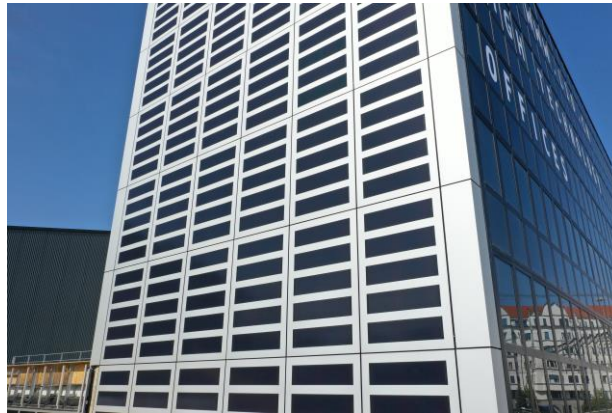


Figure 4.5 P6 installed on a façade in Dietlikon Zürich

5 EXPERIMENTAL BUILDING

The NEST building at EMPA was, and still is foreseen to be equipped with flexible FLISOM modules. Due to failure of the concrete structure and subsequent re-design the project is delayed by ~2 years.

FLISOM has therefore looked for an alternative to test the product P6. Together with the company Surber a solution was found. The modules were glued on the façade, the same way as it was planned for the nest building. The flex product can now be tested in that installation.

The modules were delivered to Surber in Spring 2019 and mounted during summer. The installation went online 21.08.2019.