Polymeric solar heating systems

INFO Sheet B13

Building integration and scalability of components

Description:	*An important outcome of the Subtask B workshop at the 15th Task 39 Meeting in March 2013 was to exhibit the scalability of polymeric collectors and heat stores.*
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Download at:	http://task39.iea-shc.org/

Introduction

Polymeric materials for solar thermal applications open the way for new processing techniques that can provide modular and scalable solutions for solar thermal collectors and system components. During the Subtask B Industry Workshop at the 15th SHC Task 39 Experts Meeting in March 2013 in Mallorca, participants investigated which products could be found in the market. In a brainstorming session, experts examined how various scalable polymeric solar thermal components could be combined into a complete system and how the system could be presented to a broad professional audience.

Scalable solar collectors: roof and facade integration

Scalability of solar collectors is of particular importance for the integration into the building, replacement of conventional roof or use as facade covers. The polymeric collector concept by the company Aventa AS is an example of a scalable collector and is described in Task 39 INFO Sheet B18. The AventaSolar collectors have a fixed width (Norwegian standard building width of 60cm) and flexible lengths (five standard sizes between two to five meters length). The scalability allows architects and building designers to fit the collector field to the actual available space on a building's roof or facade to avoiding costly transitions between collector field and the conventional roof/facade covers. Additional aspects suggest that this type of polymeric collector is particularly suitable for building integration: Light-weight modules, installation process fitting to typical handling of conventional roof/facade modules. Following technical characteristics are rather different from conventional solar thermal systems and important to be considered when choosing other system components fitting to these scalable collectors:

Drain-back collector system, non-pressurized open to atmospheric pressure
Heat carrier: water, no additives
Heat carrier volume: 3.5L/(m^2 collector area)
Volume flow: 2 -2.5L/(module min)

Figure 1: Left: Scalable, facade integrated polymeric collectors (source: Aventa) Right: Scalability illustrated at the SHC2013 (Fraunhofer ISE).

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* On behalf of the experts at the Subtask B Industry Workshop in Mallorca, March 2013: AIT (AT), Aventa AS (N), Chevron Phillips Chemicals (BE), Johannes Kepler University Linz (AT), PCCL (AT), Prirev (PT), TSC-Concentra (ES), University of Innsbruck (AT), Vaillant GmbH & Co. KG (DE).

Scalable heat stores: system size, logistics and available space

Scalability of solar heat stores is an important issue, especially for retrofit projects with limited space and access to the technical room (basement). Several small and medium sized solar heat stores of polymeric materials are available in the market (Köhl et al., 2012). Concerning scalability, two heat store concepts were more closely investigated at the Subtask B Industry workshop. The FLEXSAVE VARIO by the company FASVE is a non-pressurized buffer store concept available from 1.5 to 150 m^3 suitable for single-family houses up to large industrial applications (Figure 2, left). The storage size and technical heating equipment can individually be chosen for each project from pre-configured standard units. For easy access to the boiler room (in small projects) or handling and transport (for larger projects) the heat store is light weight compared to conventional non polymeric stores and delivered modular. The inner tank consists of PP sheets and is easily welded on-site by the installation team. The Thermotank QUADROLINE heat storage concept by the company ROTH WERKE GmbH is also modular, but available as prefabricated 325L units and first of all for small and medium sized domestic projects. The pressure resistant storage tank consists of fiber/plastic composite technology and the thermal insulation of modular EPS blocks. The QUADROLINE modules can be integrated into domestic heating and drinking water systems in various configurations, individually or in a battery installation (Figure 2, right).

Both heat stores are award winning concepts. The FLEXSAVE VARIO received among others the Intersolar Award 2010 for ”Solar thermal technology” and the pro-K industrial association named the Thermotank Quadroline "Product of the year 2013".

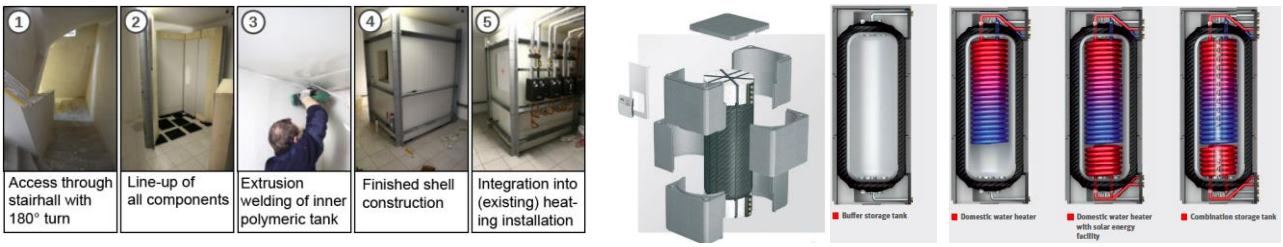

Figure 2: Scalable heat store concepts of polymeric materials: FLEXSAVE VARIO by FSAVE GmbH and Thermo-tank QUADROLINE by ROTH WERKE GmbH.

Exhibition at SHC 2013 in Freiburg

As a follow-up and dissemination event of the Subtask B Industry Workshop products demonstrating scalability of polymeric solar applications were presented to a broad professional audience at the SHC Task 39 Exhibition at the SHC 2013. The exhibition was a meeting point in front of Freiburg Concert House where the SHC 2013 took place. Further reading.

References

[1] Köhl et al., 2012: Polymeric Materials for Solar Thermal Applications. Weinheim: Wiley-VCH, 2012. ISBN: 978-3-527-33246-5.