CASE STORY

Solar heating

Arbeitsgemeinschaft Erneubare Energie (AEE), Austria

The efficiency of solar collectors is growing constantly, and their availability with non-black absorptive surfaces is helping architects to see new creative opportunities for them. The solar heating market is consequently one of the most expansive in the European energy sector. In Austria, for example, the market grew 18% annually between 1994-1999.

SWEP's compact brazed heat exchangers (BPHE) are important components in efficient solar heating systems. One of SWEP's distributors in Austria is AEE, an independent association working with renewable energy, which provides consultancy services to energy projects.

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The problem

The ethylene glycol is heated by the sun. It then flows through a helical pipe inside the water tank where its energy is transferred to the cooler water. Heat transfer in such single-circuit systems is often inadequate, for two reasons.

First, low turbulence inside the pipes impairs the transfer of heat from the ethylene glycol to the pipe. Second, the formation of deposits on the outside surface of the pipe, due to the water in the tank being stationary, impairs the transfer of heat from the pipe into the water. Furthermore, hygiene may be compromised by algal growths. As a result, the tank must be opened and cleaned periodically, which is expensive and timeconsuming.

The solution

These problems with efficiency, hygiene and maintenance can be avoided by using a highly efficient SWEP BPHE in a two-circuit system. The flow inside the BPHE is very turbulent, maximizing energy transfer and virtually eliminating deposits and algal growth. The system is therefore not only more efficient but also maintenance-free, saving costs and down time.

Although a pump is required, the BPHE solution saves space in the water tank, which is used solely to store heated water. The two-circuit solution also offers better control, because all the heat exchange takes place outside the tank.

Low-flow variants (see Table below) of the two-circuit system, which require at least two BPHEs, allow different temperature zones to be maintained in the water tank. This means hot water can be supplied from the same tank for both sanitary and heating use, offering further savings.

System description

A 40% ethylene glycol solution is heated by solar radiation as it passes through the solar collectors. In a single-circuit system, the warm glycol then passes through a helical pipe in the water tank, where it heats the water.

In a two-circuit system, the pipe inside the tank is not needed because all heat transfer takes place in the BPHE.

Benefits

In this solution, SWEP BPHEs offer:

- Compactness, which is particularly important in domestic applications
- High turbulence even at low flow rates for efficiency and minimal cleaning
- Improved control because heat exchange is separated from storage
- Flexibility that enable heating/sanitary water to be supplied simultaneously

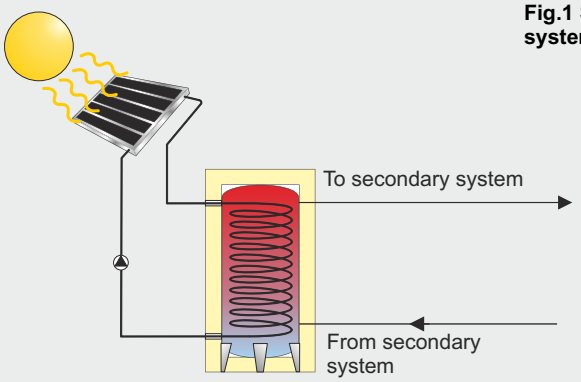

Fig.1 Single circuit system.

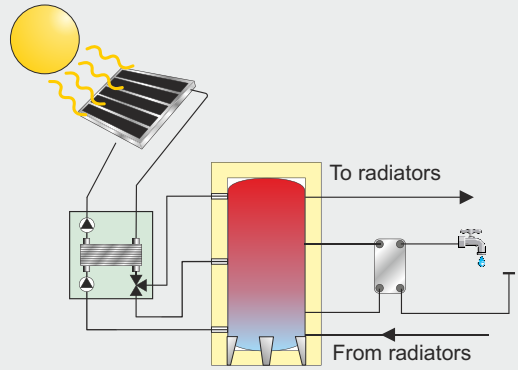

Fig.2 New system with external bphe.

Low-flow variants of the two-circuit system maintain different temperature zones in the water tank, supplying heating and sanitary water separately.

Application data for high- and low flow double-circuit systems

	High flow	Low flow	
BPHE type	B25	B25 / 2P	
Heating capacity (kW)	0-60	0-60	
Ethylene glycol flow (dm³ /(m²,h))	30	15	m2=collector area
Water temperatures (ºC)	30 → 50	30 → 70	
Eth. Glycol 40% temperatures (ºC)	56 → 36	76 → 36	
Collector area (m²)	0 – 99	0 – 99	

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