

Description:	<i>OHC – Collector: Collector Overheating Protection with Backcooler</i>
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Authors:	<u>Alexander Thür</u> , Claudia Hintringer, Norbert Hauer, Wolfgang Streicher (University of Innsbruck), Robert Hausner, Alexander Kaiser (AEE INTEC), Roland Riepl (Greiner Technologies), Gernot Wallner (JKU-IPMT)
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Introduction

Within the Austrian project SolPol-2 (www.solpol.at) the concept of a flat plate collector, which can be completely produced with cheap plastic (max. temperature 90°C) with integrated overheating protection was investigated and functional models were developed, constructed and tested. The principle concept is shown in the Figure 1:

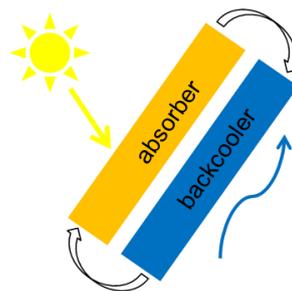


Figure 1: Principle of overheat protection via thermosyphonal backcooling.

In case of risk of overheating a special valve opens the connection from the absorber to the backcooler, and due to the solar irradiation on the absorber and the cooling effect at the backside at the backcooler a thermosyphon driven cooling flow occurs.

Test Results

In several steps functional model collectors were developed, constructed and tested. For the absorber black-pigmented polypropylene grades were used. In Figure 2 left selected model collectors (small and large) are depicted. Performance tests and stagnation tests were performed at different test facilities. In Figure 2 right the efficiency curve of a model collector is presented.

In Figure 3 a stagnation test shows the potential of the cooling effect. Without backcooling (until 12:30) the absorber temperature increases up to 115°C and still did not reach the maximum. After activating the backcooling system the absorber temperature dropped to about 85°C at about 950W/m² solar irradiation and about 20°C ambient temperature.

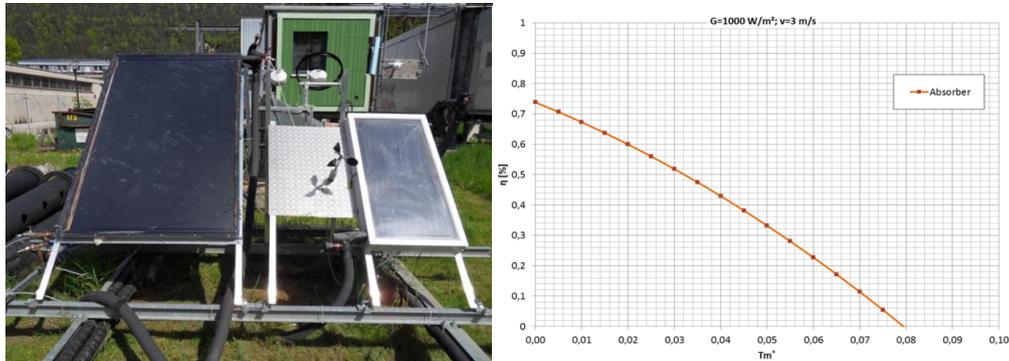


Figure 2: Left - functional model collectors at the outdoor test facility; Right - measured efficiency curve of the large collector.

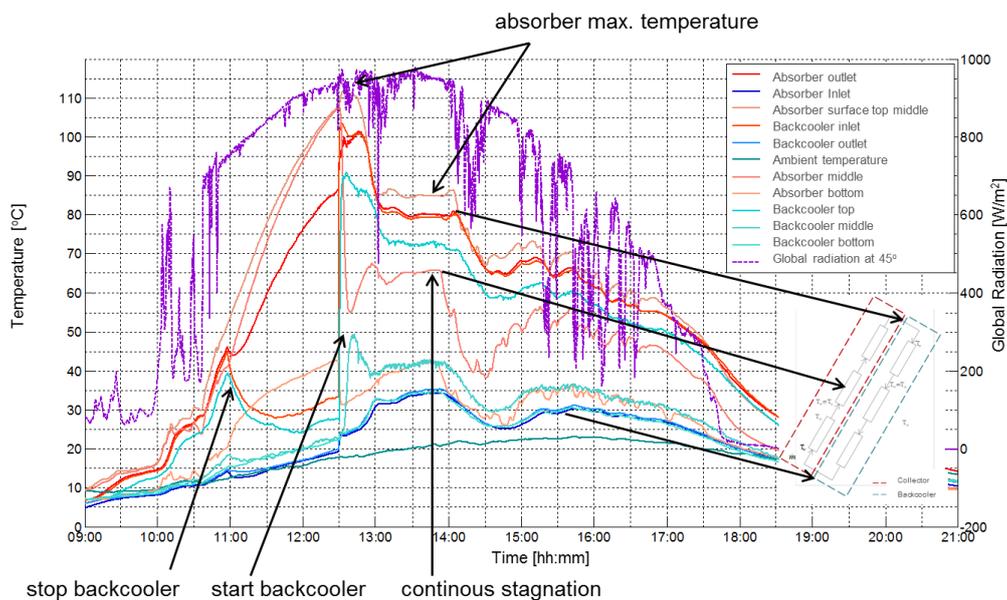


Figure 3: Stagnation test showing the potential of temperature limitation at the absorber.

References

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