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Solar Domestic Hot Water Design and Optimisation in the United Kingdom

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Nomenclature

Symbol		Meaning	Unit
A_c		Collector Area	m^2
α		Thermal Diffusivity	m^2/s
β		Collector Incidence Angle	^oC
β'		Volumetric Coefficient of Expansion	1/K
C_p		Specific Heat Capacity	J/kgK
ΔT		Change in Temperature	K
d_i		Inside Pipe Diameter	m
d_o		Outside Pipe Diameter	m
δ		Plate Thickness	m
ε		Collector Effectiveness	-
ε_c		Glass Emittance	-
ε_p		Plate Emittance	-
F		Heat Distribution Factors	-
g		Gravitational Constant	N/kg
G_t		Incident Radiation	W
$h_{c,\ p\text{-}c}$		Convective Heat Transfer Coefficient Plate to Cover	W/m^2K
h_i		Heat Transfer Coefficient Inside Pipe Wall	W/m^2K
h_o		Heat Transfer Coefficient Outside Pipe Wall	W/m^2K
$h_{r,\ c\text{-}a}$		Radiation Heat Transfer Coefficient Cover to Air	W/m^2K
$h_{r,\ p\text{-}c}$		Radiation Heat Transfer Coefficient Plate to Cover	W/m^2K
h_w		Convective Heat Transfer Coefficient Cover to Air	W/m^2K
I_t		Solar Irradiance	W/m^2
k		Thermal Conductivity	W/m^2K
L		Distance for Plat to Lower Spacing	m
$\dot{m}$		Mass Flow Rate	Kg/s
NTU		Number of Transfer Units	-
N_u		Nusselt Number	-
P_r		Prantle Number	-
Q		Heat Energy Transferred	J
R_a		Rayleigh Number	-
R_e		Reynolds Number	-
ρ		Density	kg/m^2
S		Solar Energy at Plate	W/m^2
σ		Stefan-Boltzmann Constant	W/m^2K^4
T_a, T_s		Ambient Temperature	K
T_c		Cover Temperature	K
T_f		Fluid Temperature at Wall	K
T_p		Plate Temperature	K
μ		Dynamic Viscosity	Pa.s
U_b		Back Loss Coefficient	W/m^2K
U_e		Edge Loss Coefficient	W/m^2K
U_L		Top Loss Coefficient	W/m^2K
U_T		Top Loss Coefficient	W/m^2K
ν		Kinematic Viscosity	m^2/s