Drag Force on a Body

Drag force on a body in a moving fluid from the drag coefficient, frontal area, fluid density and velocity, with the power to overcome it and the dynamic pressure.

Method: Drag equation F = C_D A ½ρv² (Textbook fluid mechanics (White, Fluid Mechanics))

Input parameters

Unit system: SI

Parameter	Value	Unit
Drag coefficient About 0.47 for a sphere, 1.0–1.2 for a cylinder across flow, 1.28 for a flat plate face-on; use test data for your shape.	1.2000	
Frontal area	2.0000	m²
Fluid density	1.2000	kg/m³
Relative velocity	30.000	m/s

Calculated results

Parameter	Value	Unit
Dynamic pressure ½ ρ v²	540.00	Pa
Drag force	1.2960	kN
Power to overcome drag F v	38.880	kW

Formula and method

$$F_D = C_D A \frac{\rho v^2}{2}, \quad P = F_D\, v$$

Variables

C_D	Drag coefficient	-
A	Frontal area	m²
ρ	Fluid density	kg/m³
v	Relative velocity	m/s
q	Dynamic pressure ½ ρ v²	Pa
F_D	Drag force	N
P	Power to overcome drag F v	W

Method and standards

Drag equation.

Assumptions and limits

- Steady flow.

References

• Drag equation F = C_D A ½ρv² (Textbook fluid mechanics (White, Fluid Mechanics))

Report details

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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/mechanical/fluid-mechanics/drag-force

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.