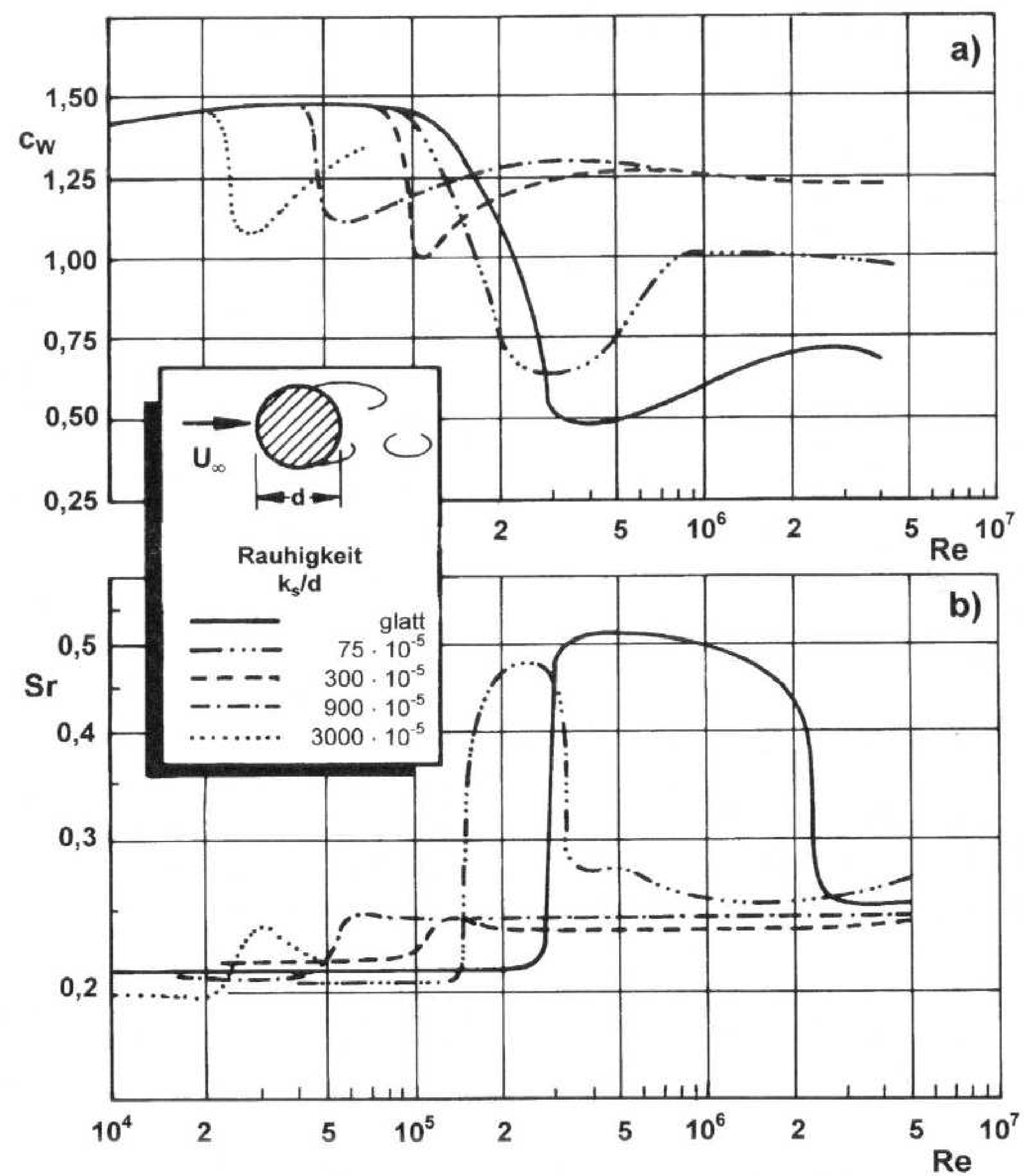
ESERCITAZIONE

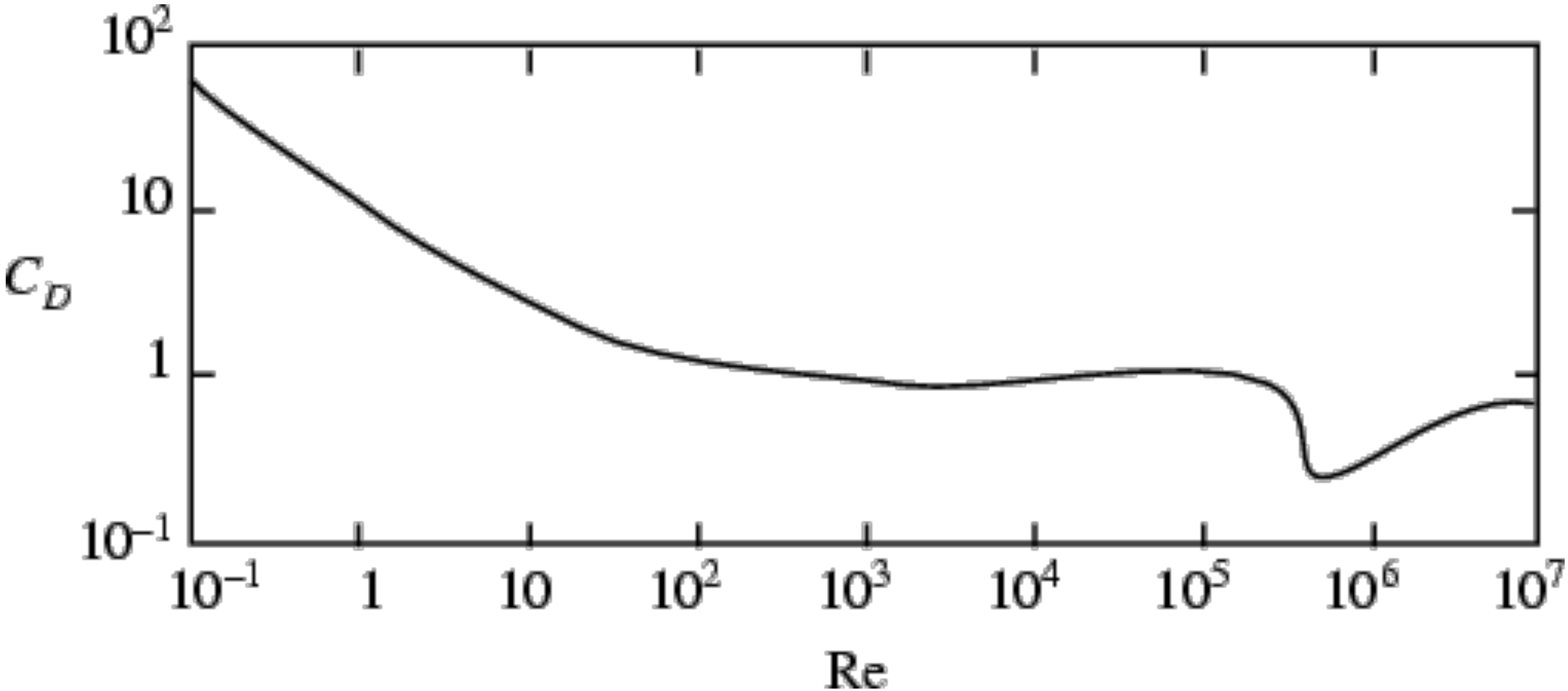
Sezione di minima resistenza aerodinamica come carenatura di un cilindro avente sezione assegnata

Resistenza aerodinamica di un cilindro sezione circolare

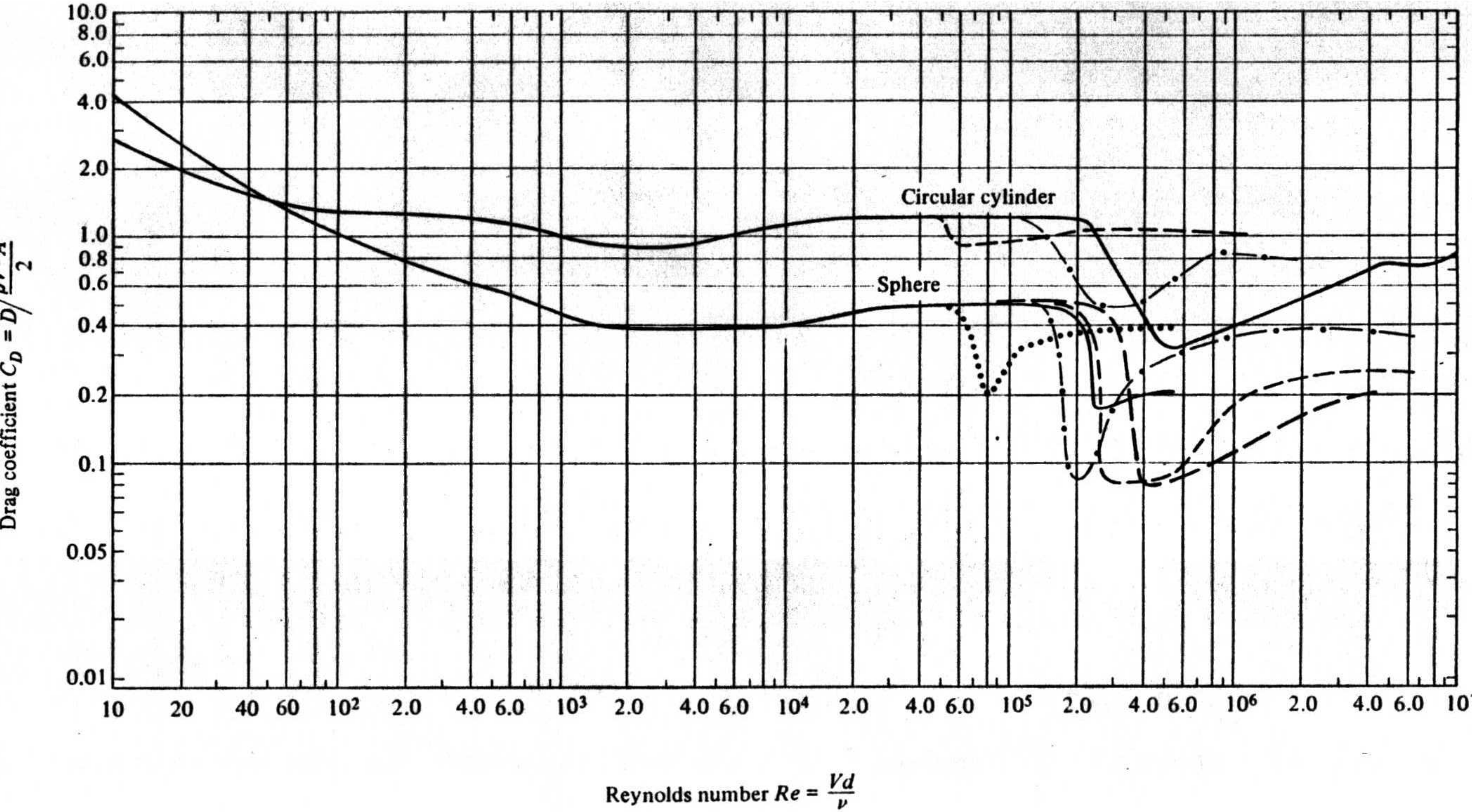


$$c_W = \frac{W}{\frac{\rho}{2} U_\infty^2 \, d l}$$

W è la forza resistente,
l la lunghezza
d diametro
U velocità



10^2
10
1
10^-1
C_D
10^-1
1
10
10^2
10^3
10^4
10^5
10^6
10^7
Re



Drag coefficients for a sphere and a cylinder as a function of Reynolds number. The Reynolds number is based on the iameter, and A is the projected area normal to the flow. The data are taken from References [9], [10], and [11]. The solid lines re for smooth surfaces. For the cylinder, the dashed line corresponds to a roughness ratio $k/d = 9 \times 10^{-3}$; the dash-dot line to $/d = 1 \times 10^{-3}$. For the sphere, the dotted line corresponds to $k/d = 17.5 \times 10^{-3}$; the dash-dot line to $k/d = 1.5 \times 10^{-3}$; and the ong dash line to $k/d = 0.25 \times 10^{-3}$. The short dash lines are a second set of experimental results for a smooth sphere, indicating he range of variation of available data.

Resistenza aerodinamica di un cilindro a sezione alare

NACA MPXX

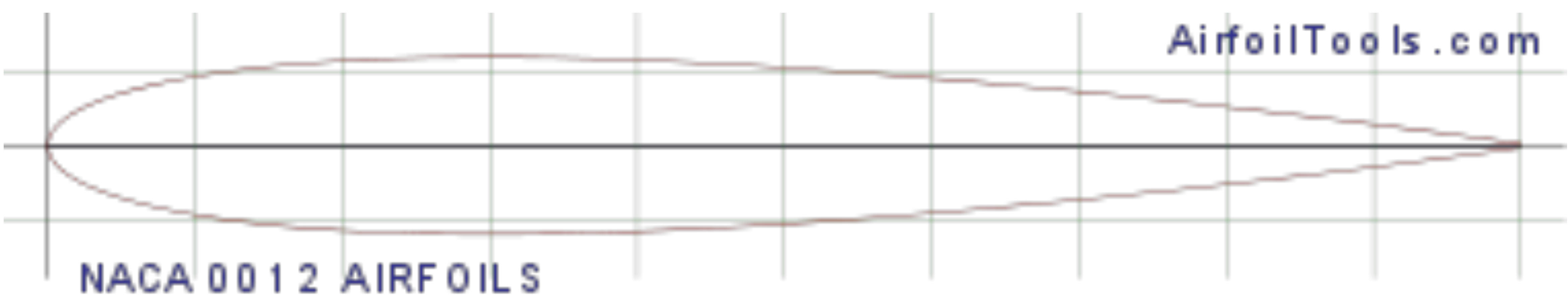
$$y_t = \frac{T}{0.2}\left(a_0 x^{0.5} + a_1 x + a_2 x^2 + a_3 x^3 + a_4 x^4\right)$$

Where:

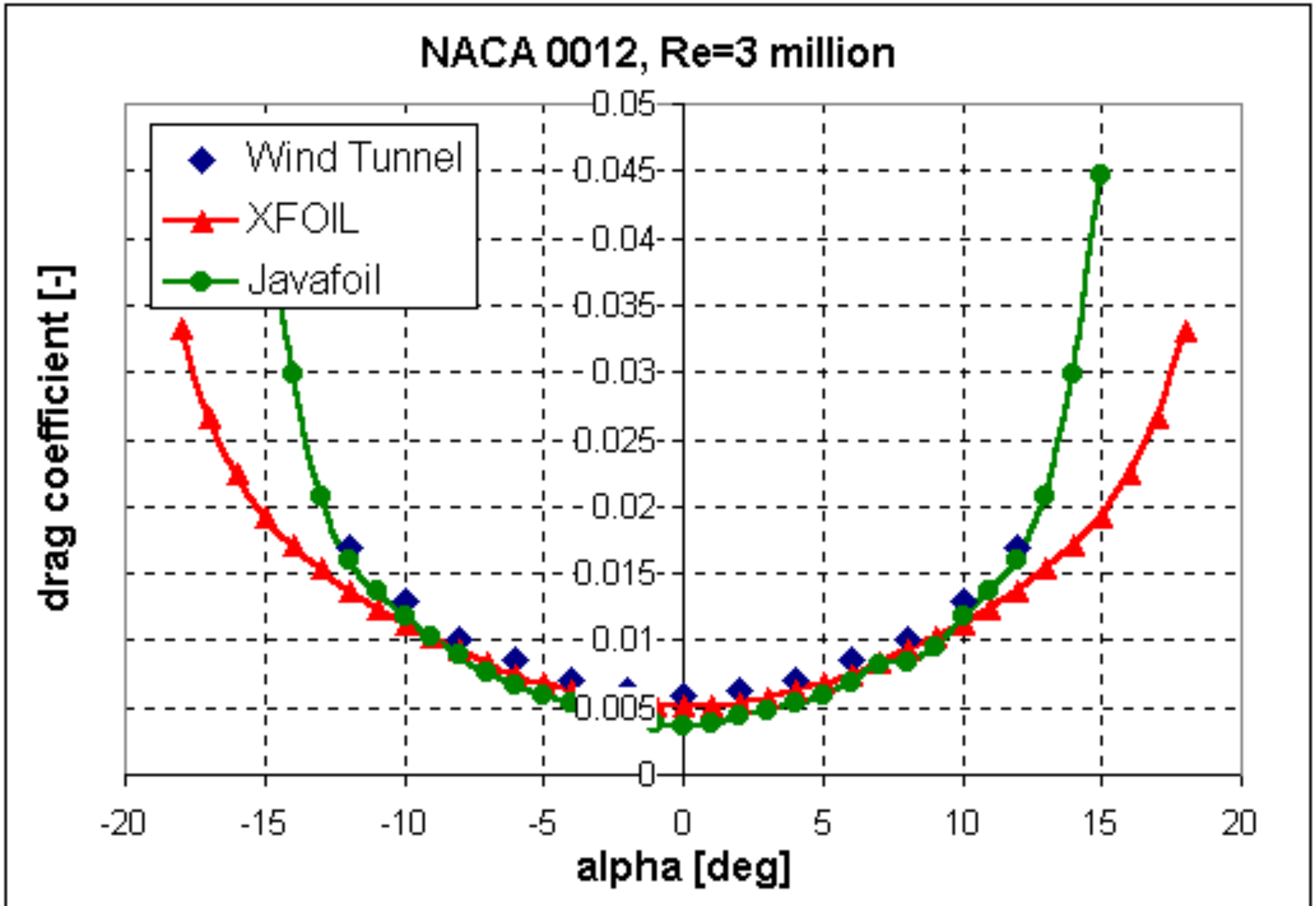
$a_0 = 0.2969$ $a_1 = -0.126$ $a_2 = -0.3516$ $a_3 = 0.2843$

$a_4 = -0.1015$ or -0.1036 for a closed trailing edge

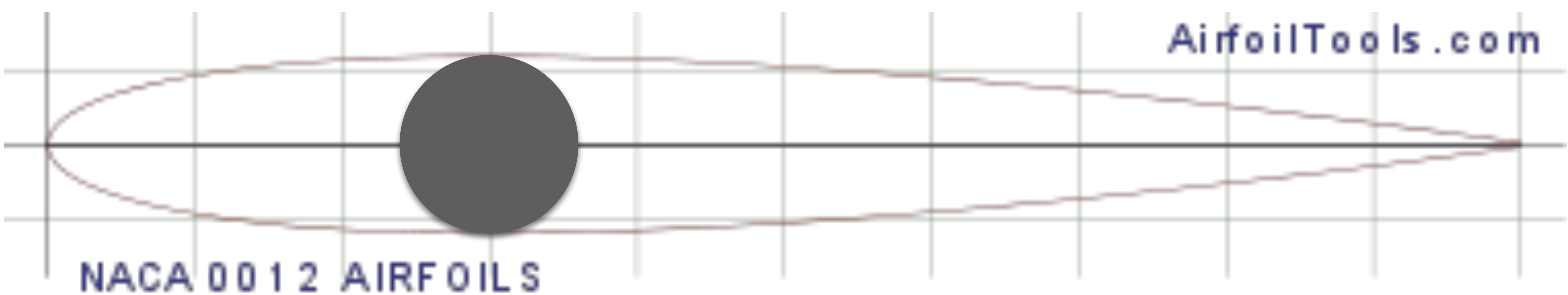
	Front ($0 \le x < p$)	Back ($p \le x \le 1$)
Camber	$y_c = \frac{M}{P^2}\left(2Px - x^2\right)$	$y_c = \frac{M}{(1-P)^2}\left(1 - 2P + 2Px - x^2\right)$
Gradient	$\frac{dy_c}{dx} = \frac{2M}{P^2}(P - x)$	$\frac{dy_c}{dx} = \frac{2M}{(1-P)^2}(P - x)$



Resistenza aerodinamica di un cilindro a sezione alare

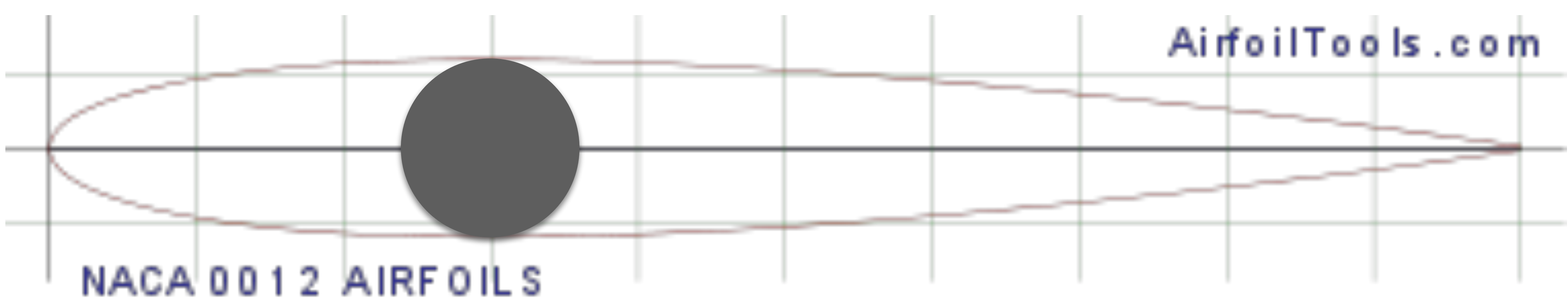


Sezione di minima resistenza aerodinamica come carenatura di un cilindro avente sezione assegnata



Sezione di minima resistenza aerodinamica come carenatura di un cilindro avente sezione assegnata

d=10mm
V=350 kmh
L=1m



Sezione aerodinamicamente ottimale di un cilindro avente sezione assegnata

Proprietà dell'Atmosfera Standard
Standard Atmosphere 1976

Altitudine (geometrica, *m*)	Temperatura assoluta (*K*)	Pressione (*hPa*)	Densità (*kg/m³*)	Viscosità dinamica (*Pa·s*)	Velocità del suono
0	288.15	1013.25	1.2250	1.79×10^{-5}	340.29
1000	281.65	898.76	1.1117	1.76×10^{-5}	336.44
5000	255.68	540.48	0.7364	1.63×10^{-5}	320.55
10000	223.25	265.00	0.4135	1.46×10^{-5}	299.53
15000	216.65	121.11	0.1947	1.42×10^{-5}	295.07
20000	216.65	54.69	88	1.42×10^{-5}	295.07
25000	221.55	25.49	39	1.45×10^{-5}	298.39

d=10 mm
V=350 kmh
L=1m

Re? Mach?