

Calculation of Metacentric Height with Wind Effect

$$GM = PAH / \Delta \tan \theta$$

GM: Metacentric height in meters.

P: Wind pressure coefficient in tons/m² according to the following table.

Navigation Area	LOA less than 24m		LOA up to 24m
	Passengers less than 150	150 passengers or more	
Sheltered Water Area	P=0.0366	P=0.0273+(L/1310) ²	
Partial Sheltered Water Area	P=0.0488	P=0.0361+(L/1310) ²	
Exposed Water Area	P=0.0733	P=0.0547+(L/1310) ²	
Remarks	L is the LOA between perpendiculars, in meters		

A: Lateral projection area of ship-body above water line, including superstructures, deckhouses, handrails and awning structures, in m².

H: Vertical distance from the center of the area mentioned above to the center of the lateral area of the ship body below water line, or to the central point of depth, in m.

Δ: Displacement in metric tons.

θ: Angle of heel, which shall be less than 14 degrees or based on the following equation, whichever is the lesser.

$$\theta = \tan^{-1} (2I / B)$$

B: Breadth of ship in m.

I: Allowable max immersion value, in m, measured at the minimum freeboard after the ship inclines; however, it shall be measured at a place three-fourths of LOA from the bow if the min. freeboard is located after the place three-fourths of LOA from the bow.

The allowable max immersion value at the min. freeboard of various types of passenger ships shall comply with the specifications as follows:

Length of the Vessel	Type of Passenger Ships	Navigation Area	Allowable Max Immersion Value
LOA less than 24m (Passengers less than 150)	(Flush Deck Vessel)	All Water Area	$I \leq f_1/2$
	(Well Deck Vessel)	Exposed Water Area	$I \leq f_1/2$
		Sheltered Water Area, with Drain Ports Replaced by Drain Holes	$I \leq f_1/2$ or $I \leq f_2/4$, whichever is the lesser
	(Cockpit Vessel)	Exposed Water Area	$I \leq f_2(2L_1-15l)/4L_1$
		Sheltered Water Area or Partial Sheltered Water Area	$I \leq f_2(2L_1-l)/4L_1$
	(Open Vessel)	All Water Area	$I \leq f_2/4$
LOA less than 24m (Passengers up to 150) or LOA up to 24m	Flush Deck Vessel	All Water Area	$I \leq f_1/2$
	Vessel with a Discontinuous Weather Deck or Special Sheer	All Water Area	$I \leq f_1/2$
Remarks	f_1 : Length of dry board measured up to side open deck, in meters. f_2 : Length of dry board measured up to the top of gunwale, in meters. L_1 : LOA of ship in meters, and is the distance measured from the front end to the rear end of the deck, excluding sheer. l : Length of hold base in meters.		