EMPIRICAL CORRELATIONS FOR FORCED CONVECTION OVER CIRCULAR AND NONCIRCULAR CYLINDERS IN CROSS FLOW

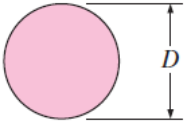**TABLE 3.2 –** Empirical correlations according to *Hilpert equation* for flow across circular cylinders.

Cross-section of the cylinder	Fluid	Re	Nu
Circle	Gas or liquid	$0.4 - 4$	$Nu = 0.989 Re^{0.330} Pr^{1/3}$
		$4 - 40$	$Nu = 0.911 Re^{0.385} Pr^{1/3}$
		$40 - 4\,000$	$Nu = 0.683 Re^{0.466} Pr^{1/3}$
		$4\,000 - 40\,000$	$Nu = 0.193 Re^{0.618} Pr^{1/3}$
		$40\,000 - 400\,000$	$Nu = 0.027 Re^{0.805} Pr^{1/3}$

TABLE 3.3 – Empirical correlations according to *Zukauskas equation* for flow across circular cylinders.
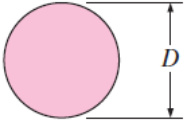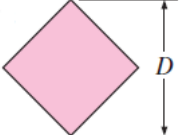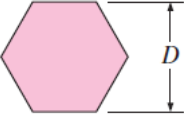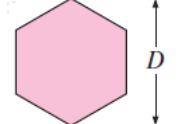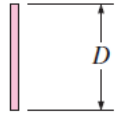
Cross-section of the cylinder	Fluid	Re	Nu
Circle	Gas or liquid	$1 - 40$	$Nu = 0.75 Re^{0.4} Pr^{1/3}$
		$40 - 10^3$	$Nu = 0.51 Re^{0.5} Pr^{1/3}$
		$10^3 - 2\times10^5$	$Nu = 0.26 Re^{0.6} Pr^{1/3}$
		$2\times10^5 - 10^6$	$Nu = 0.076 Re^{0.7} Pr^{1/3}$

TABLE 3.4 – Empirical correlations according to *Hilpert equation* for flow across noncircular cylinders.

Cross-section of the cylinder	Fluid	Re	Nu
Square	Gas	$5\times10^3 - 10^5$	$Nu = 0.102 Re^{0.675} Pr^{1/3}$
Square (tilted 45°)	Gas	$5\times10^3 - 10^5$	$Nu = 0.246 Re^{0.588} Pr^{1/3}$
Hexagon	Gas	$5\times10^3 - 10^5$	$Nu = 0.153 Re^{0.638} Pr^{1/3}$
Hexagon	Gas	$5\times10^3 - 19.5\times10^3$ $19.5\times10^3 - 10^5$	$Nu = 0.160 Re^{0.638} Pr^{1/3}$ $Nu = 0.0385 Re^{0.782} Pr^{1/3}$
Vertical plate	Gas	$4\times10^3 - 15\times10^3$	$Nu = 0.228 Re^{0.731} Pr^{1/3}$