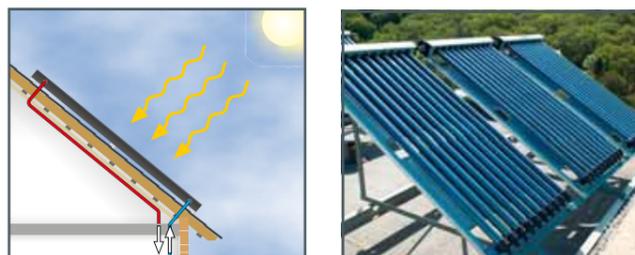


Basic knowledge Solar thermal energy

Solar thermal energy is defined as using solar power to provide heat. The heat can be used for heating in the home and for heating domestic water, as well as for process heat in industry and for steam generation in power stations and even for cooling.



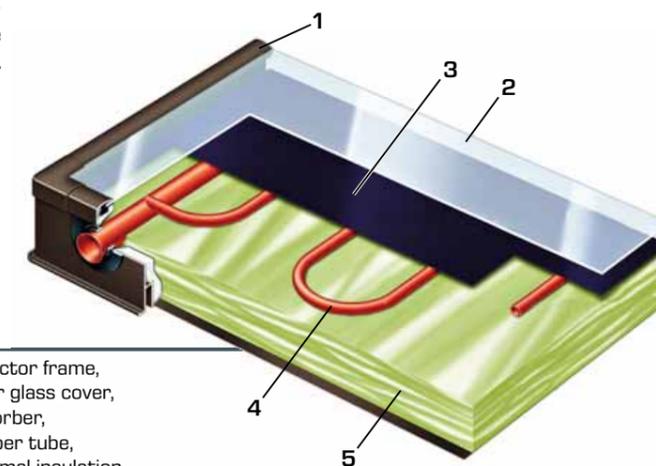
Typical applications for solar thermal collectors:

- heating water in swimming pools
- low-temperature heat for heating rooms
- domestic water heating
- process heat (concentrated solar power)
- electricity generation (concentrated solar power)

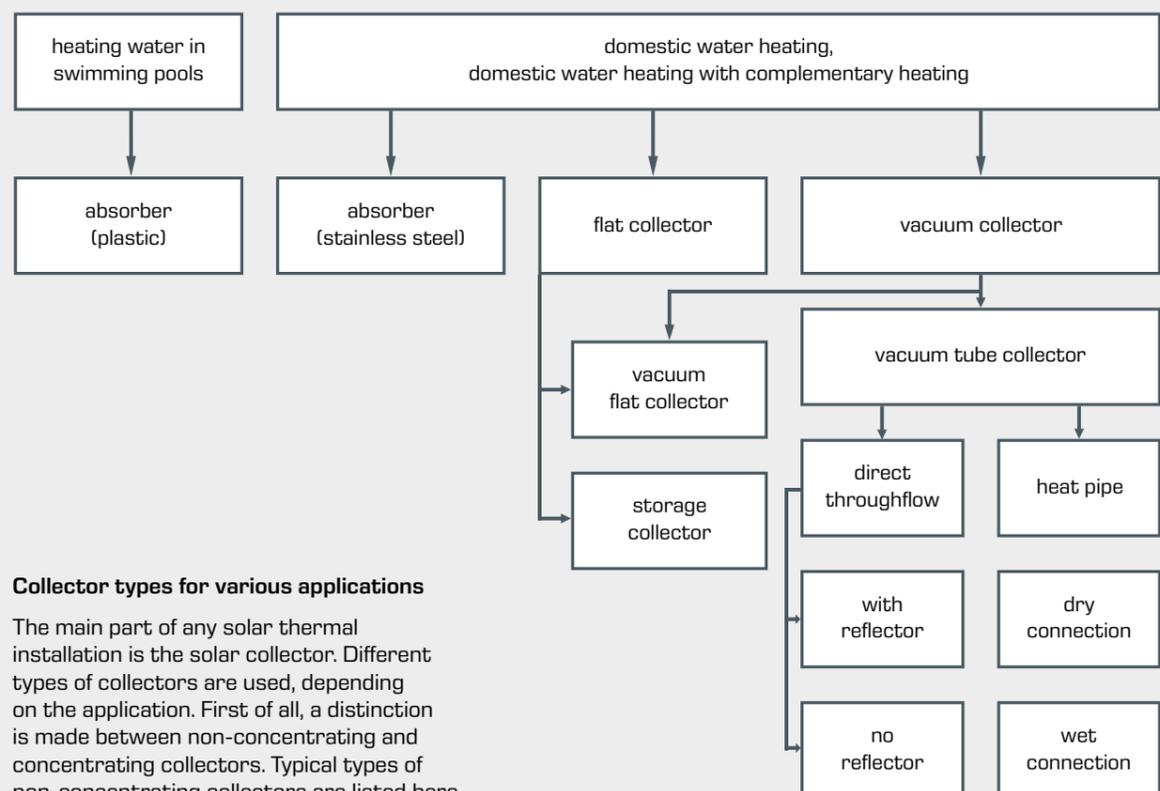
Flat collector

A widely-used type of collector is the flat collector. It represents a balanced compromise between a simple, cost-effective design and efficiency. The back is insulated against heat loss. The copper tube can be fed through the collector in different ways. The construction will seek a compromise between good convective heat transfer through to turbulent flow and low pressure loss. The absorber may be made of copper, aluminium or steel.

The absorber's dark colour is caused by the selective coating. The glass cover is made of high-quality, low-iron solar glass with a low absorption factor.



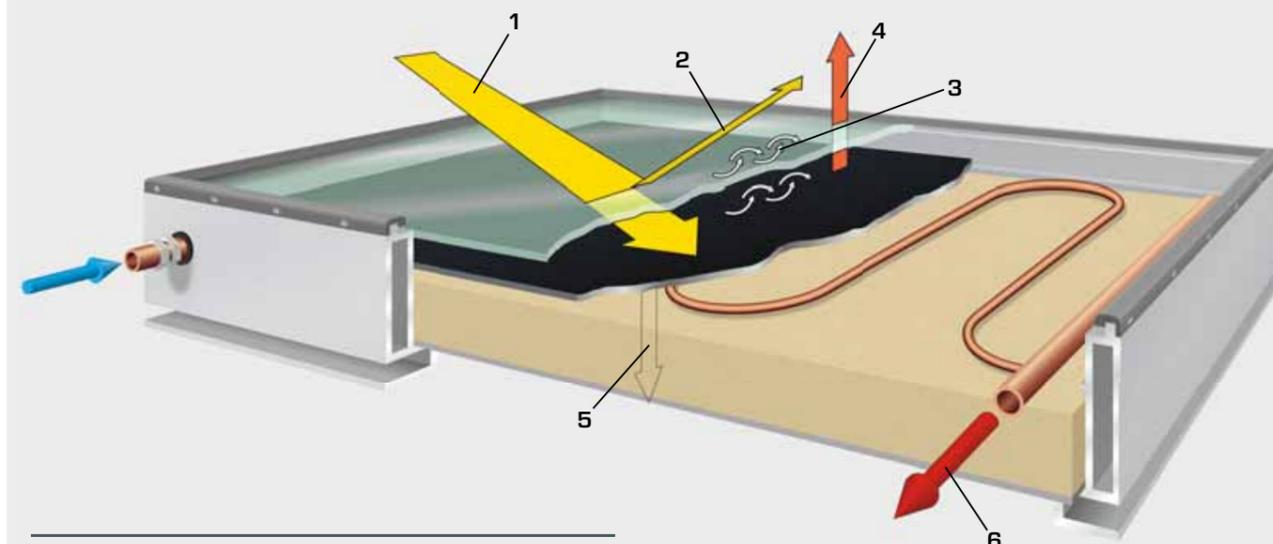
1 collector frame,
2 solar glass cover,
3 absorber,
4 copper tube,
5 thermal insulation



Collector types for various applications

The main part of any solar thermal installation is the solar collector. Different types of collectors are used, depending on the application. First of all, a distinction is made between non-concentrating and concentrating collectors. Typical types of non-concentrating collectors are listed here.

Energy balance of a flat collector



1 incident solar radiation,
2 losses through reflection,
3 losses through convection,
4 thermal radiation losses,
5 losses through heat conduction,
6 generated heat at the collector outlet

Minimising losses

One of the main objectives for modern collectors is to minimise losses. The proportions of the major loss types in thermal solar

energy utilisation with flat collectors are shown diagrammally in the figure above.