0. Description of the most important Symbols

The following most important symbols are used, in principle, whereever possible, deviations from these symbols are always indicated at the relevant equations and illustrations.

Symbol		Description	Unit	Remarks
A		area, area of cross-section	m^2	
B	B	amount of fuel	kg	
	$\dot{B}$	fuel flow rate	kg/s	
C	C	radiation constant	$W/(m^2K^4)$	
	C_s	radiation constant of black body	$W/(m^2K^4)$	$C_s = 5{,}67\ W/(m^2K^4)$
D		diameter	m	
E	E	modulus of elasticity	Pa	preferred: N/mm^2
	E	energy	J	
F		force	N	
G		force of weight	N	$G = m \cdot g$
H	H	head, loss of head	m	
	H_o	gross calorific value	J/kg	
	H_u	net calorific value	J/kg	
I	I	geometrical moment of inertia	m^4	
	İ	momentum	Ns	
I		current	A	
L		length	m	
M		moment	N m	
O		surface	m^2	
P		output	W	1 W = 1 J/s
Q	Q	amount of heat	J	1 J = 1 Ws
	$\dot{Q}$	heat flux	W	
R		specific gas constant	J/(kg K)	
S		safety factor	–	
T		thermodynamic temperature	K	
U	U	circumference	m	
	U	voltage	V	
V	V	volume	m^3	
	$\dot{V}$	flow rate	m^3/s	
W	W	work	J	
	W	resistance moment	m^3	
a	a	acceleration	m/s^2	
	a	temperature conductivity	m^2/s	
c	c	specific thermal capacity	J/(kg K)	
	c	spring coefficient	N/m	
d		diameter	m	
f	f	factor	–	
	f	frequency	Hz	1 Hz = 1/s
g		acceleration due to gravity	m/s^2	$g_n = 9{,}80665\ m/s^2$
h	h	enthalpy	J/kg	
	h	height	m	
i		radius of moment of inertia	m	

k	k	overall heat transfer coefficient	$W/(m^2K)$	
	k	height of tube roughness	m	
m	m	mass	kg	
	$\dot{m}$	mass flow	kg/s	
	m	opening ratio	–	
n	n	number of revolutions	1/s	
	n	air ratio	–	
p		pressure	Pa	$1 \text{ Pa} = 1 \text{ N/m}^2$
$\dot{q}$		heat flux density	W/m^2	
r	r	specific evaporation enthalpy	J/kg	
	r	radius	m	
s		layer thickness, wall thickness	m	
t		time	s	
v		specific volume	m^3/kg	$v = 1/\varrho$
w		velocity	m/s	
z	$\dot{z}$	decomposition rate	kg/s	

α	α	coefficient of longitudinal elongation	1/K	
	α	flow rate	–	
	α	heat transfer coefficient	$W/(m^2K)$	
β	β	volumetric expansion coefficient	1/K	
	β	angle	–	
δ		thickness of boundary layer	m	
ε	ε	emission ratio	–	
	ε	elongation	–	
ζ		resistance coefficient	–	
η	η	dynamic viscosity	Pa s	
	η	efficiency	–	
ϑ		temperature °Celsius	°C	
λ	λ	thermal conductivity	W/(m K)	
	λ	ratio of slenderness	–	
	λ	tube friction coefficient	–	
μ		friction coefficient	–	
ν		kinematic viscosity	m^2/s	
ϱ		density	kg/m^3	
σ	σ	tension, stress	N/m^2	
	σ	surface tension	N/m	
τ		sheer stress, shear strain	N/m^2	

Characteristic Quantities

Bi	Biot number	$= \frac{\alpha \cdot s}{\lambda_w}$
Gr	Grashof number	$= \frac{d^3 \cdot g \cdot \beta \cdot \Delta\vartheta}{\nu^2}$
Nu	Nusselt number	$= \frac{\alpha \cdot d}{\lambda}$
Pe	Péclet number	$= \frac{w \cdot d}{a} = \frac{w \cdot d \cdot \varrho \cdot c}{\lambda} = Re \cdot Pr$
Pr	Prandtl number	$= \frac{c \cdot \varrho \cdot \nu}{\lambda} = \frac{\nu}{a}$
Re	Reynolds number	$= \frac{w \cdot d}{\nu}$

Data are required for the unambigious description of a characteristic quantity, how the characteristic quantity used is defined and the temperature on which the properties are based.

Signs

Δ	difference
α	differential
Σ	sum

Superior Indicator

—	mean, average
·	quantity referred to time
∧	maximum
∨	minimum
~	alternating
′	liquid phase
″	vapour phase

Inferior Indicator

F	flame
Fl	liquid, fluid
G	gas
Gr	boundary layer
K	convection
L	air, longitudinal, laminar
N	rated value
Q	cross-section
R	return
S	radiation
T	turbulent
V	flow, loss
W	wall
a	external
äq	equivalent
dyn	dynamic
ges	total
h	hydraulic
i	internal
log	logarithmic
n	normal condition
proj	projected
th	theoretical, thermal
ü	overpressure
x	direction
y	direction
zul	permissible
ϑ	relating to temperature
$\perp$	vertical
$\parallel$	parallel
0	initial value
1	start, inlet
2	end, outlet
∞	infinite