

FAFCO

Solar heating system for swimming pools



For bathing pleasure at a comfortable
temperature using eco-friendly
solar energy

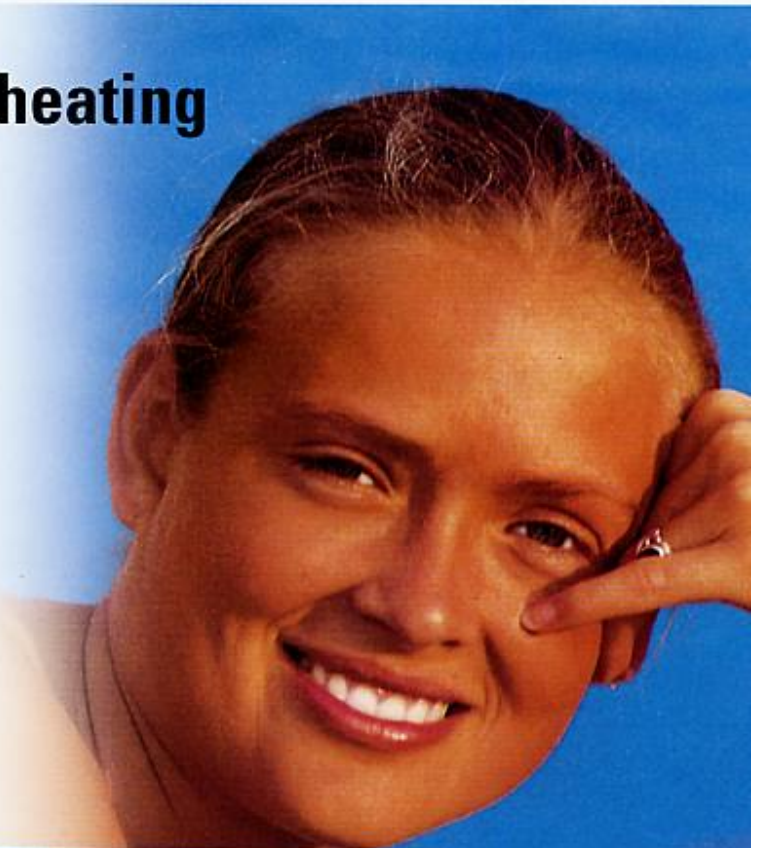
The Fafco solar heating system: swimming pool heating using free solar energy

Fafco is among the pioneers in the use of solar energy.

The Fafco solar heating system guarantees bathing fun at a comfortable temperature from May to the end of September, at temperatures between 24 and 29°C. And all at zero cost, because solar energy still comes free.

The advantages of the Fafco solar heating system:

- The product is well proven
- Low purchase costs and therefore short payback times
- The conversion efficiency is higher than with glazed or film-covered collectors
- The collector construction, in the form of fine matt-black tubes
- No corrosion problems, the pool water flows through the collectors without the use of a heat exchanger
- Simple installation and mounting
- The good design, and the harmonious integration into the roof construction
- Easily incorporated into existing systems





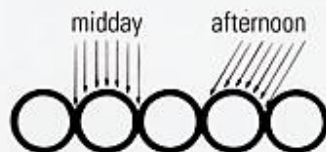
The Fafco collector



The cross-sectional design of the FAFCO collectors provides definite advantages. The outstanding characteristics are confirmed in independent testing.

CEC Commission of European Communities Joint Research Centre
FSEC Florida Solar Energy Centre
air Federal Institute for Reactor Research

with direct radiation



Direct radiation from the sun can be absorbed by the fine collector tubes, with no obstructions and independent of the angle of incoming radiation at the time, and is passed on to the pool water flowing through the tubes.

diffuse radiation



With diffuse (indirect) radiation, the FAFCO collector achieves maximum energy absorption because of its cross-section, since the surface area of the collector is substantially greater than that of a collector of the same overall dimensions ($l \times w$) with a flat surface.

and reflection



As a rule, any solar energy reflected from a collector tube strikes one or the other adjacent tube, and thus is also utilised.

Sensitivity to wind effects

The grooved surface of the FAFCO collector leads to minimum energy loss through wind cooling (high air-drag coefficient.)

Functional diagram

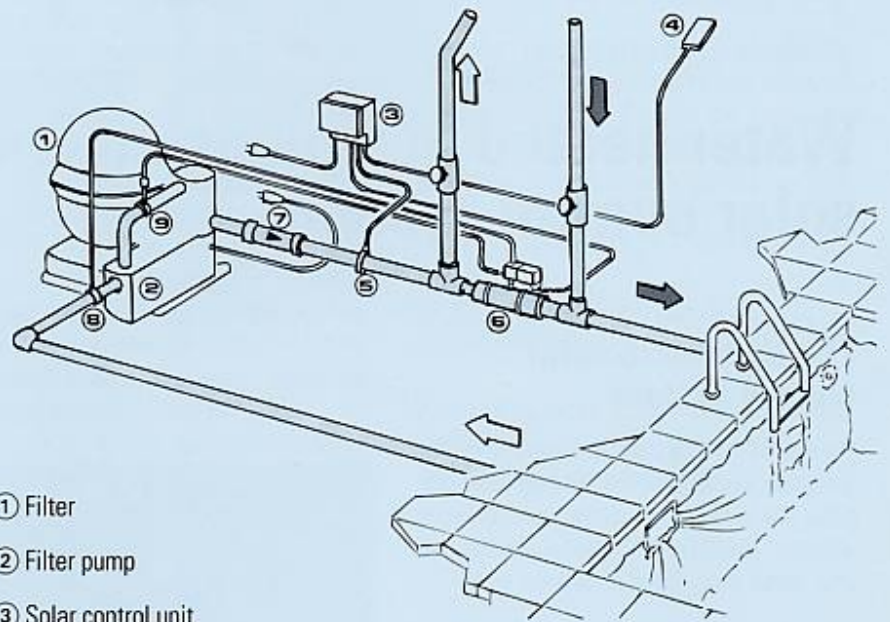
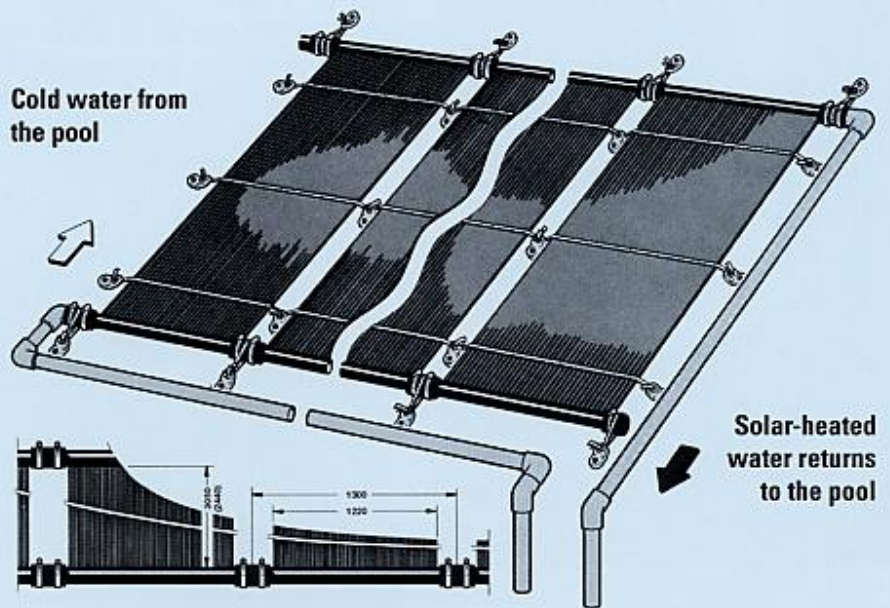
As a rule, the solar heating unit is incorporated into an existing filter circuit. The pool pump operates the solar unit at the same time.

The return pipe from the solar panel is fitted into the pool circuit after the hydraulic pinch valve using a T-fitting. A second T-fitting is inserted into the system between the filter and the pinch valve.

The pinch valve is controlled by an electronic temperature control system. The control unit receives information from a solar sensor and a water sensor. The former is mounted on the collector and the latter is fitted into the pool circuit. The water sensor measures the temperature of the pool water.

If the solar sensor measures temperature higher than the water sensor the control panel will close the pinch valve thus diverting the flow through the solar panel. The water circuit will then follow from the filter through the solar panel and back to the pool.

No additional electricity costs arise, since the solar panel is supplied via the filter pump which will be operating in any case.



- ① Filter
- ② Filter pump
- ③ Solar control unit
- ④ Solar sensor
- ⑤ Water sensor
- ⑥ Hydraulic pinch valve
- ⑦ Check valve
- ⑧ Exhaust tap connection
- ⑨ Pressure tap connection

Specifications and technical data

FAFCO Solar collector 3.7 m²

Length 3.05 m
 Width 1.22 m
 Effective surface area 3.72 m²
 Weight empty approx. 9.00 kg
 Water content approx. 19.00 kg

Flow rate (per collector)
 recommended 0,3 - 1,0 l/s

Associated pressure loss
 (does not increase when several collectors are connected in parallel) approx. 0.10 bar

Maximum operating pressure
 2.4 bar at 28 °C and 0.34 bar at 90 °C

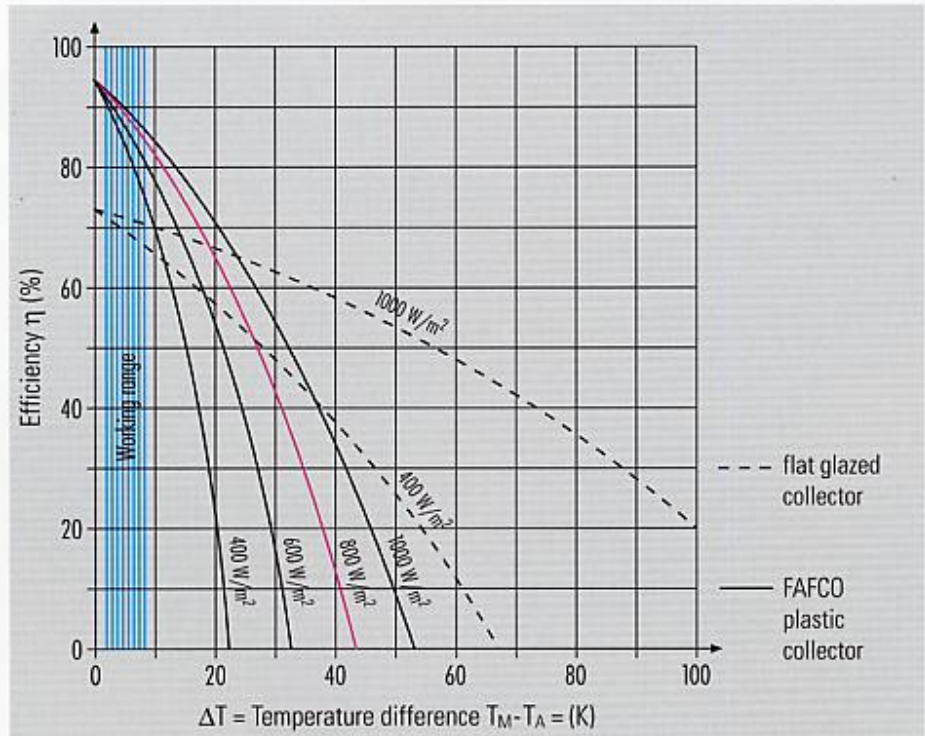
FAFCO Solar collector 3.0 m²

Length 2.44 m
 Width 1.22 m
 Effective surface area 3.00 m²
 Weight empty approx. 7.50 kg
 Water content approx. 13.50 kg

Flow rate (per collector)
 recommended 0,3 - 1,0 l/s

Associated pressure loss
 (does not increase when several collectors are connected in parallel)
 approx. 0.10 bar

Maximum operating pressure
 2.4 bar at 28 °C and 0.34 bar at 90 °C



The efficiency diagram shows the performance of the FAFCO collector in comparison with glazed collectors. It can be seen from the diagram that for heating swimming-pool water (working range) the FAFCO collector is superior to the significantly more expensive glazed collector. The efficiency is greater by approx. 10–20%. The reason is reflection losses at the glass surface. For pool heating, the expensive construction of the insulated and glazed collectors has no advantage (small temperature difference $T_M - T_A$). An example brings out the efficiency of the FAFCO collector system:

Irradiation = 800 W/m²
 Ambient air temperature $T_A = 20$ °C
 Temperature at the collector input (pool-water temperature) $T_1 = 22$ °C
 Temperature at the collector output
 $T_0 = 26$ °C
 Mean collector temperature
 $T_M = \frac{1}{2} (T_0 + T_1) = 24$ °C
 Temperature difference $\Delta T = T_M - T_A = 4$ K

With the Fafco collector the mean collector temperature T_M is particularly low, since all the water pumped through the filter also passes through the collector system. The result is a high efficiency. A η of approx. 88% can be read from the efficiency diagram. This leads to a heat gain of $E = 800 \text{ W/m}^2 \times \eta = 704 \text{ W/m}^2$

six 3.7 m² collectors are provided.
 $E_{\text{tot}} = 704 \text{ W/m}^2 \times 22.2 \text{ m}^2 = 15'628 \text{ W}$.

A heating power of 15.6 kW derived from free solar energy is therefore available to raise the temperature of the pool water.

Test certificates:
 Euratom, Commission of the European Communities, Ispra

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