

RESOLUTION A.562(14)

Superseded by [A.749\(18\)](#)

*Adopted on 20 November 1985
Agenda item 10(b)*

**RECOMMENDATION ON A SEVERE WIND AND ROLLING CRITERION
(WEATHER CRITERION) FOR THE INTACT STABILITY OF PASSENGER
AND CARGO SHIPS OF 24 METRES IN LENGTH AND OVER**

A

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO resolution A.167(ES.IV) as amended by resolution A.206(VII) entitled "Recommendation on Intact Stability for Passenger and Cargo Ships under 100 Metres in Length",

NOTING that in resolution A.167(ES.IV) the Maritime Safety Committee had been requested to continue studies on improved stability criteria,

RECOGNIZING the need to establish international standards for a weather criterion for passenger and cargo ships of 24 metres in length and over,

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its fifty-first session,

1. **ADOPTS** the Recommendation on a Severe Wind and Rolling Criterion (Weather Criterion) for the Intact Stability of Passenger and Cargo Ships of 24 Metres in Length and Over, the text of which is set out in the Annex to the present resolution and which is also recommended for fishing vessels of 45 metres in length and over in unrestricted service;
2. **INVITES** all Governments concerned to take steps to give effect to the recommendation as soon as possible, unless they are fully satisfied that their national stability requirements supported by long operating experience ensure adequate stability for particular types and sizes of ships.

B

THE ASSEMBLY,

NOTING that weather criteria were previously adopted for dynamically supported craft in resolution A.373(X) as well as for mobile offshore drilling units in resolution A.414(XI) and that a weather criterion for fishing vessels is also given in recommendation 1 of attachment 3 to the Final Act of the International Conference on Safety of Fishing Vessels, 1977;

REQUESTS the Maritime Safety Committee to continue to develop improved and additional stability criteria and to review the weather criteria for particular types of craft referred to in the above paragraph, in particular for fishing vessels under 45 metres in length, with a view to any possible harmonization which may be achieved between them and to report to the Assembly in due course.

ANNEX

**RECOMMENDATION ON A SEVERE WIND AND ROLLING CRITERION
(WEATHER CRITERION) FOR THE INTACT STABILITY OF
PASSENGER AND CARGO SHIPS OF 24 METRES IN
LENGTH AND OVER**

(recommended also for fishing vessels of 45 m
in length and over in unrestricted service)

1 SCOPE

1.1 The criterion given hereunder is recommended for new decked seagoing passenger and cargo ships of 24 m in length and over and applies to all loading conditions.

1.2 This criterion supplements the stability criteria of the Recommendation on Intact Stability for Passenger and Cargo Ships under 100 m in Length in resolution A.167(ES.IV) as amended by resolution A.206(VII). The more stringent criteria of resolution A.167(ES.IV) and the weather criterion of the present Recommendation should govern the minimum requirements for passenger or cargo ships under 100 m in length.

1.3 The minimum stability of passenger and cargo ships of 100 m in length and over should comply with the weather criterion of the present Recommendation in addition to other appropriate stability criteria to the satisfaction of the Administration.

1.4 Administrations are invited to adopt, in conjunction with other appropriate criteria, the weather criterion of the present Recommendation unless satisfied that experience justifies departures therefrom.

2 RECOMMENDED CRITERION

2.1 The ability of a ship to withstand the combined effects of beam wind and rolling should be demonstrated for each standard condition of loading, with reference to the figure as follows:

- .1 The ship is subjected to a steady wind pressure acting perpendicular to the ship's centreline which results in a steady wind heeling lever (ℓw_1).
- .2 From the resultant angle of equilibrium (θ_0), the ship is assumed to roll owing to wave action to an angle of roll (θ_1) to windward. Attention should be paid to the effect of steady wind so that excessive resultant angles of heel are avoided.*
- .3 The ship is then subjected to a gust wind pressure which results in a gust wind heeling lever (ℓw_2).
- .4 Under these circumstances, area "b" should be equal to or greater than area "a".
- .5 Free surface effects should be accounted for in the standard conditions of loading, e.g. according to appendix 1 to resolution A.167(ES.IV).

* The angle of heel under action of steady wind (θ_0) should be limited to a certain angle to the satisfaction of the Administration. As a guide, 16° or 80% of the angle of deck edge immersion, whichever is less, is suggested.

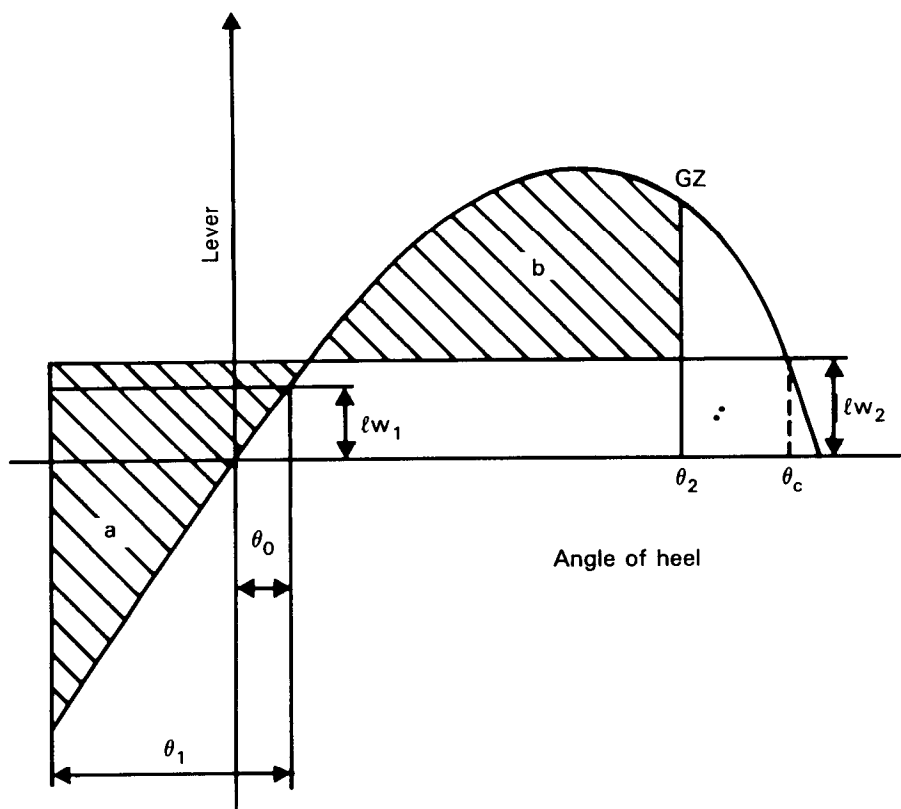


Figure — Severe wind and rolling

The angles in the above figure are defined as follows:

θ_0 = angle of heel under action of steady wind (see 2.1.2 and footnote)

θ_1 = angle of roll to windward due to wave action

θ_2 = angle of downflooding (θ_f) or 50° or θ_c whichever is less,

where:

θ_f = angle of heel at which openings in the hull, superstructures or deckhouses which cannot be closed weathertight immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open.

θ_c = angle of second intercept between wind heeling lever ℓw_2 and GZ curves.

2.2 The wind heeling levers ℓw_1 and ℓw_2 referred to in 2.1.1 and 2.1.3 are constant values at all angles of inclination and should be calculated as follows:

$$\ell w_1 = \frac{P \cdot A \cdot Z}{\Delta} \text{ (m) and}$$

$$\ell w_2 = 1.5 \ell w_1 \text{ (m)}$$

where: $P = 0.0514 \text{ (t/m}^2\text{)}$ *

$A =$ projected lateral area of the portion of the ship and deck cargo above the waterline (m^2)

$Z =$ vertical distance from the centre of A to the centre of the underwater lateral area or approximately to a point at one half the draught (m)

$\Delta =$ displacement (t).

2.3 The angle of roll (θ_1)** referred to in 2.1.2 should be calculated as follows:

$$\theta_1 = 109k \cdot X_1 \cdot X_2 \sqrt{r \cdot s} \text{ (degrees)}$$

where: $X_1 =$ factor as shown in table 1

$X_2 =$ factor as shown in table 2

$k =$ factor as follows:

$k = 1.0$ for round-bilged ship having no bilge or bar keels;

$k = 0.7$ for a ship having sharp bilges;

$k =$ as shown in table 3 for a ship having bilge keels, a bar keel or both

$$r = 0.73 \pm 0.6 \text{ OG/d}$$

with: $\text{OG} =$ distance between the centre of gravity and the waterline (m)
(+ if centre of gravity is above the waterline, — if it is below)

$d =$ mean moulded draught of the ship (m)

$s =$ factor as shown in table 4.

* The value of P used for ships in restricted service may be reduced subject to the approval of the Administration.

** The angle of roll for ships provided with antirolling devices should be determined without taking into account the operation of these devices.

Table 1
Values of factor X_1

B/d	X_1
≤2.4	1.0
2.5	0.98
2.6	0.96
2.7	0.95
2.8	0.93
2.9	0.91
3.0	0.90
3.1	0.88
3.2	0.86
3.3	0.84
3.4	0.82
≥3.5	0.80

Table 2
Values of factor X_2

C_B	X_2
≤0.45	0.75
0.50	0.82
0.55	0.89
0.60	0.95
0.65	0.97
≥0.70	1.0

Table 3
Values of factor k

$\frac{A_k \cdot 100}{L \cdot B}$	k
0	1.0
1.0	0.98
1.5	0.95
2.0	0.88
2.5	0.79
3.0	0.74
3.5	0.72
≥4.0	0.70

Table 4
Values of factor s

T	s
≤6	0.100
7	0.098
8	0.093
12	0.065
14	0.053
16	0.044
18	0.038
≥20	0.035

(Intermediate values in tables 1-4 should be obtained by linear interpolation.)

$$\text{Rolling period } T = \frac{2 C \cdot B}{\sqrt{GM}} \text{ (seconds)}$$

where: $C = 0.373 + 0.023 (B/d) - 0.043 (L/100)$.

The symbols in the above tables and formula for the rolling period are defined as follows:

- L = waterline length of the ship (m)
- B = moulded breadth of the ship (m)
- d = mean moulded draught of the ship (m)
- C_B = block coefficient
- A_k = total overall area of bilge keels, or area of the lateral projection of the bar keel, or sum of these areas (m²)
- GM = metacentric height corrected for free surface effect (m).