European Maritime Safety Agency

Directive 2003/25/EC – Passenger Ship Safety

Introduction and main elements

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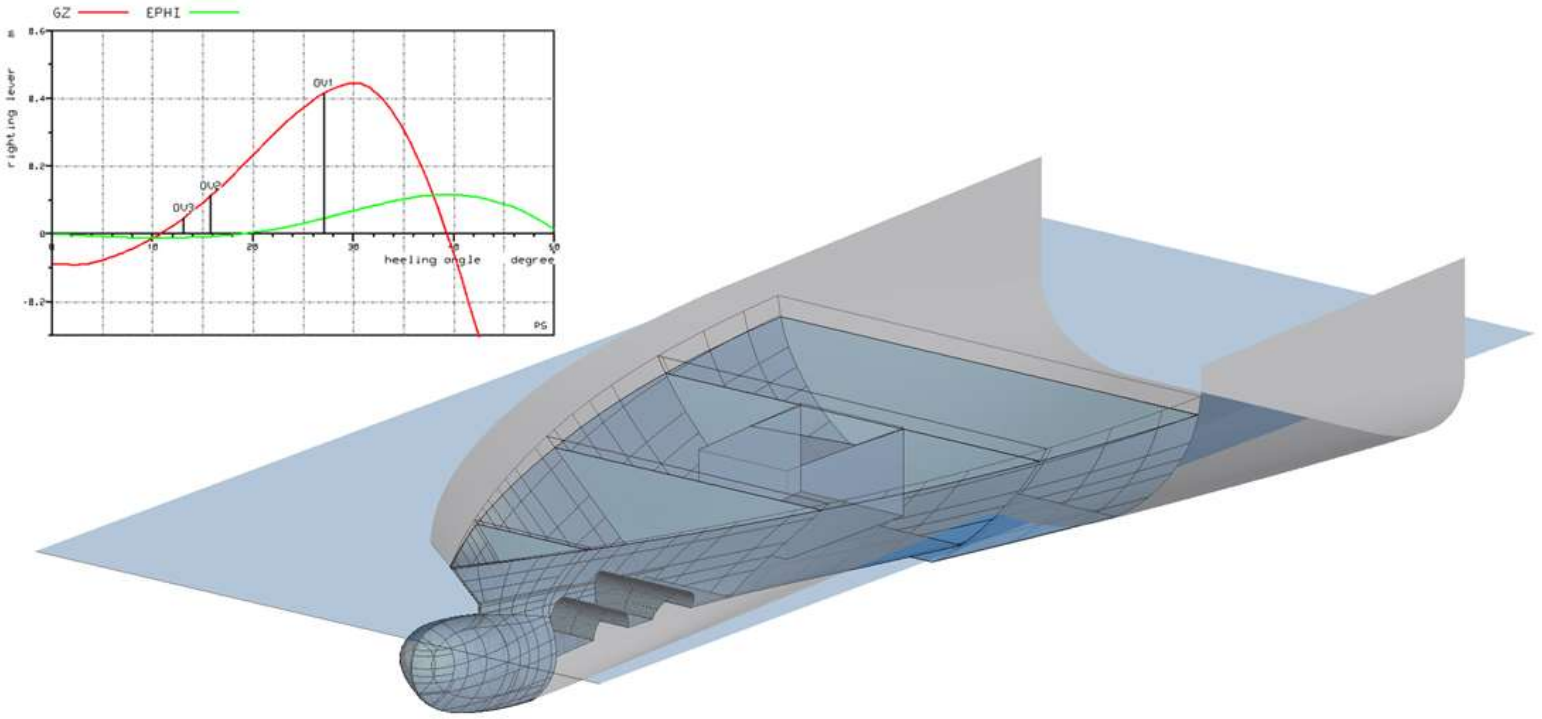
EMSA

Introduction to Damage Stability

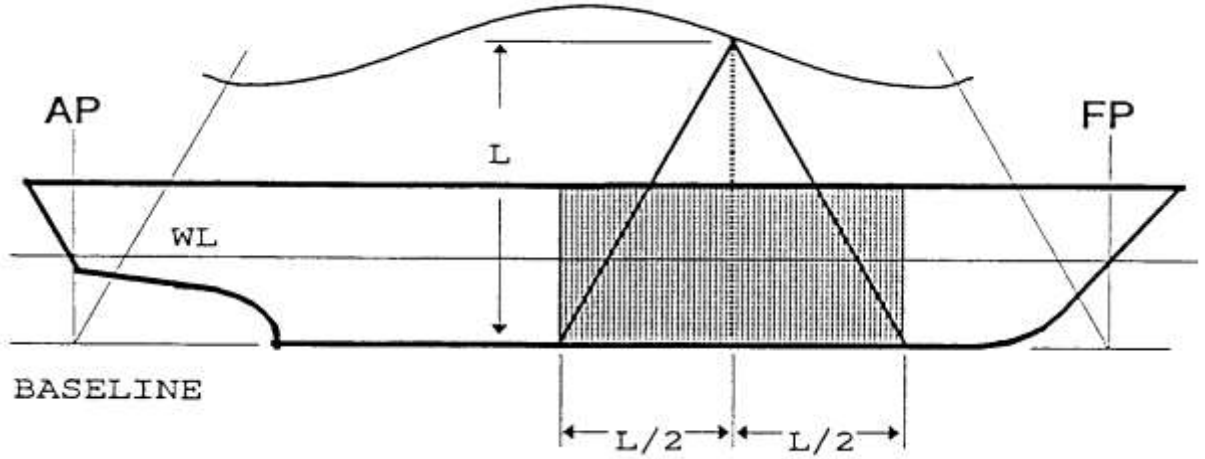
Damage stability refers to the stability of a floating object in a damaged condition.



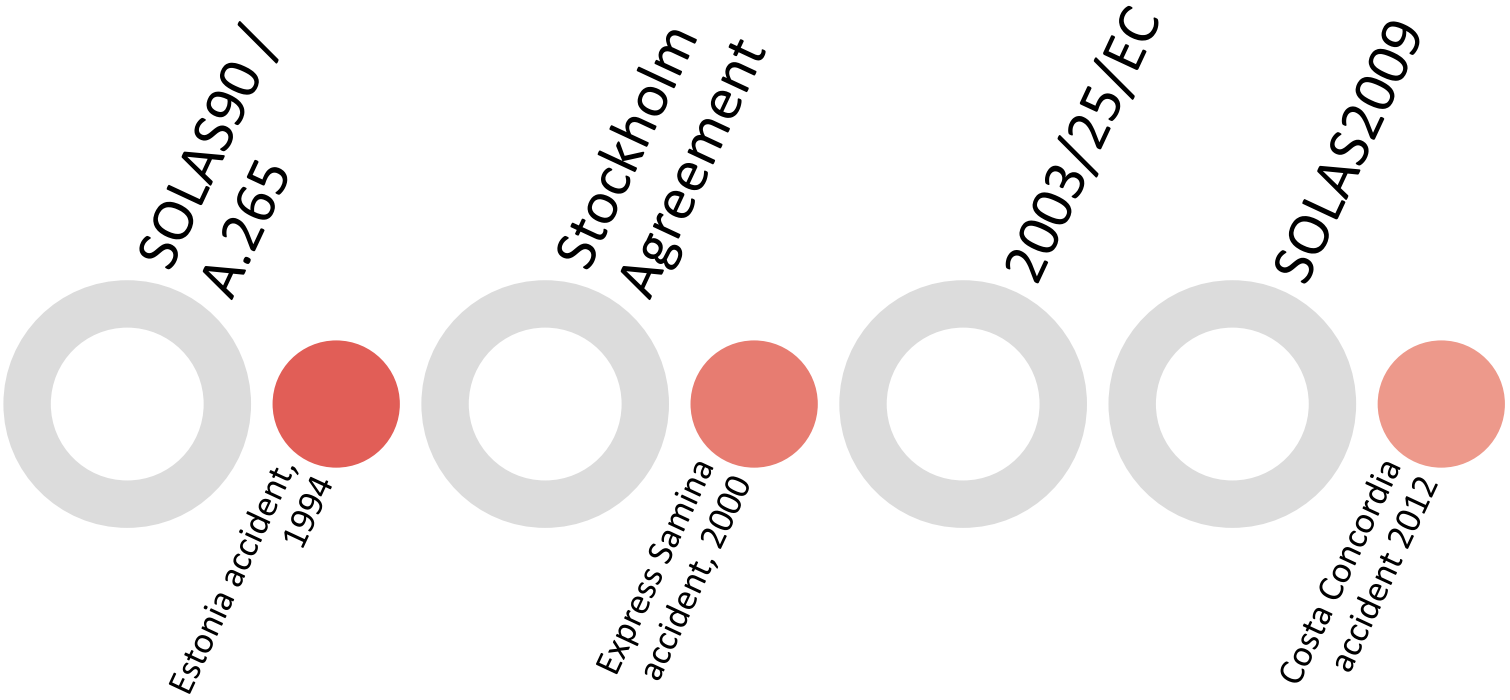
Subdivision criteria

SOLAS and various national or regional standards set out various requirements in relation to acceptable conditions of flotation and stability after flooding.

Main categories: Deterministic & Probabilistic



Subdivision criteria - evolution



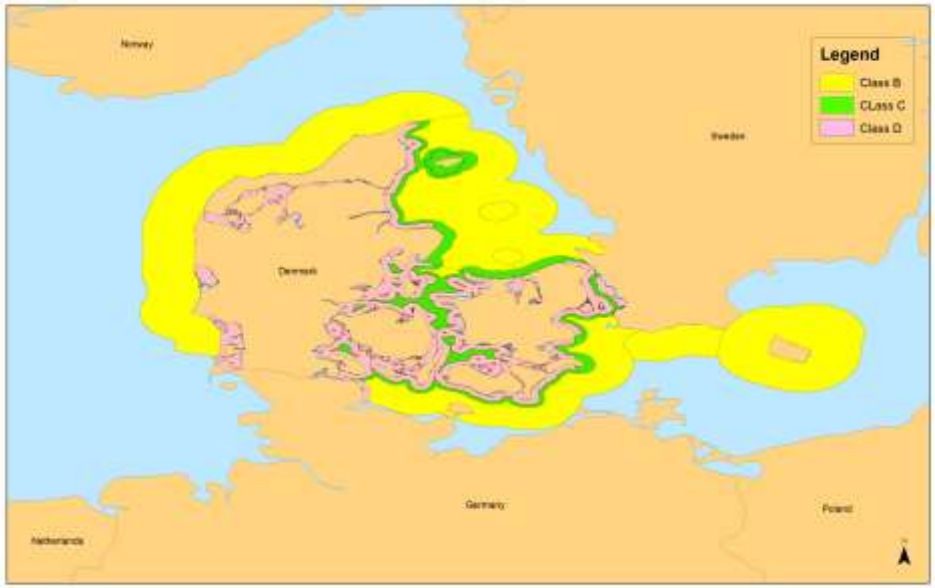
Application

2003/25 applies to:

- **All ro-ro passenger ships engaged in international voyages*;**
- **All class A & B domestic ro-ro passenger ships;**
- **Class C domestic ro-ro passenger ships built on or after 01/10/2004.**

- *including ro-ro passenger ships of third country flags.

Sea areas and significant wave heights



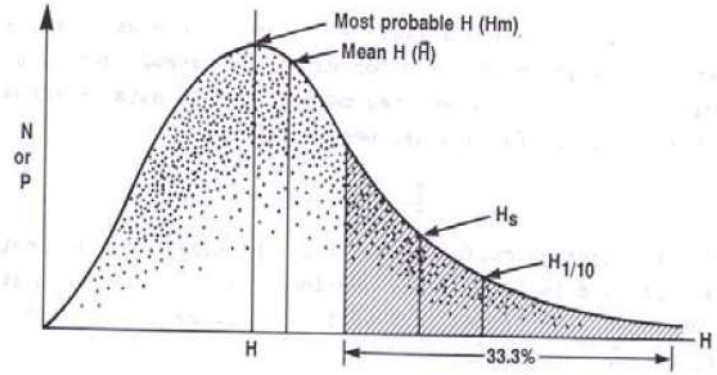


Figure 4.9: The statistical distribution of wave heights showing various parameters (from Bretschneider, 1964)

- **<u>Class C</u>: Hs=2.5m but Hmax = 4.2m (1%) (Hm ≈1.6m)**
- **<u>Class D</u>: Hs=1.5m but Hmax= 2.5m (1%) (Hm ≈ 0.95m)**

Seasonal operations

- **Lower significant wave heights than those established for the same sea area for all-year-round operation may apply;**
- **If the significant wave height is equal or less than 1.5m, SOLAS 90 standard applies.**

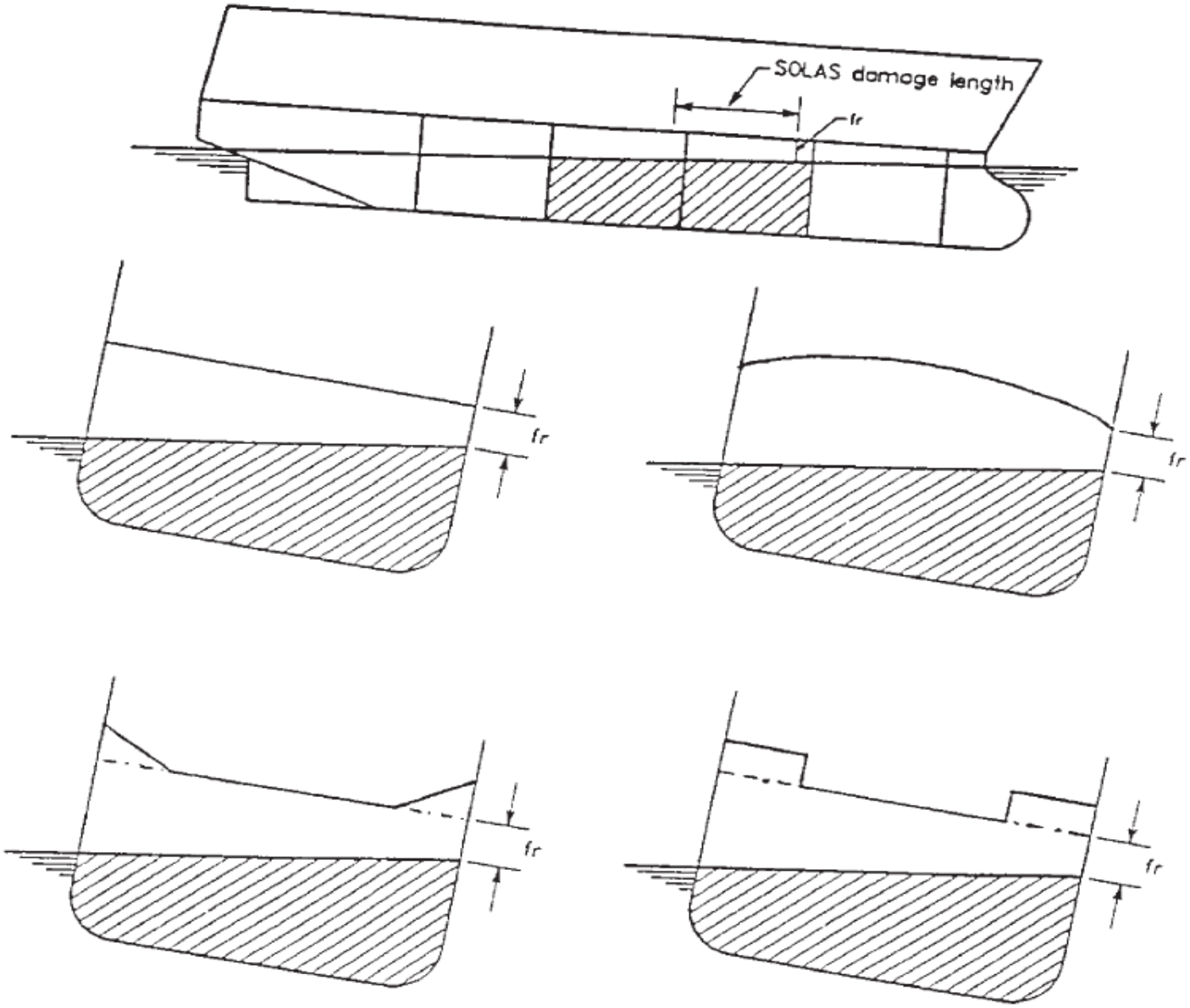
Main element of the Stockholm Agreement

Additional wedge of water on the ro-ro deck to be included in the calculations depending on residual freeboard and applicable significant wave height.

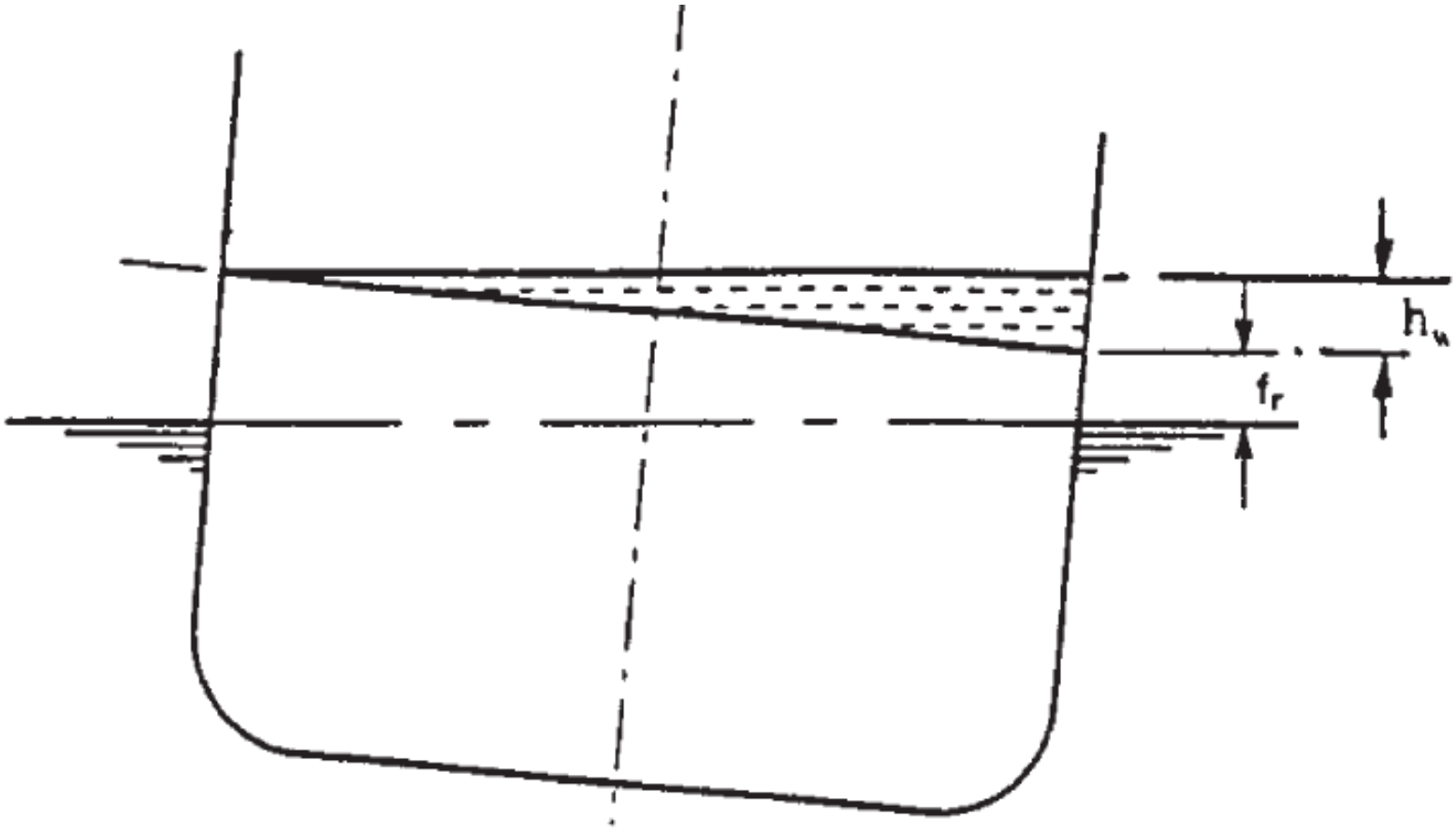
Additional to SOLAS90 standard*.

***no other requirements of Regulation II-1/B/8 need be taken into account. (e.g. angles of equilibrium or non-submergence of the margin line.)**

Residual freeboard

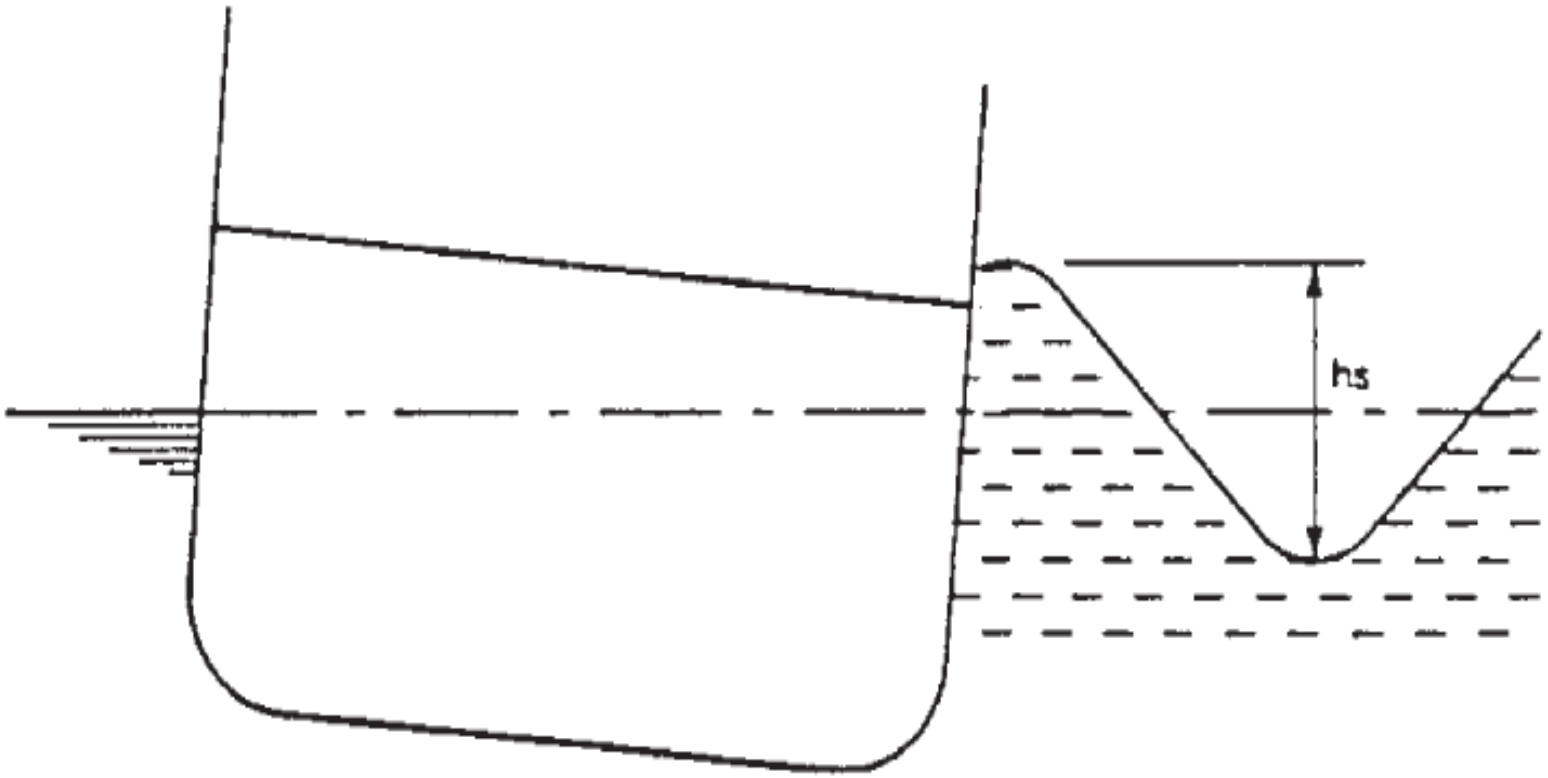


Accumulated water



1. If $f_r \geq 2{,}0$ metres, height of water on deck (h_w) = 0,0 metres.
2. If $f_r < 0{,}3$ metres, height of water on deck (h_w) = 0,5 metres.

Accumulated water



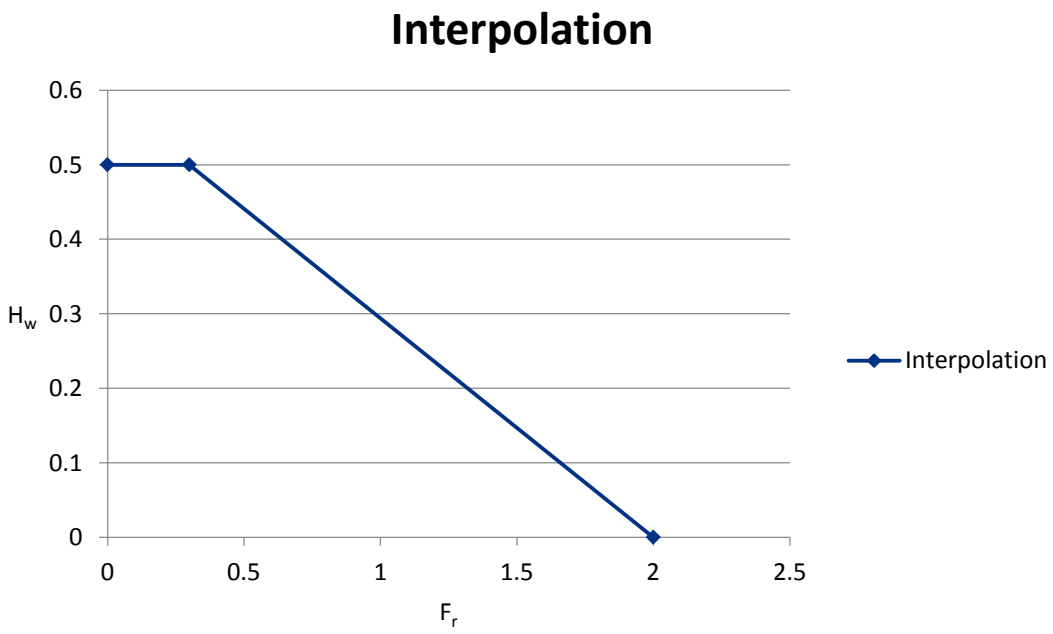
1. If $h_s \geq 4{,}0$ metres, height of water on deck is calculated as per figure 3.
2. If $h_s < 1{,}5$ metres, height of water on deck (h_w) = 0,0 metres.

Accumulated water

Example:

If f_r = 1.15 m and h_s = 2.75 m,

h_w = ?



Accumulated water

Example:

If f_r = 1.15 m and h_s = 2.75 m,

h_w = 0.125 m

Extent of damage

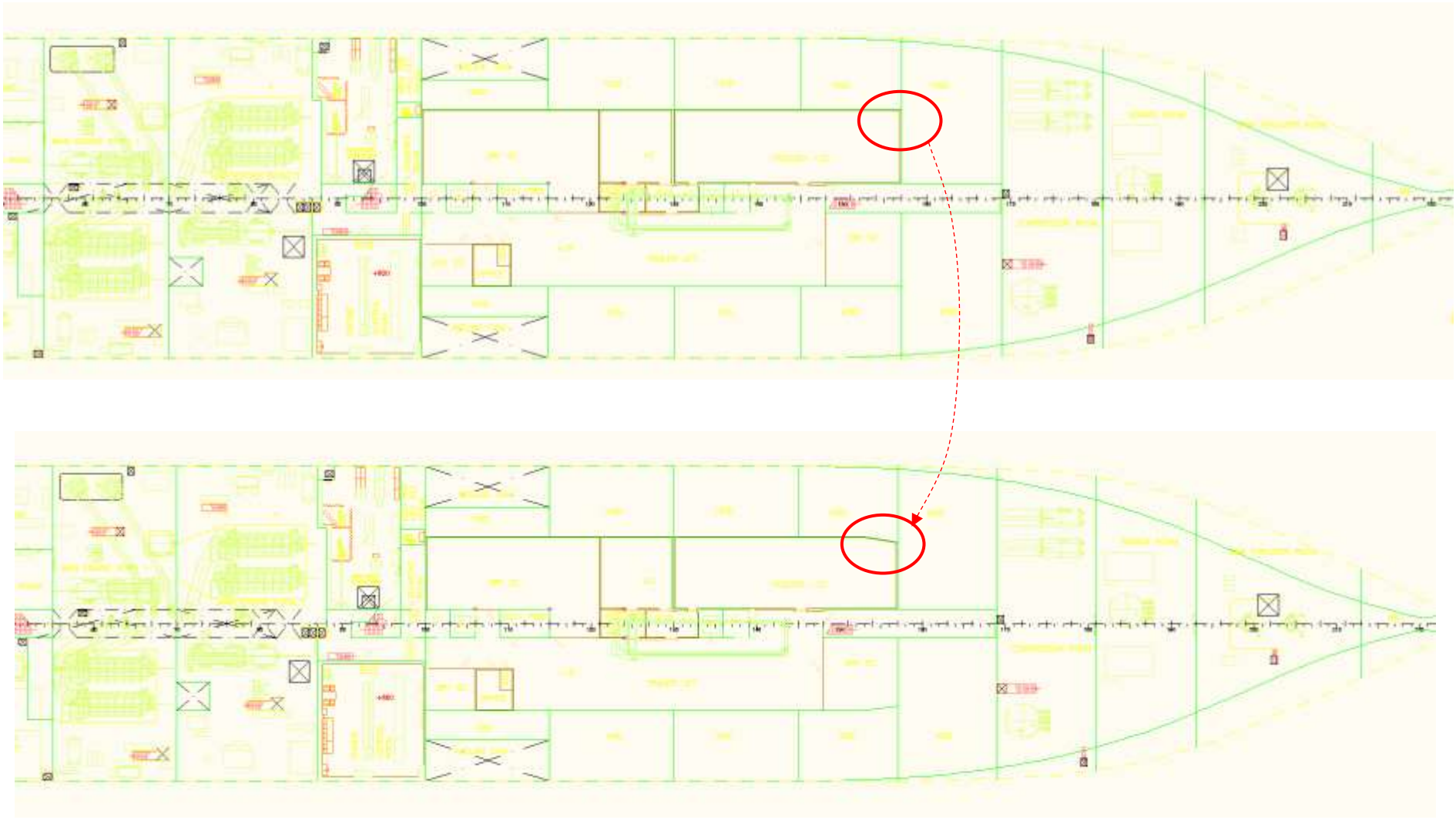
As per SOLAS 90 (Regulation II-1/B/8):

1. longitudinal extent: 3.0m + 3 % L, or 11.0m whichever is the less. Where the required factor of subdivision is .33 or less the assumed longitudinal extent of damage shall be increased as necessary so as to include any two consecutive main transverse watertight bulkheads;

.2 transverse extent (measured inboard from the ship's side, at right angles to the centre line at the level of the deepest subdivision load line): a distance of one-fifth of the breadth of the ship, as defined in regulation 2; and

.3 vertical extent: from the base line upwards without limit

Compliance issues



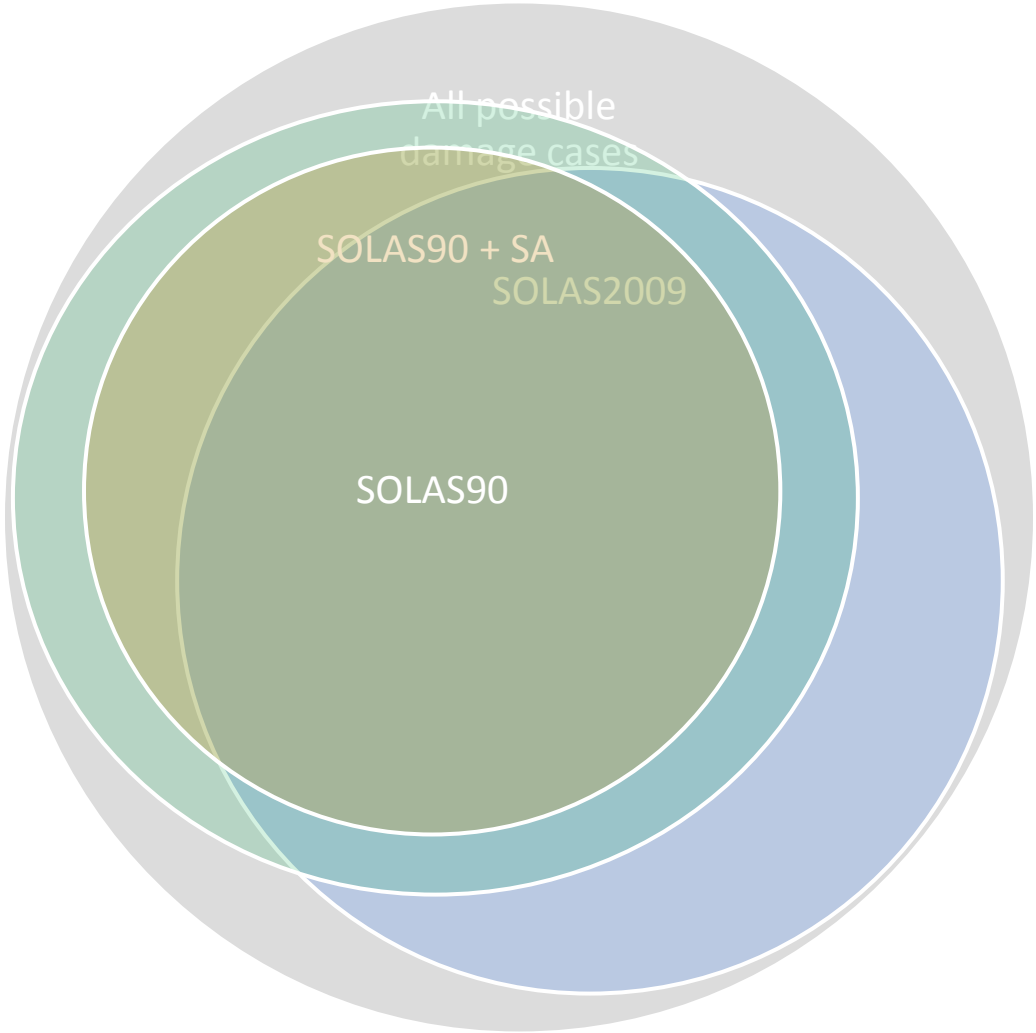
Alternative possible: Model tests

Possible solutions for compliance

Solutions for compliance vary:

- **Side casings of B/5;**
- **Watertight subdivision of ro-ro deck;**
- **Sponsons;**
- **Changes in watertight subdivision;**
- **…**

Subdivision criteria – Equivalent?



Subdivision criteria – Equivalent?

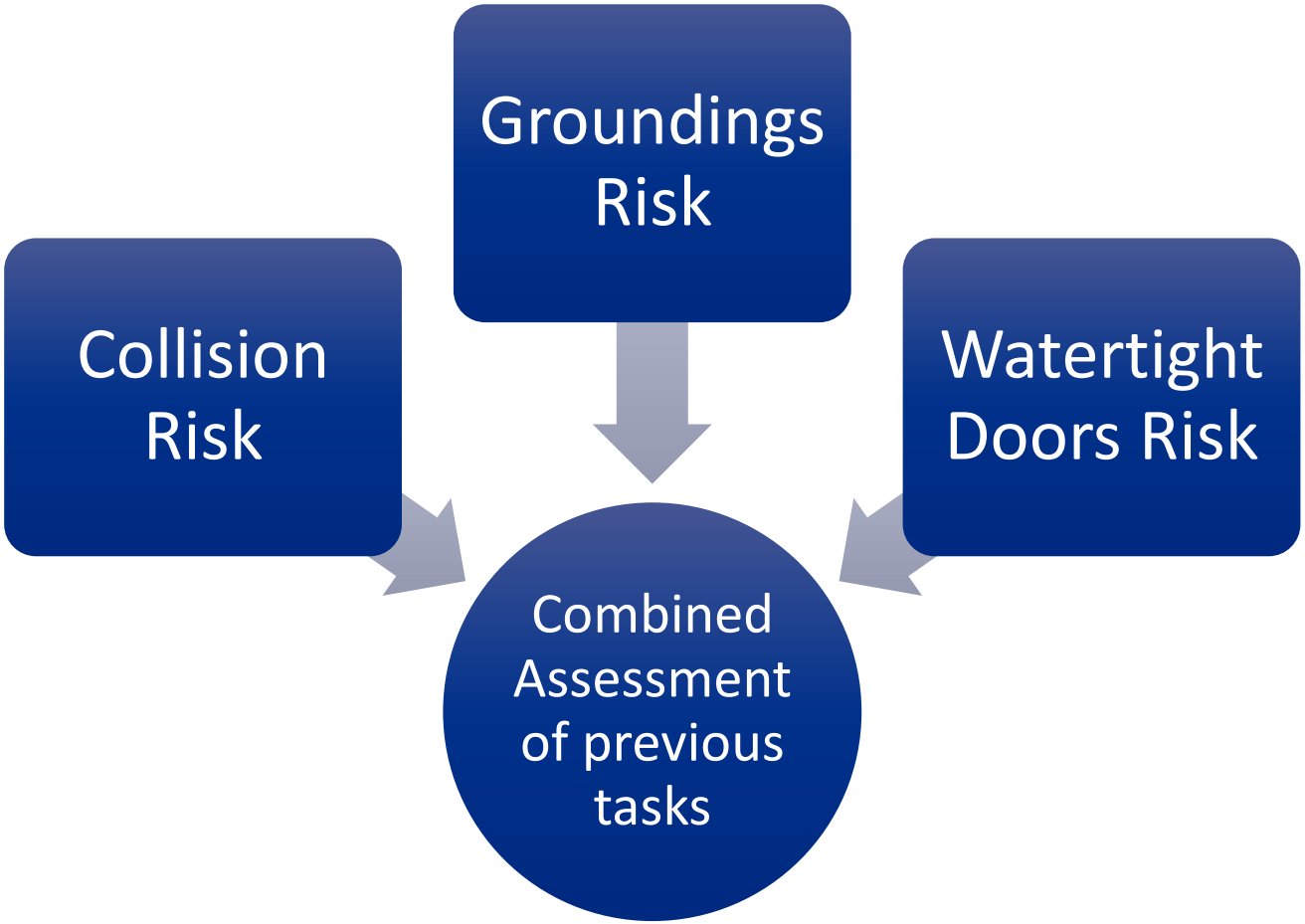
EMSA commissioned 2 studies on this issue:

- **HSVA finalised in 2009 (EMSA1);**
- **UoS finalised in 2011 (EMSA2);**

EMSA2 further questioned the adequacy of the level of the Required Subdivision Index 'R' of SOLAS2009

GOALDS (EU funded) also raised similar concerns and proposed a much higher 'R' – no agreement at IMO on the issue

EMSA3 Structure



Further information on EMSA3:

- Conducted by DNVGL and 14 Sub-contractors;
- Final reports published (http://www.emsa.europa.eu/damage-stability-study.html) and submitted to IMO;
- Has been reviewed by IMO FSA Expert Group in November 2015; and
- Expected to be adopted at MSC 97.

Questions?

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