



















### Greek symbols

$\alpha_i$	incident beam angle (degree)
$\alpha$	absorptance factor
$\beta$	collector tilted angle (degree)
$\Delta$	difference
$\delta$	thickness (m)
$\varepsilon$	emissivity
$\varphi$	volume concentrations
$\gamma$	bond thickness (m)
$\eta$	efficiency
$\mu$	viscosity
$\tau$	transmittance factor
$(\tau\alpha)$	effective product transmittance – absorptance
$\theta$	refracted beam angle (degree)
$\rho$	density

### Subscripts

a	ambient
ave	average
$\alpha$	absorption
B	horizontal surface
b	bottom, bond, horizontal surface
bf	base fluid
c	collector

D	diffuse
d	destruction, Diffuse
e	around the collector, edge, exit
EX	exergy
f	fin
fi	inside of the tube
G	ground
g	glass
i	inlet, inside
in	inlet
L	length, overall, leakage
n	normal
nf	Nano-fluid
np	Nano-powder
o	optical
out	outlet
p	plate
r	refraction
s	solar
T	tube
t	top, total
u	useful
v	volume
w	wind
	parallel
⊥	vertical