Ship Hull Form Coefficients: Block, Midship, Prismatic, Waterplane

Block, midship, prismatic, waterplane and vertical prismatic coefficients of a hull, with displacement and tonnes per cm immersion, from its dimensions and areas.

Method: Hull form coefficients and tonnes per centimetre immersion

Input parameters

Unit system: SI

Parameter	Value	Unit
Length between perpendiculars (or waterline)	120.00	m
Breadth (moulded)	20.000	m
Draught (moulded)	7.5000	m
Displaced volume	12,600	m³
Midship section area (to the draught)	146.00	m²
Waterplane area	2,000.0	m²
Water density (sea 1,025; fresh 1,000)	1,025.0	kg/m³

Calculated results

Parameter	Value	Unit
Block coefficient ▯/(LBT)	0.70000	
Midship coefficient A_M/(BT)	0.97333	
Prismatic coefficient ▯/(A_M L)	0.71918	
Waterplane coefficient A_WP/(LB)	0.83333	
Vertical prismatic coefficient ▯/(A_WP T)	0.84000	
Displacement ρ▯	12,915	t
Tonnes per centimetre immersion	20.500	t/cm

Notes for this case

- C_P = C_B/C_M. Typical C_B: tankers 0.80–0.85, bulk carriers 0.75–0.85, general cargo 0.65–0.75, container ships 0.55–0.70, fast craft below 0.5.

Formula and method

$$C_B = \frac{\nabla}{LBT}, \quad C_M = \frac{A_M}{BT}, \quad C_P = \frac{\nabla}{A_M L} = \frac{C_B}{C_M}, \quad C_{WP} = \frac{A_{WP}}{LB}$$

$$\Delta = \rho \nabla, \quad TPC = \rho A_{WP} \times 0.01 \text{ m}$$

Variables

L	Length between perpendiculars (or waterline)	m
B	Breadth (moulded)	m
T	Draught (moulded)	m
∇	Displaced volume	m³
A_M	Midship section area (to the draught)	m²
A_{WP}	Waterplane area	m²
ρ	Water density (sea 1,025; fresh 1,000)	kg/m³

C_B	Block coefficient ∇/(LBT)	-
C_M	Midship coefficient A_M/(BT)	-
C_P	Prismatic coefficient ∇/(A_M L)	-
C_{WP}	Waterplane coefficient A_WP/(LB)	-
C_{VP}	Vertical prismatic coefficient ∇/(A_WP T)	-
Δ	Displacement ρ∇	kg
TPC	Tonnes per centimetre immersion	kg/m

Method and standards

Hull form coefficients.

Assumptions and limits

- Moulded dimensions; areas to the stated draught.

References

Hull form coefficients and tonnes per centimetre immersion

Report details

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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/ship-form-coefficients

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Reopens the calculator with the inputs of this report.