NOMENCLATURE

Symbol	Name of quantity	Abridged notation in SI units
a_1	speed of sound	m/s
a_{cr}	critical speed of sound	m/s
a^*	speed of sound in frozen flow	m/s
a, b	sides of a rectangle	m
c_p and c_v	specific heats of gases at constant pressure and constant volume, respectively	J/kg ^oC
c_x	coefficient of drag	–
D, d	cross-section diameters	m
$D_h = 4F/\Pi$; $d_h = 4f/\Pi$	hydraulic or equivalent diameter ($4 \times$ hydraulic radius)	m
F, f	cross-sectional areas	m^2
$\bar{f} = F_{or}/F_{gr}$	area ratio of a grid, orifice, perforated plate, etc.	–
G	mass flow rate of liquid (gas)	kg/s
g	gravitational acceleration	m/s^2
h	height	m
$k = c_p/c_v$	specific heat ratio	–
l	length of flow segment, depth of channel, or thickness of orifice	m
$Ma = w/a_1$	Mach number	–
$M = 1/F \int_F (w/w_0)^2 dF$	coefficient of momentum (Boussinesq coefficient)	–
m_0	wetting intensity	m^3/m^3
m	exponent	–
$N = 1/F \int_F (w/w_0)^3 dF$	coefficient of kinematic energy (Coriolis coefficient)	–
N_m	power	W
n	polytropic exponent	–
n_{ar}	area ratio (degree of enlargement or reduction of cross section); polytropic exponent; number of elements	–

Symbol	Name of quantity	Abridged notation in SI units
n_{el}	number of elements	–
p_*	static pressure	Pa
p_f	total pressure of flow stagnation pressure	Pa
p_{ex}	excess pressure	Pa
Δp	overall pressure difference	Pa
P_{dr}	drag force	N
Q	volumetric flow rate	m^3/s
R	gas constant	J/kg K
R_h	hydraulic radius ($\frac{1}{4} D_h$)	m
R_0, r	radii of cross sections of a circular pipe or curved pipe length	m
$\mathrm{Re} = wD_h/\nu$	Reynolds number	–
S, s	spacing (distance between rods in a bundle of pipes, between grid holes, etc.)	m
S_{fr}	length of a free jet	m
S_0	surface area	m^2
S_m	frontal area of a body in a flow	m^2
$T(t)$	thermodynamic temperature	K (^oC)
T^*	thermodynamic flow stagnation temperature	K
v_{sp}	specific volume	m^3/kg; m/s
v	side discharge (inflow) velocity	m/s
w	stream velocity	m/s
w'	longitudinally fluctuating stream velocity	m/s
z	dust content	g/m^3
z_d	dust capacity	kg/m^2
α	central angle of divergence or convergence; angle of a wye or tee branching; angle of stream incidence	deg
δ	angle of turning (of a branch, elbow); angle of valve opening	
δ_t	thickness of a wall, boundary layer, or wall layer	m
δ_j	height of joint	m
Δ	equivalent uniform roughness of walls	m
Δ_0	mean height of wall roughness protuberances (absolute roughness)	
$\bar{\Delta}_0 = \Delta_0/D_h$; $\bar{\Delta} = \Delta/D_h$	relative roughness of walls	–
$\varepsilon = F_{con}/F_0$	coefficient of jet contraction	–
ε'	porosity (void fraction)	–
$\varepsilon_t = \sqrt{\overline{w'^2}}/w_0$	degree of turbulence	–
$\zeta \equiv \Delta p/(\rho w^2/2)$	coefficient of fluid resistance (pressure loss coefficient)	–

Symbol	Name of quantity	Abridged notation in SI units
ζ_{loc}	coefficient of local fluid resistance	–
ζ_{fr}	coefficient of friction resistance of the segment of length l	
η	dynamic viscosity	Pa s
η_{Π}	cleaning coefficient	–
$\lambda = \zeta_{fr}/(l/D_h)$	friction coefficient [friction resistance of the segment of relative unit length $(l/D_h = 1)$]	–
$\lambda_c = w/a_{cr}$	relative (reduced) stream velocity	–
μ	discharge coefficient	–
μ_{con}	mass concentration of suspended particles in flow	–
ν	kinematic viscosity	m^2/s
ρ	density of liquid (gas)	kg/m^3
ρ^*	density of frozen gas flow	kg/m^3
ρ_{cr}	density of gas at critical velocity	kg/m^3
Π	cross-sectional (wetted) perimeter	m
φ	velocity coefficient	–

SUBSCRIPTS

Subscripts listed for the quantities F, f, D, d, Π, a, b, w, ρ, Q, and p refer to the following cross sections or pipe segments:

0	governing cross section or minimum area
1	larger cross section in the case of expansion or contraction of the flow segment
2	larger cross section after equalization of the stream velocity
k	intermediate cross section of curved channel (elbow, branch) or the working chamber of the apparatus
con	contracted jet section at the discharge from an orifice (nozzle)
or	orifice or a single hole in the perforated plate or screen
gr	front of the perforated plate, screen, orifice
br, st, ch	side branch, straight passage, and common channel of a wye or tee, respectively
out	outlet
∞	velocity at infinity

Subscripts 0, 1, 2, k, and d at l refer, respectively, to the inlet, straight outlet, intermediate (for a curved channel), and diffuser pipe lenghths.

Subscripts at Δp and ζ refer to the following forms of the fluid resistances:

loc	local
fr	friction

ov	overall
d	total resistance of a diffuser in the network
out	total resistance of a diffuser or a branch at the outlet from the network
int	internal resistance of a diffuser
exp	resistance to flow expansion in a diffuser
sh	shock resistance at sudden enlargement of the cross section
br and st	resistance of a branch and straight passage of a wye or tee (for the resistance coefficients reduced to the velocity in respective branch pipes)
r.br., r.st.	resistance coefficients of the side branch and of the straight passage of a wye or tee reduced to the velocity in a common channel of a wye or tee