The performance of solar collector depends on following factors

(a) Fin Efficiency Factor (Fe) : It is defined as the ratio of actual rate of heat transferred to the heat that would be transferred, if entire fins (plate area) are at temperature

$$Fe = \frac{Q \, actual}{A_c \left[\alpha_0 \tau_0 I_t - U_L (T_p - T_a) \right]}$$

where

$Q \, actual$ = Actual rate of heat transfered to the tube base

A_c = Collector Area

I_t = Incident total radiations

U_L = Overall heat loss coefficient

T_p = Plate Top Temperature

T_a = Ambient Temperature

α_0 = Absorptivity and Trans

τ_0 = Transmitivity

collector efficiency factor (Fc):

m = Mass flow rate of fluid/unit area collector

C_f = Outlet Specific heat of fluid

T_{fo} = Outlet fluid temprature

T_{fi} = Inlet fluid temprature

collector Efficiency (η_c) = It is define as the ratio of userfull energy absorbed by collector to the incident solar energy.

$$\eta_c = \frac{Q_u}{A_c I_t}$$

$$\eta_c = \frac{F_R A_c [q_o \tau_o I_t - U_L (T_{fi} - T_a)]}{A_c I_t}$$

$$\therefore Q_u = F_R A_c [q_o \tau_o I_t - U_L (T_{fi} - T_a)]$$

$$\eta_c = T_R q_o \tau_o - \frac{F_R U_L (T_{fi} - T_a)}{I_t}$$

$$\eta_c = mx + c \quad (\text{Its linear eqn.})$$

$$m = -F_R U_L$$

$$x = \frac{(T_{fi} - T_a)}{I_t} \qquad c = F_R q_o \tau_o$$

various Meterial used for Solar flat plate collector :-

There are following Meterial used for plate collector.

(a) Absorber plate
(b) Transparent covers
(C) Insulation, and
(d) Box.