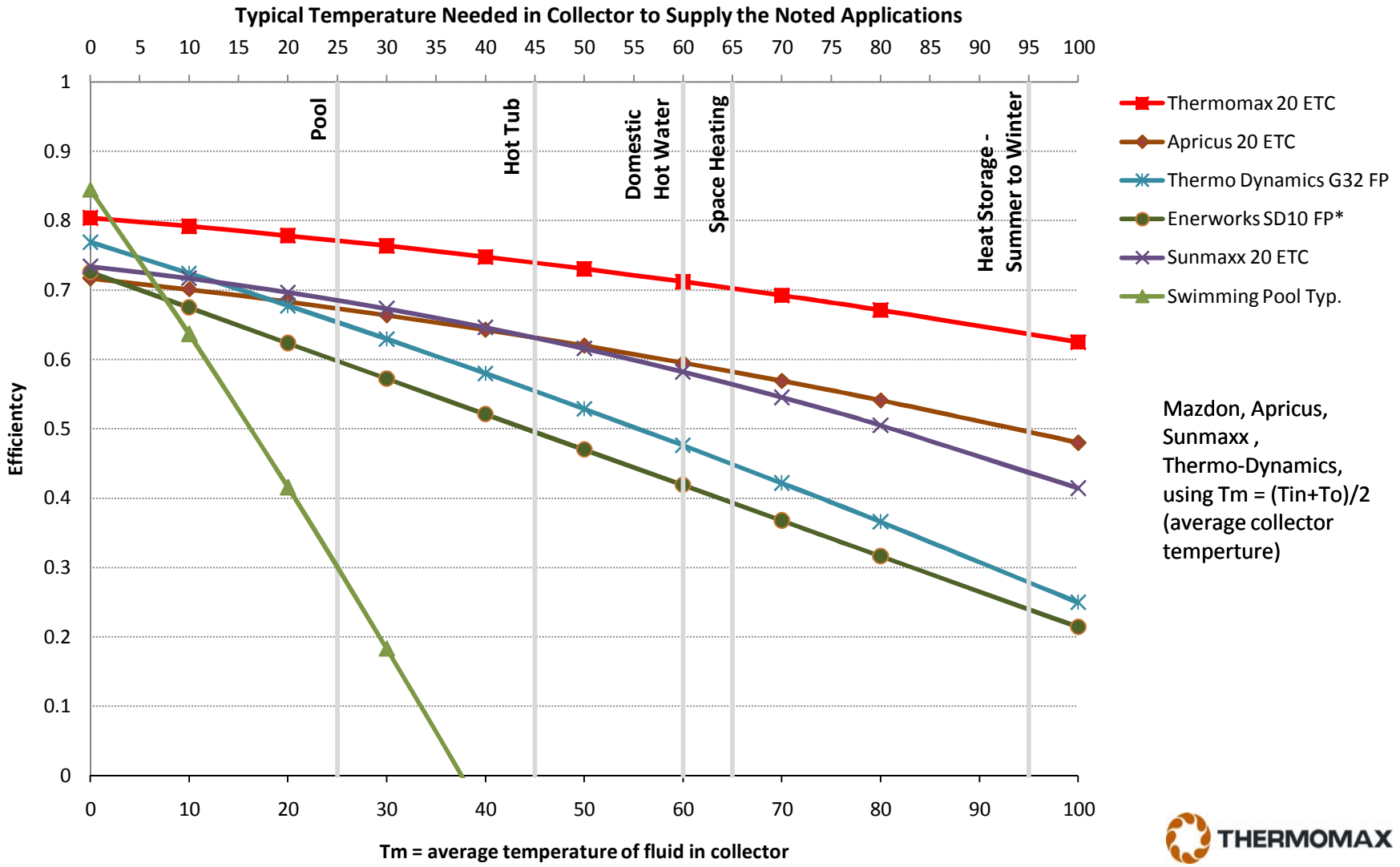
Solar Collector Efficiency at 1000 watts/m², Ambient Temperature 0°C, and using Absorber Surface Area.

Efficiency data obtained from SPF, Solar Keymark**, or Bodycote Materials testing* Certifications.
(FP = Flat Plate, ETC = Evacuated Tube Collector)



Mazdon, Apricus, Sunmaxx , Thermo-Dynamics, using Tm = (Tin+To)/2 (average collector temperture)

THERMOMAX

Solar Collector Efficiency Graph

This page is intended to provide definitions and explanations to help utilize the Solar Collector Efficiency Graph. The graph is an expression of data obtained from official third party solar testing facilities, the Solartechnik Prufung Forschung (SPF Rapperswil, www.solarenergy.ch), in Germany and Bodycote Materials Testing Canada Inc.

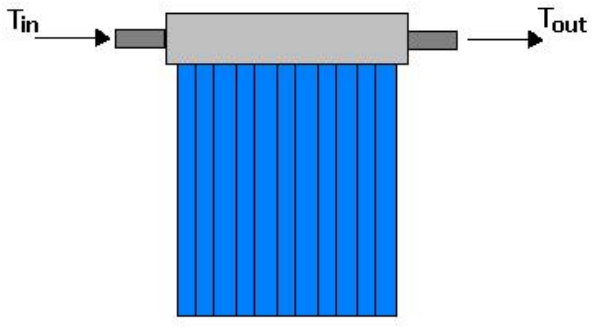


Figure 1 Solar Tube Manifold

Graph details:

Ta = Ambient Temperature, or air temperature of surrounding space. For our purposes, allowing a more intuitive interpretation of the graph, we have set Ta as a constant (unchanging), in this case Ta = 0°C.

Efficiency = A fraction of 1... i.e. 0.3 on the graph represents 30%, 0.5 on the graph is 50%, and so forth.

Tm = Mean temperature, expressed as (Tin + Tout)*½

Equations:

Two types of collectors are represented in the graph; Flat Plate designated 'FP', and the high efficiency Evacuated Tube Collector designated 'ETC'.

The efficiency equation used by the European (SPF Rapperswil) testing facilities for Mazdon (ETC), Apricus (ETC), Sunmaxx (ETC) and Veisman (FP) collectors is:

$$\eta = \eta_0 - \frac{a_1}{G}\left(\frac{T_{in}+T_{out}}{2}\right) - \frac{a_2}{G}\left(\frac{T_{in}+T_{out}}{2}\right)^2$$

The efficiency eqn. for Enerworks (FP) is:

$$\eta = 0.717 - 4.033\frac{(T_i+T_a)}{G} - 0.0184\frac{(T_i+T_a)^2}{G}$$

The efficiency eqn. for Thermo Dynamix (FP) is:

$$\eta = 0.738 - 5.247\frac{(T_i+T_a)}{G}$$

The Canadian testing bodies for Enerworks and Thermo Dynamix used the inlet temperature (Ti, or Tin) instead of the mean or average collector temperature (Tm) in the efficiency equations. The results were adjusted by adding half of the typical temperature increase across the manifold (8°C) for these two collectors in order to obtain comparable results.