



CFD Best Practice Guidelines for modelling pressure losses and flow characteristics in square- and knife-edged orifice plates

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THE PREPARATION OF THIS CFD GUIDE

The work on this particular CFD Guide was monitored and guided by the Internal Flow Panel. This Panel first met in 1979 and now has the following membership:

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who also has overall responsibility for the work in this subject area.

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CFD BEST PRACTICE GUIDELINES FOR MODELLING PRESSURE LOSSES AND FLOW CHARACTERISTICS IN SQUARE- AND KNIFE-EDGED ORIFICE PLATES

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1. NOTATION AND UNITS

		<i>SI Unit</i>
A	pipe cross-sectional area	m^2
D	pipe internal diameter, see Sketch 2.1	m
d	orifice plate bore internal diameter, see Sketch 2.1	m
m	mass flow rate	kg/s
Re_D	pipe Reynolds number, defined as $Re_D = V_1 D / \nu$	–
Re_θ	momentum-thickness Reynolds number, defined as $Re_\theta = \theta u_\infty / \nu$	–
TI	turbulence intensity, defined at pipe inlet as $TI = u' / V_1$	–
t	orifice plate bore thickness, see Sketch 2.1	m
t^*	orifice plate thickness, see Sketch 2.1(b)	m
u'	RMS value of the fluctuating component of local velocity in turbulent flow	m/s
u_∞	local free stream velocity	m/s
u_τ	friction velocity, defined as $u_\tau = \sqrt{\tau_w / \rho}$	m/s
V_1	pipe bulk-mean velocity, defined as $V_1 = m / (A_1 \rho)$	m/s
Y_{plus}	wall y^+ , defined as $Y_{plus} = y_w u_\tau \rho / \mu$	–
y_w	height of wall mesh element for the pipe and orifice plate, see Sketches 3.1 to 3.4	m
β	orifice to pipe diameter ratio, $\beta = d/D$, see Sketch 2.1	–
γ	intermittency factor	–
ε	turbulent eddy dissipation	m^2/s^3
φ	back bevel angle, see Sketch 2.1	degree
κ	turbulence kinetic energy	m^2/s^2
μ	fluid dynamic viscosity	Pa s
ν	fluid kinematic viscosity	m^2/s
θ	boundary layer momentum thickness	m
ρ	fluid density	kg/m^3
τ_w	wall shear stress	Pa

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