ENVIRONMENTAL TECHNOLOGY VERIFICATION

DANETV

DANISH TECHNOLOGICAL INSTITUTE

ETV Verification Statement

Technology type	Solar air heater	
Application	Ventilation, heating, dehumidification of indoor air	
Product name	SolarVenti SV14	
Company (vendor)	SolarVenti A/S	
Website	www.solarventi.dk	**Phone** +45 86 96 67 00
E-mail	hjc@solarventi.dk	

DANETV, The Danish Centre for Verification of Climate and Environmental Technologies, undertakes independent tests of environmental technologies and monitoring equipment.

DANETV is a co-operation between the following five technological service institutes: DHI, Danish Technological Institute, FORCE Technology, Delta, and AgroTech. DANETV was established with the financial support of the Danish Agency of Science, Technology and Innovation. Information and DANETV documents are available at www.etv-denmark.com.

Verification and tests are planned and conducted in accordance with the guidelines for the ETV Scheme which is currently being established by the European Union.

This verification statement summarizes the results of the ETV test of the SolarVenti SV14 solar air heater.

Technology Descriptions

Open loop solar air heaters are characterized by simple devices which require very little or no maintenance. They usually consist of three major parts: 1) solar air collector, 2) solar cell panel and 3) ventilator with or without a temperature regulated controller.

When the solar cell panel powers the ventilator, cold outdoor air is driven through the solar air collector and thereby heated. Heated air is supplied to a summer house or a garage through a duct whereby the summer house or garage is ventilated, heated, dried or a combination of these (see figure 1).

ENVIRONMENTAL TECHNOLOGY VERIFICATION

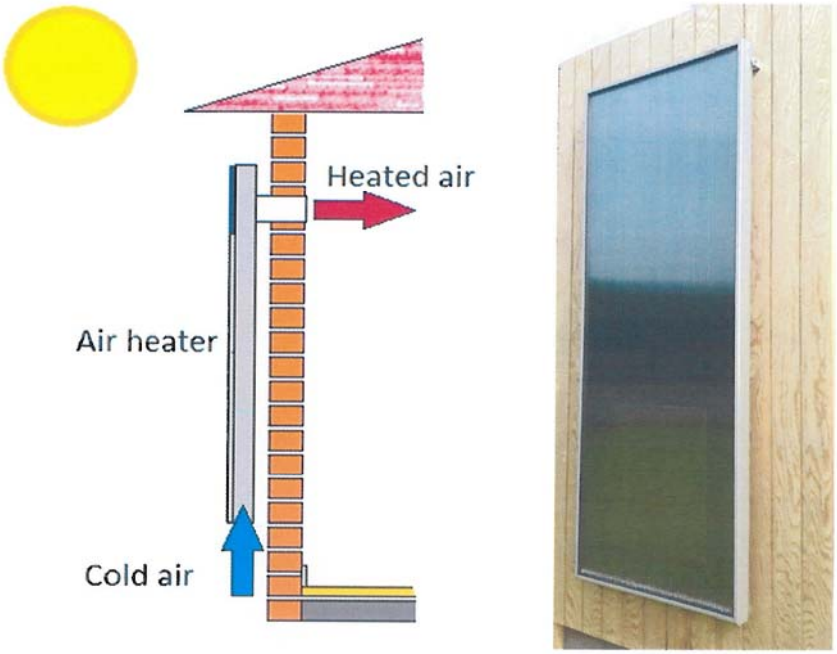

Figure 1: Drawing depicting the function of a solar air heater (left) and the SV14 solar air heater (right).

Application of Technology

The intended application of the tested product is defined in terms of the matrix, the targets and the effects of the product. The matrix is the type of application which the product is intended for, the targets are the measurable properties which are affected by the product, and the effects describe how the targets are affected.

Matrix	Residential houses, summer houses, garages, etc., up to 70 m^2
Targets	Supplementary heating and ventilation
Effects	Improved indoor climate in unheated humid buildings
Exclusions	None

Description of Test

The ETV solar air heater test has been designed to quantify and verify the vendor's claims and to provide an indication of how the solar air heater will perform in an actual application. A test rig was built to simulate real operational conditions comparable to those present when the air heater is mounted vertically on the wall of a house or a garage. A simulation model has been developed to describe the seasonal performance. Establishing the actual performance characteristics of the air heater has a great advantage over laboratory tests with forced ventilation through the solar air heater as the fans are known to be very sensitive to pressure losses, both related to the heater itself and to the downstream hot air channel. Tests of different systems (manufactures and models) are comparable by means of seasonal performance calculations based on data from the test rig and on regional climate data (design reference year data).

ENVIRONMENTAL TECHNOLOGY VERIFICATION

Verification Results

This section summarizes the results of the test and verification as described in the test report and the verification report, respectively. It is important to note that the results were reached under certain conditions. The test matrix is designed to reflect the conditions in a typical Danish summer house without heating and with moisture problems. Therefore, the results are only valid in relation with installations with no heating from October 15th to April 15th. The effect of the product will vary according to the different applications, settings, environments, locations etc. It will not be possible to achieve the target which has been verified during this process in all installations.

Heating

Energy output (Oct.15 – Apr. 15)	205 kWh

Dehumidification and Ventilation

Avg. ventilation with SV14 (Oct.15 – Apr. 15)	20.4 m³/hr
Avg. ventilation without solar air heater Oct.15 – Apr. 15)	7.0 m³/hr

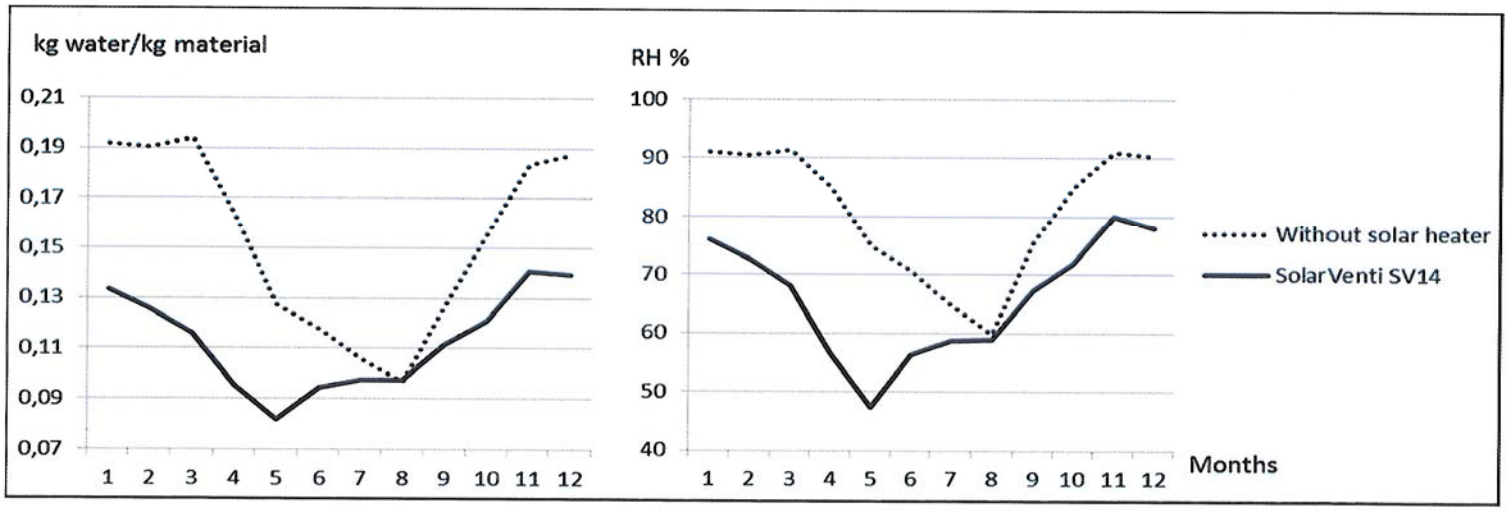

Figure 2: Simulation results showing the hourly variations in temperature and indoor relative humidity in a design reference year with (solid line) and without (dotted line) a DSB2 solar air heater.

It is concluded that the panel increases the average annual ventilation and provides extra heating of the house. This combined lowers the relative humidity of the air in the house and results in lower water content in the wooden material in the house.

The high relative humidity observed during wintertime > 80 % and the high water content in the wooden material of the house >18 % increase the risk of mold growth. Based on the calculated values, the unventilated house has an average to high risk of mold growth. The installation of the solar heater lowers the water content of the wooden materials to values lower than 15 % (0.15 kg/kg). This reduces the risk of mold growth. Based on the classification in *"By og Byg Anvisning 204 – Undersøgelse og vurdering af fugt og skimmelsvampe i bygninger (Investigation and Assessment of humidity and mold in Buildings)"*, the risk of mold is now to be considered a minor risk. This leads to the conclusion that the solar panel improves the indoor climate of the specific model house.

It is important to acknowledge that this is an overall consideration and that the risk of mold growth to a great extent depends on the specific construction, e.g. local thermal bridges may lead to high condensation which may increase the risk locally. It is also important to acknowledge that the model house has to be considered as a humid house with a high moisture load. The solar panel has the potential to lower the humidity, but whether the moisture is lowered enough to give a significant indoor climate improvement may differ in a

particular house. However, the present model house is dimensioned to represent an average summer house with respect to Danish building habits but with moisture problems.

Quality Assurance

Tests and verification have been performed according to the DANETV Quality Manual. As part of the quality assurance, two technical experts have reviewed the planning, conducting and reporting of the verification and tests. There have been no deviations from the test plan.

	12/11-2013		12/11-2013
Signed by Claus S. Poulsen Test Centre Management Representative	Date	Signed by Bjarke Paaske Verification Responsible	Date