

Yearly Energy Yield

The yearly energy yield based on the calculation (simulation using TRNSYS) of the yearly collector energy within a reference system for domestic hot water. The system dimension is designed for a 4 people household. The calculation is done for aperture areas of 3, 4, 5 and 6 m² and reference weather data for Würzburg (Germany).

Manufacturer	Vaillant GmbH
Brand	VFK 155 V
All values are related to TÜV Report:	21219030::: (Measurement of performance)

Collector parameter: (based on aperture area of 2:352 m ²)					
η_0	0.850		K_d	0.92	($K_{b(51.6^\circ)}$)
a_1	3.770	W/(m ² K)	$K_{b(50^\circ)}$	0.93	
a_2	0.015	W/(m ² K ²)	C_{eff}	6.26	kJ/(m ² K)

Reference System:	
Roof orientation	South; elevation equal to latitude
Collector loop	Inlet and outlet pipe each 15m, DN 16, Insulation thickness 25 mm $\lambda=0,04$ W/(mK), half length inside and half outside
Storage tank	Volume 300l, Heat loss capacity rate 2,2 W/K; Ambient temp inside 15°C; Stand by volume 135 l; set point 60°C; stratification rate 100; effective axial conductivity $2 * \lambda_{W_{aterr}}$
Heat exchanger	Immersed heat exchanger, $(UA)_{hx}=9W/(m^2K) * \text{Aperture area} * \Theta^{0,6}$; (Θ = mean value between hx-inlet-temperature and local storage temperature)
Domestic hot water consumption	200l/day (7 ⁰⁰ : 80l; 12 ⁰⁰ : 40l; 19 ⁰⁰ :80l); Cold water temperature 10°C; domestic hot water 45°C Yearly energy consumption: 2936 kWh/a

Simulation Results: (energy gain just for collector array without pipe or store losses)				
Aperture area:	3	4	5	6
Würzburg (1212 kWh/(m ² a))	626	567	511	459