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LIST OF SYMBOLS

Solar radiation		Units
t_s	Solar time	decimal hours
t_{SL}	Local solar time	decimal hours
EOT	Equation of time	decimal minutes
L_{SM}	local standard time meridian	degrees
L_{ON}	local longitude	degrees
ω	Hour angle	degrees
δ	Declination angle	degrees
θ_z	Zenith angle	degrees
θ_i	Incident angle	degrees
θ_E	Elevation angle	degrees
ϕ	Latitude angle	degrees
α	Solar altitude	degrees
γ	Azimuth	degrees
γ_s	Surface azimuth	degrees
β	Slope from horizontal plane	degrees
E_0	Extraterrestrial solar irradiance	W/m^2
E_b	Beam solar irradiance	W/m^2
E_d	Diffuse solar irradiance	W/m^2
E_t	Total solar irradiance	W/m^2
E_{DN}	Direct normal of solar irradiance	W/m^2
E_G	Global solar irradiance	W/m^2
E_V	Vertical solar irradiance	W/m^2
E_{CS}	Total solar irradiance on slope surface	W/m^2
E_{CS-ISO}	Total solar irradiance of isotropic sky model	W/m^2

LIST OF SYMBOLS (CONT.)

		Units
E_{IS-ANI}	Total solar irradiance of anisotropic sky model	W/m^2
$E_{IS-HDKR}$	Total solar irradiance of HDKR sky model	W/m^2
E_{T-SIPV}	Total solar irradiance of SIPV	W/m^2
K	Clearness index	decimal %
R_b	Relative of beam irradiance	decimal %
R_d	Relative of diffuse irradiance	decimal %
R_{sd}	Relative of stack effect	decimal %
R_{rG}	Relative of ground reflected irradiance	decimal %
R_{rB}	Relative of building reflected irradiance	decimal %
ρ_g	Ground reflectivity	decimal %
A_i	Anisotropic index	-
AM	Air mass	-
N	Day Number	-

PV technology

P	Power	W
P_i	Power input	W
P_o	Power output	W
P_{SIPV}	Power of SIPV	W
P_{MP}	Maximum power	W
PR	Performance	decimal %
FF	Fill factor or Squareness of the IV curve	decimal %
η	Efficiency	decimal %
η_{PV}	Efficiency of PV	decimal %
η_{SIPV}	Efficiency of SIPV	decimal %

LIST OF SYMBOLS (CONT.)

		Units
η_{inv}	Efficiency of inverter	decimal %
η_D	Efficiency of long term PV degradation	decimal %
I	Current	A
I_{SC}	Short-circuit current	A
I_{MP}	Maximum current	A
I_0	Input current	A
I_L	Light generated current	A
V	Voltage	V
V_{oc}	Open-circuit voltage	V
V_{MP}	Maximum voltage	V
q	Constants	-
k	Constants	-
n	Ideality factor	-
T	Temperature	K or °C
T_m	Module temperature	°C
T_{amb}	Ambient temperature	°C
A_{PV}	Surface call area	m ²
W	Shading extension	m
H	Height of clear window	m

Special subscript

$a\text{-Si}$	Amorphus Silicon
$p\text{-Si}$	Polycrystalline Silicon
$SIPV$	Shading device Integrated Photovoltaic

Cooling load

q	Heat flux	W
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LIST OF SYMBOLS (CONT.)

		Units
q_{cond}	Conduction heat flux	W
q_{rad}	Radiation heat flux	W
q_{el}	Cooling load from lighting	W
HG_{el}	Heat gain from lighting	W
W_1	Total lamp power	W
A	Surface area	m^2
U	Conduction heat transfer coefficient	$\text{W}/\text{m}^2\text{-}^\circ\text{C}$
h	Convection heat transfer coefficient	$\text{W}/\text{m}^2\text{-}^\circ\text{C}$
R_T	Total resistance value	$\text{m}^2\text{-}^\circ\text{C}/\text{W}$
R_G	Resistance value of air gap	$\text{m}^2\text{-}^\circ\text{C}/\text{W}$
R_o	Resistance value of air film out side	$\text{m}^2\text{-}^\circ\text{C}/\text{W}$
R_i	Resistance value of air film in side	$\text{m}^2\text{-}^\circ\text{C}/\text{W}$
V	Room air supply rate	$1/\text{s}\text{-}\text{m}^2$
dx	Dept of material layer	m
CLTD	Cooling Load Temperature Differences	$^\circ\text{C}$
E_{twS}	Total solar irradiance on window with shading	W/m^2
E_{tw}	Total solar irradiance on window	W/m^2
SHGF	Solar Heat Gain Factor	W/m^2
SC	Shading Coefficient	decimal %
SC_b	Shading Coefficient only diffuse radiation	decimal %
SC_d	Shading Coefficient only beam radiation	decimal %
SHGC	Solar Heat Gain Coefficient	decimal %
VT	Visual transmittance	decimal %
F_{ul}	Lighting use factor	decimal %
F_{sa}	Lighting special allowance factor	decimal %

LIST OF SYMBOLS (CONT.)

		Units
CLF	Cooling Load Factor	-
CLF _{el}	Cooling Load Factor of light	-
COP	Coefficient of performance	-
 Daylight Factor		
E	Illumination level	fc or lux
E _h	Horizontal illuminance	fc or lux
E _v	Vertical illuminance	fc or lux
E _i	Inside illuminance	fc or lux
E _o	Outside illuminance	fc or lux
E _{sky}	Illuminance from sky	fc or lux
L	luminance	cd/ft ² or lm/m ²
L _θ	luminance	cd/ft ² or lm/m ²
L _h	Horizontal luminous	cd/ft ² or lm/m ²
L _z	Zenith luminous	cd/ft ² or lm/m ²
DF	Daylight Factor	decimal %
DF _{av}	Average Daylight Factor	decimal %
IRC	Internal reflected component	decimal %
ERC	External reflected component	decimal %
SC	Sky component	decimal %
SC _w	Sky component of window opening	decimal %
SC _o	Obstructed sky component	decimal %
ρ	Reflectance	decimal %
ρ _{av}	Average reflectance of room surface	decimal %
ρ _{FW}	Average reflectance of wall	decimal %
ρ _{CW}	Average reflectance of ceiling	decimal %
τ	Transmittance	decimal %
C	Obstruction coefficient	decimal %

LIST OF SYMBOLS (CONT.)

		Units
A_w	Area of window less frame	ft^2 or m^2
A_t	Total internal surface area of room	ft^2 or m^2
A_U	Upper surface area of room	ft^2 or m^2
A_L	Lower surface area of room	ft^2 or m^2
MF	Maintenance Factor	decimal %
ρ_{av}	Average reflectance of room surfaces	decimal %
ρ_U	Upper reflectance of room surfaces	decimal %
ρ_L	Lower reflectance of room surfaces	decimal %
GBC	Glazing bar correction	-

Daylight Glare Index

dG	Day lighting glare constant	-
dGI	Day lighting glare Index	-
DMI	Modified Day lighting glare Index	-
GI	Glare Index	-
L_s	Source luminance	cd/ft^2 or lm/m^2
L_b	Background luminance	cd/ft^2 or lm/m^2
E_a	Diffuse illuminance at the plane of aperture	fc or lux
E_{sp}	Illuminance at the station point	fc or lux
E_H	Horizontal illuminance	fc or lux
E_{dGI}	Exterior illuminance on the horizontal	fc or lux
E_{co}	Cut off illuminance	fc or lux
IRE	Interior reflected illuminance	fc or lux
ERE	Exterior reflected illuminance	fc or lux
v	Direction of view factor	-

LIST OF SYMBOLS (CONT.)

		Units
F_{dGI}	Fraction	-
ρ_r	Average room reflectivity	decimal %
T_g	Glazing normal transmittance	decimal %
Lighting		
F	Rate of flow visible radiation	lm
E	Illumination level	fc or lux
CP	Luminous intensity	cd
CU	Coefficient of utilization	decimal %
LLD	Lamp lumen depreciation	decimal %
LDD	Luminaire dirt depreciation	decimal %
L	Length of cavity	ft or m
W	Width of cavity	ft or m
A	Using area	ft^2 or m^2
h_c	Height of cavity	ft or m
h_{cc}	Height of ceiling cavity	ft or m
h_{rc}	Height of room cavity	ft or m
h_{fc}	Height of floor cavity	ft or m
CR	Cavity ratio	-
CCR	Ceiling cavity ratio	-
RCR	Room cavity ratio	-
FCR	Floor cavity ratio	-
Economic		
PVB	Present value of benefits	THB

LIST OF SYMBOLS (CONT.)

		Units
PVC	Present value of cost	THB
B	Benefits value	THB
C	Costs value	THB
i	Interest	THB
K	Fix cost	THB
B/C	Benefits-Costs ratio	-
t	Time index	-