Admiralty Coefficient: Ship Power at a New Speed or Displacement

Admiralty coefficient of a ship from a known power, displacement and speed, and the power needed at another speed or displacement, assuming the same coefficient.

Method: Admiralty coefficient method

Input parameters

Unit system: SI

Parameter	Value	Unit
Known displacement	20,000	t
Known speed	14.000	kn
Known shaft power	6,000.0	kW
New displacement	17,000	t
New speed	15.000	kn

Calculated results

Parameter	Value	Unit
Admiralty coefficient Δ^{2/3}V³/P (t, kn, kW)	336.97	
Power at the new condition	6,622.0	kW
Power ratio	1.1037	
Fuel per distance ratio (P/V)	1.0301	

Notes for this case

• P ∝ Δ^(2/3)V³ holds for small changes of speed and displacement of the same ship. Over wide speed ranges the exponent of V rises above 3 as wave resistance grows.

Formula and method

$$C_{adm} = \frac{\Delta^{2/3} V^3}{P}, \quad P_2 = P_1 \left(\frac{\Delta_2}{\Delta_1}\right)^{2/3} \left(\frac{V_2}{V_1}\right)^3$$

Variables

Δ_1	Known displacement	kg
V_1	Known speed	m/s
P_1	Known shaft power	W
Δ_2	New displacement	kg
V_2	New speed	m/s
C_{adm}	Admiralty coefficient Δ^{2/3}V³/P (t, kn, kW)	-
P_2	Power at the new condition	W
P_2/P_1	Power ratio	-
F_2/F_1	Fuel per distance ratio (P/V)	-

Method and standards

Admiralty coefficient scaling.

Assumptions and limits

- Same ship or a close sister; calm water; similar trim.

References

Admiralty coefficient method

Report details

Report reference	FCC-EMDG-M08B (the same inputs always give the same reference)
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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/marine/admiralty-coefficient-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.