RULES FOR CLASSIFICATION

Inland navigation vessels

Edition December 2015

Part 5 Ship types

Chapter 5 Passenger vessels
FOREWORD

DNV GL rules for classification contain procedural and technical requirements related to obtaining and retaining a class certificate. The rules represent all requirements adopted by the Society as basis for classification.

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CHANGES – CURRENT

This is a new document.
The rules enter into force 1 July 2016.
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SECTION 1 DESIGN & SAFETY REQUIREMENTS FOR PASSENGER VESSELS

1 Symbols

\[ L = \] rule length [m] defined in Pt.3 Ch.1 Sec.1 [1]
\[ B = \] breadth [m] defined in Pt.3 Ch.1 Sec.1 [1]
\[ D = \] depth [m] defined in Pt.3 Ch.1 Sec.1 [1]
\[ T = \] draught [m] defined in Pt.3 Ch.1 Sec.1 [1]
\[ L_{WL} = \] length of the hull [m] measured at the maximum draught
\[ \Delta = \] displacement of the laden vessel [t]
\[ v = \] maximum speed of the vessel in relation to the water [m/s]
\[ KG = \] height [m] of the centre of gravity above base line
\[ C_B = \] block coefficient
\[ S = \] spacing [m] of primary supporting members
\[ n = \] navigation coefficient defined in Pt.3 Ch.2 Sec.2
\[ = 0.85 \cdot H \]
\[ H = \] significant wave height [m]
\[ \sigma_1 = \] hull girder normal stress [N/mm\(^2\)]
\[ z = \] Z co-ordinate [m] of the calculation point

2 General

2.1 Application

2.1.1 Vessels complying with the requirements of this section are eligible for the assignment of the type and service notation Passenger vessel, as defined in Pt.1 Ch.2 Sec.2 [5.1.1]

2.1.2 Vessels dealt with in this section shall comply with the requirements stated under Pt.1, Pt.2, Pt.3 and Pt.4 of the Rules for Inland Navigation Vessels, as applicable, and with the requirements of this section, which are specific to passenger vessels.

2.1.3 Various requirements of these rules shall be applied for safety of passengers and crew according to Table 1.

Where available, statutory regulations in the operating area of the vessel (e.g. Rhine Rules, European directive) shall take precedence over these requirements.

2.2 Definitions

2.2.1 Day trip vessel
A day trip vessel is a passenger vessel without overnight passenger cabins.

2.2.2 Cabin vessel
A cabin vessel is a passenger vessel with overnight passenger cabins.

Table 1 Requirements applicable for safety of passengers and crew

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### 3 Vessel arrangement

#### 3.1 Subdivision, transverse bulkheads

**3.1.1** In addition to the bulkheads called for in Pt.3 Ch.4 Sec.5, the vessel shall be subdivided by further watertight transverse bulkheads in such a way that the requirements of [6] are met. All these bulkheads shall be extended upwards to the bulkhead deck.

The stepping of bulkheads is permitted only if this is located outside the penetration depths stated in [6.3.3].

**3.1.2** The first compartment aft of the collision bulkhead may be shorter than the length of damage stated in [6.3.3] if the total length of the two foremost compartments measured in the plane of maximum draught is not less than this value.

The distance of the collision bulkhead from the forward perpendicular shall be between $0.04 \cdot L_{WL}$ and $(0.04 \cdot L_{WL} + 2) \text{[m]}$.

**3.1.3** Passenger spaces shall be separated by watertight bulkheads from cargo, machinery and boiler spaces. Bulkhead doors are not permitted in the bulkheads between passenger and machinery spaces. The number of openings in watertight bulkheads shall be as small as is compatible with the construction and proper operation of the vessel.

**3.1.4** Bulkhead doors which are normally in the OPEN position shall be locally operable from both sides of the bulkhead, shall be capable of being closed from an accessible location above the bulkhead deck and shall meet the following conditions:

- the closing time shall not be less than 20 s nor more than 60 s
- at the remote control position, indicator lights shall be mounted showing whether the door is open or closed
- during the closing operation, a local audible alarm shall sound automatically
- the door drive and signalling systems shall also be able to operate independently of the vessel’s mains.

Bulkhead doors without remote control are permitted only outside the passenger area. They shall be kept closed and may only be briefly opened to allow passageway. Bulkhead doors and their systems shall be situated outside the penetration depth stated in [6.3.3].

Open piping systems and ventilation ducts shall be routed in such a way that no further flooding can take place in any considered damaged condition.

Pipelines lying outside the penetration depth stated in [6.3.3] and more than 0.5 m above the base line shall be regarded as undamaged.

Bulkhead openings below the margin line shall be made watertight.

**Guidance note:**

Margin line is an imaginary line drawn on the side plating not less than 10 cm below the bulkhead deck and not less than 10 cm below the lowest non-watertight point of the vessel’s side. If there is no bulkhead deck, a line drawn not less than 10 cm below the lowest line up to which the outer plating is watertight shall be used.

---end---of---guidance---note---
3.2 Passenger rooms and areas

3.2.1 Means of escape
Spaces or group of spaces which are provided for 30 or more passengers or are equipped as such or which have beds for 12 or more passengers shall be provided with at least two widely separated and ready means of escape. On board of day trip vessels one of the means of escape may be replaced by two emergency exits. For spaces below the freeboard deck one of the required means of escape may be a watertight door to the adjacent watertight compartment from which the uppermost deck can be reached. The second means of escape shall lead directly to a safe area above the bulkhead deck or open deck. This does not apply to single cabins.

Means of escape shall be arranged in a practical way and shall have a clear width of at least 0.8 m and a clear height of at least 2 m. The width of doors to cabins may be reduced to 0.7 m.

Spaces and group of spaces provided for more than 80 passengers shall have escape ways with a clear width of at least 0.01 m per passenger. This does also apply to doors within the means of escape.

Doors shall always open in the direction of means of escape and shall be clearly marked as such.

3.2.2 Doors of passenger rooms
Doors of passenger rooms shall comply with the following requirements:

a) With the exception of doors leading to connecting corridors, they shall be capable of opening outwards or be constructed as sliding doors.
b) Cabin doors shall be made in such a way that they can also be unlocked from the outside at any time.

3.2.3 Stairs
Stairs and their landings in the passenger areas shall comply with the following requirements:

a) They shall be constructed in accordance with recognized standards.
b) They shall have a clear width of at least 0.80 m or, if they lead to connecting corridors or areas used by more than 80 passengers, at least 0.01 m per passenger.
c) They shall have a clear width of at least 1.00 m if they provide the only means of access to a room intended for passengers.
d) They shall not lie in the damage area, unless there is at least one staircase on each side of the vessel in the same zone.

3.2.4 Escape routes
Escape routes shall comply with the following requirements:

a) Stairways, exits and emergency exits shall be so disposed that, in the event of a fire in any given area, the other areas may be evacuated safely.
b) The escape routes shall lead by the shortest route to evacuation areas.
c) Escape routes shall not lead through engine rooms or galleys.
d) There shall be no rungs, ladders or the like installed at any point along the escape routes.
e) Doors to escape routes shall be constructed in such a way as not to reduce the minimum width of the escape route.
f) Escape routes and emergency exits shall be clearly signed. The signs shall be lit by the emergency lighting system.

3.3 Propulsion system

3.3.1 In addition to the main propulsion system, vessels shall be equipped with a second independent propulsion system so as to ensure that, in the event of a breakdown affecting the main propulsion system, the vessel can continue to make steerageway under its own power.
3.3.2 The second independent propulsion system shall be placed in a separate engine room. If both engine rooms have common partitions, these shall be built according to Pt.6 Ch.6 Sec.1 [2].

4 Fire protection, detection and extinguishing

4.1 Documents for review/approval
The following drawings and documents shall be submitted where applicable, at least in triplicate for review/approval:
— fire division/insulation plan showing designation of each space, including information on applied materials and constructions
— ventilation plan
— escape way plan
— sprinkler system.

4.2 Fire protection in accommodation areas

4.2.1 General
All insulation materials, bulkheads, linings, ceilings and draught stops shall be of at least approved non-combustible material.
Primary deck coverings and surface materials shall be of an approved type.

4.2.2 Integrity of bulkheads and decks
Bulkheads between cabins shall be of approved type B-0 and to corridors of approved type B-15.
Where a sprinkler system is fitted, the corridor bulkheads may be reduced to approved type B-0.
Corridor bulkheads shall extend from deck to deck unless a continuous B-class ceiling is fitted on both sides of the bulkhead in which case the corridor bulkhead may terminate at the continuous ceiling.
All stairways shall be of steel frame or other non-combustible construction.
Stairways connecting more than two decks shall be enclosed by at least class B bulkheads.
Stairways connecting only two decks need to be protected at least at one deck level by class B bulkheads.
Doors shall have the same fire resistance as the bulkheads in which they are fitted.
Where class A and B divisions are penetrated for the passage of cables, pipes, trunks, ducts, etc. or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall be made to ensure that the fire resistance is not impaired.

4.2.3 Internal subdivision
The vessel shall be subdivided into sections of not more than 40 m length by class A divisions. The doors shall be of self-closing type or shall be capable of remote release from the bridge and individually from both sides of the door. Status of each fire door (open/closed position) shall be indicated on the bridge.
Galleys and control stations shall be separated from adjacent spaces by class A divisions. Machinery spaces shall be separated from accommodation areas by class A divisions. Doors fitted therein shall have the same fire resistance and shall be self-closing and reasonable gastight.
Air spaces enclosed behind ceilings, panelling or linings shall be divided by close-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc., shall be closed at each deck level.

4.2.4 Means of escape
One of the means of escape required by [3.2.1] shall give direct access to a stairway from where the embarkation deck or the open deck can be reached.
Stairways shall have a clear width of at least 0.80 m. Clear width means between bulkheads and/or handrails.

Emergency exits shall have a clear dimension of not less than \((0.70 \times 0.70)\) m\(^2\) or diameter of at least 0.7 m. They shall open in the direction of escape and be marked on both sides.

### 4.2.5 Ventilation system

All parts of the system shall be made of non-combustible material, except that short ducts applied at the end of the ventilation device may be made of a material which has low-flame spread characteristics (see Note). Ventilation ducts shall be subdivided by approved fire dampers analogously to the requirements of [4.2.3] (first paragraph). Penetrations through stairway boundaries are also to be provided with approved fire dampers.

Fire dampers shall be so designed that they can be operated locally from both sides of the division.

**Guidance note:**
Reference is made to the Fire Test Procedure Code, Annex 1, Part 5, adopted by IMO by Resolution MSC. 61(67).

---e-n-d---of---g-u-i-d-a-n-c-e---n-o-t-e---

### 4.3 General water fire extinguishing system

#### 4.3.1 Passenger vessels over 40 m \(L_{WL}\) and passenger vessels with cabins for passengers over 25 m \(L_{WL}\) are subject to the additional requirements of [4.3.2] to [4.3.5].

#### 4.3.2 It shall be possible to project at least two jets of water simultaneously on any part of the vessel from two different hydrants using for each a single length of hose not more than 20 m long. The length of throw shall be at least 12 m with a nozzle diameter of 12 mm.

#### 4.3.3 The minimum capacity of the fire pump shall be 20 m\(^3\)/h.

#### 4.3.4 If the fire pump is located in the engine room, a second power-driven fire pump shall be provided outside the engine room. The pump drive shall be independent of the engine room, and the pump capacity shall conform to the preceding requirements [4.3.2] and [4.3.3].

Connections in the piping system with the engine room shall be capable of being shut off from outside at the point of entry into the engine room.

A portable pump may be accepted, provided that a permanently installed pump is available in the engine room.

#### 4.3.5 Two fire hoses with dual-purpose nozzles shall be located in hose boxes in both fore ship and aft ship. Further fire hoses may be required depending on the size and structural features of the vessel.

### 4.4 Portable fire extinguisher

#### 4.4.1 One additional fire extinguisher shall be provided for:
— each unit of 120 m\(^2\), or part thereof, of the gross floor area of public rooms, dining rooms and day rooms
— each group of 10 cabins, or part thereof.

#### 4.4.2 Galleys and shops shall depending on their size and contents be provided with additional fire extinguishers.

#### 4.4.3 These additional fire extinguishers shall be located in such a way that a fire extinguisher is at all times accessible in the immediate vicinity of any position.
4.5 Fixed fire extinguishing systems

Machinery spaces containing internal combustion engines used for propulsion and oil fired boilers shall be provided with a fixed fire extinguishing system in compliance with Pt.4 Ch.7 Sec.1 [3].

Where installed, automatic pressure water spraying systems for the passenger area shall be ready for operation at all times when passengers are on board. No additional measures on the part of the crew shall be needed to actuate the system.

5 Electrical installations

5.1 General

5.1.1 Application

Cabin vessels and day trip vessels (LWL ≥ 25 m) are required to comply with the following requirements in addition to the requirements stated under Pt.4 Ch.4.

Relaxations of these rules may be allowed for ferries and day passenger vessels.

5.2 Generator plant

At least two separate independent main generator plants shall be provided for the supply to the electrical equipment. The prime mover system and the generator output shall be such that, if any generator set fails or is taken out of service, the remaining capacity is sufficient to meet the requirements of running service and manoeuvring.

5.3 Emergency power supply and emergency lighting

5.3.1 General

An emergency source of electrical power independent of the main power supply shall be provided which is capable of feeding the electrical systems and consumers essential to the safety of passengers and crew. The feeding time depends on the purpose of the vessel and should be agreed with the national Authority, but shall not be less than half an hour. The power supply to the following systems is in special relevant to the safety of passengers and crew:

— navigation and signalling lights
— sound devices such as tyfon
— emergency lighting
— radio installations
— alarm systems for vessel’s safety
— public address system (general alarm)
— telecommunication systems essential to safety and the operation of the vessel
— emergency searchlights
— fire detection system
— sprinkler systems and other safety installations.

5.3.2 Emergency source of electrical power

a) A generator set with both fuel supply and cooling system independent of the main engine, which starts automatically in the event of a network failure and can automatically take over the power supply within 30 s.
b) A storage battery which automatically assumes the power supply in the event of a network failure and is capable of supplying the aforementioned consumers for the specified period without recharging and without an inadmissible voltage drop.

5.3.3 Installation
Emergency generator sets, emergency storage batteries and the relevant switchgear shall be installed outside the machinery space, the machinery casings and the main generator room. They shall be separated from these spaces by fire retardant and watertight bulkheads so that the emergency power supply will not be impaired in the event of a fire or other accident in the machinery space.

The emergency power supply shall remain fully serviceable with a permanent list of 22.5° and/or a trim of 10°.

Facilities shall be provided for the periodical operational testing of all items of equipment serving the emergency power supply system including especially the automatic switchgear and starting equipment. Such tests shall be possible without interference with other aspects of the vessel’s operation.

5.4 Alarm and communication systems
The requirements of Pt.4 Ch.5 Sec.1 shall be observed.

5.4.1 Fire detection and alarm system
All day rooms normally accessible to passengers and crew as well as galleys and machinery spaces shall be monitored by a type tested, automatic fire detection and alarm system.

a) Detectors shall be grouped into separate sections, each of which shall not comprise more than one main fire zone or one watertight division and not more than two vertically adjacent decks.

If the fire detection system is designed for remote and individual identification of detectors, several decks in one main fire zone respectively one watertight division may be monitored by the same detector loop. The detector loop shall be so arranged, that in the event of a damage (wire break, short circuit, etc.) only a part of the loop becomes faulty.

Smoke detectors shall be used in passageways, stairways and escape routes. Heat detectors shall be used in cabins in the accommodation area.

Flame detectors shall only be used in addition to the other detectors.

b) The blowout of a fire and the area concerned shall be signalled automatically to a permanently manned station.

c) The requirements of items a) and b) are deemed to be met in the case of spaces protected by an automatic pressure water-spraying system designed in accordance with Pt.4 Ch.7

d) Manually operated call points shall be provided in addition to the automatic system:

— in passageways, enclosed stairways and at lifts
— in saloons, day rooms and dining rooms
— in machinery spaces, galleys and spaces with a similar fire hazard

The manually operated call points shall be spaced not more than 10 m apart, however at least one call point shall be available in every watertight compartment.

e) The alarm set off by a manual call point shall be transmitted only to the rooms of the vessel’s officers and crew and shall be capable of being cancelled by the vessel's officers. Manual call points shall be safeguarded against unintended operation.

5.4.2 Passenger alarm system
Passenger vessels with cabins shall be equipped with a passenger alarm system. This shall be capable of being actuated from the wheelhouse and a permanently manned station. The alarm shall be clearly perceptible in all rooms accessible to passengers. The alarm actuator shall be safeguarded against unintended operation.
5.4.3 Crew alarm system
Passenger vessels with cabins shall be equipped with a crew alarm system in each cabin, in alleyways, lifts and stairwells, such that the distance to the next actuator is not more than 10 m, but at least one actuator every watertight compartment; in crew mess rooms, engine rooms, kitchens and similar fire hazard rooms.

5.4.4 Engineer’s alarm
An engineer’s alarm shall be provided enabling the machinery personnel to be summoned in their quarters from the engine room should this be rendered necessary by the arrangement of the machinery space in relation to the engineers’ accommodation.

5.5 Intercommunications

5.5.1 Intercommunications from the bridge
Where no direct means of communication exist between the bridge and the:
— crew’s day rooms
— service spaces
— engine room (control platform)
— foreship and aftship,
a suitable intercommunications system shall be provided.

The general telephone system can be approved for this purpose provided it is guaranteed that the bridge/engine link always has priority and that existing calls on this line between other parties can be interrupted.

Where a telephone system is used, the engineer’s alarm may be dispensed with provided that two-way communication is possible between the machinery space and the engineers’ accommodation.

5.5.2 Public address systems
Vessels with a length $L_{WL}$ of 40 m and over and vessels intended for more than 75 passengers shall be equipped with loudspeakers capable of reaching all the passengers.

5.6 Fire door and watertight door closure indicators
The door release panel on the bridge or in the permanently manned safety station shall be equipped with indicators signalling the closure and the opening of fire doors or watertight doors.

5.7 Lighting systems

5.7.1 Construction and extent of the main lighting system
There shall be a main lighting system supplied by the main source of electrical power and illuminating all parts of the ship normally accessible to the passengers and crew. This system shall be installed in accordance with Pt.4 Ch.4 Sec.10.

5.7.2 Construction and extent of the emergency lighting system
a) Construction
An emergency lighting system shall be installed, the extent of which shall conform to b).
The power supply and the duration of the supply shall conform to [5.3].
As far as practicable the emergency lighting system shall be installed in a manner, that it will not be rendered unserviceable by a fire or other incident in rooms in which the main source of electrical power, any associated transformers, the main switchboard and the main lighting distribution panel are installed.
The emergency lighting system shall be cut in automatically following a failure of the main power supply. Local switches shall be provided only where it may be necessary to switch off the emergency lighting (e.g. in the wheelhouse).
Emergency lights shall be marked as such for ease of identification.

b) Extent
Adequate emergency lighting shall be provided in the following areas:
— positions at which collective life-saving appliances are stored and at which they are normally prepared for use
— escapes, exits, connecting passageways, lifts and stairways in the accommodation area
— marking indicating escapes and exits
— machinery spaces and their exits
— wheelhouse
— space of the emergency power source
— locations of fire extinguishers and fire pumps
— rooms in which passengers and crew assemble in an emergency

c) If a vessel is divided into main fire zones, at least two circuits shall be provided for the lighting of each main fire zone, and each of these shall have its own power supply line. One circuit shall be supplied from the emergency power source. The supply lines shall be so located that, in the event of a fire in one main fire zone, the lighting in the other zones is as far as practicable maintained.

5.7.3 Final subcircuits
In the important spaces mentioned below the lighting shall be supplied by at least two different circuits:
— passageways
— stairways leading to the boat deck, and public spaces and day rooms for passengers and crew
— large galleys
The lamps shall be so arranged that adequate lighting is maintained even if one of the circuits fails.

6 Buoyancy and stability

6.1 General
General requirements of Pt.6 Ch.5 Sec.1 [2.2] to Pt.6 Ch.5 Sec.1 [2.5] shall be complied with. All stability calculations have to be based on ship-specific light ship data, to be determined by conducting an inclining experiment.

6.2 Intact stability

6.2.1 General
Proof of appropriate intact stability of the vessel shall be furnished. All calculations shall be carried out free to trim and sinkage.

6.2.2 Standard load conditions
The intact stability shall be proven for the following standard load conditions:

a) at the start of the voyage:
   100 % passengers, 98 % fuel and fresh water, 10 % waste water
b) during the voyage:
   100 % passengers, 50 % fuel and fresh water, 50 % waste water
c) at the end of the voyage:
   100 % passengers, 10 % fuel and fresh water, 98 % waste water
d) unladen vessel:
   no passengers, 10 % fuel and fresh water, no waste water
For all standard load conditions, the ballast tanks shall be considered as either empty or full in accordance with normal operational conditions.

As a precondition for changing the ballast whilst under way, the requirement of [6.2.3], item d), shall be proved for the following load condition:

— 100 % passengers, 50 % fuel and fresh water, 50 % waste water, all other liquid (including ballast) tanks are considered filled to 50 %

6.2.3 Intact stability criteria
The proof of adequate intact stability by means of a calculation shall be produced using the following intact stability criteria, for the standard load conditions mentioned in [6.2.2], items a) to c):

a) The maximum righting lever arm $h_{max}$ shall occur at a list angle of $\varphi_{max} \geq (\varphi_{mom} + 3^\circ)$ and shall not be less than 0.20 m. However, in case $\varphi_f < \varphi_{max}$ the righting lever arm at the downflooding angle $\varphi_f$ shall not be less than 0.20 m.

b) The downflooding angle $\varphi_f$ shall not be less than $\varphi_{mom} + 3^\circ$.

c) The area $A$ under the curve of the righting lever arm shall, depending on the position of $\varphi_f$ and $\varphi_{max}$, reach at least the values given in Table 3, where:

\[ \begin{align*}
\varphi &= \text{list angle} \\
\varphi_f &= \text{list angle, at which openings in the hull, in the superstructure or deck houses which cannot be closed so as to be weathertight, submerge} \\
\varphi_{max} &= \text{list angle at which the maximum righting lever arm occurs} \\
\varphi_{mom} &= \text{maximum list angle defined under item e)} \\
A &= \text{area beneath the curve of the righting lever arms}
\end{align*} \]

d) The metacentric height at the start, $G_{M0}$, corrected by the effect of the free surfaces in liquid tanks, shall not be less than 0.15 m.

e) In each of the following two cases the list angle $\varphi_{mom}$ shall not be in excess of the value of 12°:

— in application of the heeling moment due to passengers and wind according to [6.2.4] and [6.2.5]

— in application of the heeling moment due to passengers and turning according to [6.2.4] and [6.2.6]

f) For a heeling moment resulting from moments due to passengers, wind and turning according to [6.2.4], [6.2.5] and [6.2.6], the residual freeboard shall be not less than 200 mm.

g) For vessels with windows or other openings in the hull located below the bulkhead decks and not closed watertight, the residual safety clearance shall be at least 100 mm on the application of the heeling moments resulting from item e).

6.2.4 Moment due to crowding of passengers
The heeling moment $M_P$ [kNm] due to one-sided accumulation of persons shall be calculated according to the following formula:

\[ M_P = g \cdot P \cdot y = g \cdot \Sigma P_i \cdot y_i \]

\[ \begin{align*}
P &= \text{total weight of persons on board [t] calculated by adding up the maximum permitted number of passengers and the maximum number of shipboard personnel and crew under normal operating conditions, assuming an average weight per person of 0.075 t} \\
y &= \text{lateral distance [m] of center of gravity of total weight of persons P from center line} \\
g &= \text{acceleration of gravity (g = 9.81 m/s}^2) \\
P_i &= \text{weight of persons accumulated on area } A_i \text{ [t]} \\
&= 0.075 \cdot n_i \cdot A_i \\
A_i &= \text{area [m}^2] \text{ occupied by persons} \\
n_i &= \text{number of persons per square meter for free deck areas and deck areas with movable furniture: } n_i = 3.75 \]
For deck areas with fixed seating furniture such as benches, \( n_i \) shall be calculated by assuming an area of 0.50 m in width and 0.75 m in seat depth per person.

\[
y_i = \text{lateral distance [m] of geometrical center of area } A_i \text{ from center line}
\]

The calculation shall be carried out for an accumulation of persons both to starboard and to port.

The distribution of persons shall correspond to the most unfavourable one from the point of view of stability. Cabins shall be assumed unoccupied for the calculation of the person moment.

For the calculation of the loading cases, the centre of gravity of a person should be taken as 1 m above the lowest point of the deck at 1/2 \( L_{WL} \), ignoring any deck curvature and assuming a weight of 0.075 t per person.

A detailed calculation of deck areas which are occupied by persons may be dispensed with if the following values are used:
- \( y = B/2 \) [m]
- for day trip vessels: \( P = 1.1 \cdot n_{max} \cdot 0.075 \)
- for cabin vessels: \( P = 1.5 \cdot n_{max} \cdot 0.075 \)

\( n_{max} = \) maximum permitted number of passengers

### 6.2.5 Moment due to lateral wind pressure

The moment \( M_W [\text{kNm}] \) due to lateral wind pressure shall be determined by the following formula:

\[
M_W = P_{WD} \cdot A_W \cdot (\ell_W + T/2)
\]

\( P_{WD} = \) specific wind pressure [kN/m\(^2\)] defined in Table 2

\( \ell_W = \) distance [m] of the centre of gravity of area \( A_W \) from the plane of draught according to the considered loading condition [m]

### Table 2 Specific wind pressure \( P_{WD} \)

<table>
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<tr>
<th>Range of navigation</th>
<th>( P_{WD} [\text{kN/m}^2] )</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN(1.2) to IN(2)</td>
<td>0.4 ( \cdot n )</td>
</tr>
<tr>
<td>IN(0), IN(0.6)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

### 6.2.6 Turning circle moment

The moment \( M_{dr} [\text{kNm}] \) due to centrifugal force caused by the turning circle, shall be determined by the following formula:

\[
M_{dr} = \frac{0.045 \cdot C_B \cdot v^2 \cdot \Delta}{L_{WL}} \cdot \left( KG - \frac{T}{2} \right)
\]

If not known, the block coefficient \( C_B \) shall be taken as 1.0.

\( v = \) maximum speed of the vessel [m/s]

\( KG = \) distance of vertical centre of gravity and moulded keel [m]
For passenger vessels with special propulsion systems (rudder propeller, water jet, cycloidal propeller and bow thruster), \( M_{dr} \) shall be derived from full-scale or model tests or else from corresponding calculations.

6.3 Damage stability

6.3.1 Proof of appropriate damage stability of the vessel shall be furnished by means of a calculation based on the method of lost buoyancy. All calculations shall be carried out free to trim and sinkage.

Table 3 Values of area \( A \) under the curve of righting lever arm

<table>
<thead>
<tr>
<th>Case</th>
<th>( \varphi_{\text{max}} \leq 15^\circ ) or ( \varphi_f \leq 15^\circ )</th>
<th>( \varphi_{\text{max}} ) ≤ ( \varphi_f )</th>
<th>( \varphi_{\text{max}} &gt; \varphi_f )</th>
<th>( \varphi_{\text{max}} \geq 30^\circ ) and ( \varphi_f \geq 30^\circ )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( 0.05 ) to angle ( \varphi = \varphi_{\text{max}} ) or ( \varphi = \varphi_f ) whichever is smaller</td>
<td>( 0.035 + 0.001 \cdot (30 - \varphi_{\text{max}}) ) to angle ( \varphi_{\text{max}} )</td>
<td>( 0.035 + 0.001 \cdot (30 - \varphi_f) ) to angle ( \varphi_f )</td>
<td>( 0.035 ) to angle ( \varphi = 30^\circ )</td>
</tr>
<tr>
<td>2</td>
<td>( 15^\circ &lt; \varphi_{\text{max}} &lt; 30^\circ )</td>
<td>( \varphi_{\text{max}} ) ≤ ( \varphi_f )</td>
<td>( \varphi_{\text{max}} &gt; \varphi_f )</td>
<td>( \varphi_{\text{max}} \geq 30^\circ ) and ( \varphi_f \geq 30^\circ )</td>
</tr>
<tr>
<td>3</td>
<td>( 15^\circ &lt; \varphi_f &lt; 30^\circ )</td>
<td>( \varphi_{\text{max}} &gt; \varphi_f )</td>
<td>( \varphi_{\text{max}} \geq 30^\circ ) and ( \varphi_f \geq 30^\circ )</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Extent of damage [m]

<table>
<thead>
<tr>
<th>Dimension of the damage</th>
<th>1-compartment status</th>
<th>2-compartment status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side damage</td>
<td>longitudinal ( \ell )</td>
<td>( 0.1 \cdot L_{WL} \geq 4 )</td>
</tr>
<tr>
<td></td>
<td>transverse ( b )</td>
<td>( B/5 )</td>
</tr>
<tr>
<td></td>
<td>vertical ( h )</td>
<td>from vessel bottom to top without delimitation</td>
</tr>
<tr>
<td>Bottom damage</td>
<td>longitudinal ( \ell )</td>
<td>( 0.1 \cdot L_{WL} \geq 4 )</td>
</tr>
<tr>
<td></td>
<td>transverse ( b )</td>
<td>( B/5 )</td>
</tr>
<tr>
<td></td>
<td>vertical ( h )</td>
<td>0.59; pipework shall be deemed intact (^1)</td>
</tr>
</tbody>
</table>

1) Where a pipework system has no open outlet in a compartment, the pipework shall be regarded as intact in the event of this compartment being damaged, if it runs within the safe area and is more than 0.50 m off the bottom of the vessel.

6.3.2 Buoyancy of the vessel in the event of flooding shall be proven for the standard load conditions specified in [6.2.2]. Accordingly, mathematical proof of sufficient stability shall be determined for the three intermediate stages of flooding (25 %, 50 % and 75 % of flood build-up) and for the final stage of flooding.

6.3.3 Assumptions

In the event of flooding, assumptions concerning the extent of damage given in Table 4 shall be taken into account.

a) For 1-compartment status the bulkheads can be assumed to be intact if the distance between two adjacent bulkheads is greater than the damage length. Longitudinal bulkheads at a distance of less than \( B/3 \) measured rectangular to centre line from the shell plating at the maximum draught plane shall not be taken into account for calculation purposes.

b) For 2-compartment status each bulkhead within the extent of damage will be assumed to be damaged. This means that the position of the bulkheads shall be selected in such a way as to ensure that the passenger vessel remains buoyant after flooding of two or more adjacent compartments in the longitudinal direction.
c) The lowest point of every non-watertight opening (e.g. doors, windows, access hatchways) shall lie at least 0.10 m above the damage waterline. The bulkhead deck shall not be immersed in the final stage of flooding.

d) Permeability is assumed to be 95 %. If it is proven by a calculation that the average permeability of any compartment is less than 95 %, the calculated value can be used instead.

The values to be adopted shall not be less than those given in Table 5.

e) If damage of a smaller dimension than specified above produces more detrimental effects with respect to listing or loss of metacentric height, such damage shall be taken into account for calculation purposes.

6.3.4 Damage stability criteria

a) For all intermediate stages of flooding referred to in [6.3.2], the following criteria shall be met:

   — The angle of heel \( \phi \) at the equilibrium position of the intermediate stage in question shall not exceed \( 15^\circ \).

   — Beyond the inclination in the equilibrium position of the intermediate stage in question, the positive part of the righting lever arm curve shall display a righting lever arm value of \( GZ \geq 0.02 \text{ m} \) before the first unprotected opening becomes immersed or an angle of heel \( \phi \) of \( 25^\circ \) is reached.

   — Non-watertight openings shall not be immersed before the inclination in the equilibrium position of the intermediate stage in question has been reached.

b) During the final stage of flooding, the following criteria shall be met (see Figure 1) taking into account the heeling moment due to passengers in accordance with [6.2.4]:

   — The angle of heel \( \phi_E \) shall not exceed \( 10^\circ \).

   — Beyond the equilibrium position the positive part of the righting lever arm curve shall display a righting lever arm value of \( GZ_R \geq 0.02 \text{ m} \) with an area \( A \geq 0.0025 \text{ m} \cdot \text{rad} \). These minimum values for stability shall be met until the immersion of the first unprotected opening or in any case before reaching an angle of heel \( \phi_m \leq 25^\circ \).

   — Non-watertight openings shall not be immersed before the trimmed position has been reached; if such openings are immersed before this point, the rooms affording access are deemed to be flooded for damage stability calculation purposes.

Table 5 Permeability values [%]

<table>
<thead>
<tr>
<th>Spaces</th>
<th>( \mu )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lounges</td>
<td>95</td>
</tr>
<tr>
<td>Engine and boiler rooms</td>
<td>85</td>
</tr>
<tr>
<td>Luggage and store rooms</td>
<td>75</td>
</tr>
<tr>
<td>Double bottoms, fuel bunkers and other tanks, depending on whether, according to their intended purpose, they shall be assumed to be full or empty for the vessel floating at the plane of maximum draught</td>
<td>0 or 95</td>
</tr>
</tbody>
</table>

6.3.5 The shut-off devices which shall be able to be closed watertight shall be marked accordingly.

6.3.6 If cross-flood openings to reduce asymmetrical flooding are provided, they shall meet the following conditions:

a) For the calculation of cross-flooding, IMO Resolution MSC.245 (83) shall be applied.

b) They shall be self-acting.

c) They shall not be equipped with shut-off devices.

d) The total time allowed for compensation shall not exceed 15 minutes.
6.4 Derogations for certain passenger vessels

6.4.1 As an alternative to proving adequate stability after damage according to [6.3], passenger vessels with a length of not more than 25 m and authorized to carry up to a maximum of 50 passengers shall comply with the following criteria:

a) after symmetrical flooding, the immersion of the vessel shall not exceed the margin line; and
b) the metacentric height $G_M$ shall not be less than 0.10 m.

The necessary residual buoyancy shall be assured through the appropriate choice of material used for the construction of the hull or by means of highly cellular foam floats, solidly attached to the hull. In the case of vessels with a length of more than 15 m, residual buoyancy can be ensured by a combination of floats and subdivision complying with the 1-com-partment status according to [6.3].

6.4.2 By way of derogation from [6.3.3], passenger compartment vessels not exceeding 45 m in length and authorized to carry up to a maximum of 250 passengers do not need to have 2-com-partment status.

6.5 Safety clearance and freeboard

6.5.1 Safety clearance

The safety clearance shall be at least equal to the sum of:

a) the additional lateral immersion, which, measured on the outside plating, is produced by the permissible angle of heel according to [6.2.3] e), and
b) the residual safety clearance according to [6.2.3] g).

For vessels without a bulkhead deck, the safety clearance shall be at least 500 mm.
6.5.2 Freeboard
The freeboard shall correspond to at least the sum of:

a) the additional lateral immersion, which, measured on the outside plating, is produced by the angle of heel according to [6.2.3] e), and
b) the residual freeboard according to [6.2.3] f)

The freeboard shall be at least 300 mm.

6.5.3 The plane of maximum draught shall be set so as to ensure compliance with the safety clearance according to [6.4.1], and the freeboard according to [6.4.2].

6.5.4 For safety reasons, the Society may stipulate a greater safety clearance or a greater freeboard.

7 Design loads

7.1 Pressure on sides
The design lateral pressure at any point of the hull sides shall be obtained from the following formulae:

\[
p_E = 9.81 \cdot (T - z + 0.6 \cdot n) \text{ for } z \leq T
\]

\[
p_E = \text{MAX} (5.9 \cdot n; 3) + p_{WD} \text{ for } z > T
\]

\[p_{WD} = \text{specific wind pressure [kN/m}^2\text{]} \text{ defined in Table 2.}\]

7.2 Pressure on sides and bulkheads of superstructures and deckhouses
The lateral pressure to be used for the determination of scantlings of structure of sides and bulkheads of superstructures and deckhouses shall be obtained [kN/m\(^2\)] from the following formula:

\[p = p_{WD} + 2\]

\[p_{WD} = \text{specific wind pressure [kN/m}^2\text{]} \text{ defined in Table 2.}\]

7.3 Pressure on decks
The pressure due to load carried on decks shall be defined by the Designer and, in general, it may not be taken less than the values given in Table 6.

7.4 Loads due to list and wind action

7.4.1 General
The loads inducing the racking in vessel superstructures above deck 1 (see Figure 2) are as follows:

- structural horizontal load \(P_S\)
- non-structural horizontal load \(P_C\)
- wind load \(P_W\)
Table 6 Pressure on decks

<table>
<thead>
<tr>
<th>Item</th>
<th>( p ) [kN/m²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather deck</td>
<td>3.75 ( \cdot ) (n + 0.8)</td>
</tr>
<tr>
<td>Exposed deck of superstructure or deckhouse:</td>
<td></td>
</tr>
<tr>
<td>— first tier (non public)</td>
<td>2.0</td>
</tr>
<tr>
<td>— upper tiers (non public)</td>
<td>1.5</td>
</tr>
<tr>
<td>— public</td>
<td>4.0</td>
</tr>
<tr>
<td>Accommodation compartments:</td>
<td></td>
</tr>
<tr>
<td>— large spaces, such as: restaurants, halls, cinemas, lounges, kitchen, service spaces, games and hobbies rooms, hospitals</td>
<td>4.0</td>
</tr>
<tr>
<td>— cabins</td>
<td>3.0</td>
</tr>
<tr>
<td>— other compartments</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Figure 2 Height and location of tier 1

7.4.2 Definitions

The following parameters are used for the determination of loads inducing racking:

- \( \phi \) = angle of list up to which no non-watertight opening to a non-flooded compartment reaches the water level, to be derived from damaged stability calculation
  - Where this value is not known, \( \phi \) shall be taken equal to 12°
- \( p_{WD} \) = specific wind pressure [kN/m²] defined in Table 2
- \( h_i \) = height [m] of tier \( i \) of superstructure (see Figure 2)
- \( b_i \) = width [m] of tier \( i \) of superstructure
7.4.3 Structural horizontal load

The structural horizontal load \([\text{kN}]\) between successive gantries or transverse bulkheads, acting on deck \(i\) is given by the formula:

\[
P_{Si} = 9.81 \cdot m_{Si} \cdot \sin \phi
\]

\(m_{Si}\) = structural mass \([\text{t}]\) of tier \(i\) of superstructure, between successive gantries or bulkheads.

The following indicated value may be adopted:

\[
= 0.08 \cdot S \cdot h_i \cdot b_i
\]

7.4.4 Non-structural horizontal load

The non-structural horizontal load \([\text{kN}]\) between successive gantries or transverse bulkheads, acting on deck \(i\) is given by the formula:

\[
P_{Ci} = p_i \cdot S \cdot b_i \cdot \sin \phi
\]

\(p_i\) = design pressure on deck \(i\) \([\text{kN/m}^2]\) defined in Table 6.

7.4.5 Wind load

The wind load \([\text{kN}]\) between successive gantries or transverse bulkheads, acting on deck \(i\), is given by the formula:

\[
P_W = p_{WD} \cdot S \cdot (h_i + h_{i+1}) / 2
\]

7.5 Inertial loads

7.5.1 General

For range of navigation higher than \(\text{IN(1.2)}\) the following inertial loads inducing racking in vessel superstructures above deck 1 (see Figure 2) shall be taken into account:

— structural horizontal load, \(P_{SR}\), induced by roll acceleration

— non-structural horizontal load, \(P_{CR}\), induced by roll acceleration.

7.5.2 Definitions

Following parameters are used for the determination of inertial loads inducing racking:

\(h_i\) = height [m] of tier \(i\) of superstructure (see Figure 2)

\(b_i\) = width [m] of tier \(i\) of superstructure

\(z_i\) = height [m] of deck \(i\) above base line (see Figure 2)

\(z_G\) = height [m] of rolling centre above base line

\(z_G\) may be considered as the vertical centre of gravity when no information is available

\(T_R\) = roll period [s]

\(= \frac{0.77 \cdot B}{\sqrt{GM}}\)

\(GM\) = distance [m] from the vessel’s centre of gravity to the transverse metacentre, for the loading considered; when \(GM\) is not known, its value may be determined using the following formula:

\(= 0.07 \cdot B\)

\(\theta_R\) = roll angle [rad]

\(= \Phi\)

\(\varphi\) = angle of list [rad] defined in [7.4.2]

\(a_R\) = roll acceleration [m/s²]
7.5.3 Structural horizontal inertial load
The structural horizontal inertial load [kN] between successive gantries or transverse bulkheads, acting on
deck i, is given by the formula:

\[ P_{SRi} = m_{Si} \cdot a_R \]

\( m_{Si} \) = structural mass [t] defined in [7.4.3].

7.5.4 Non-structural horizontal inertial load
The non-structural horizontal inertial load [kN] between successive gantries or transverse bulkheads, acting
on deck i, is given by the formula:

\[ P_{Cri} = \frac{p_i \cdot S_i \cdot b_i \cdot a_R}{9.81} \]

\( p_i \) = design pressure on deck i [kN/m²] defined in Table 6.

See also Pt.3 Ch.2 Sec.3 [6.6.4]

7.6 Loads induced by collision
In the case of sensitive superstructures, the Society may require the structure to be checked against
collision-induced loads. The values of the longitudinal and transverse accelerations [m/s²] shall be taken not
less than:
— longitudinal acceleration: \( a = 3.0 \text{ m/s}^2 \)
— transverse acceleration: \( a = 1.5 \text{ m/s}^2 \)

7.7 Hull girder loads
The design bending moments in hogging and sagging conditions and the vertical design shear force shall be
determined according to Pt.3 Ch.4.

8 Hull girder strength

8.1 Basic criteria

8.1.1 Superstructure efficiency
The superstructure efficiency indicating the contribution degree of a superstructure to the hull girder
strength, may be defined as the ratio of actual stress at the superstructure neutral axis, \( \sigma_{1'} \), to the hull girder
stress at the same point \( \sigma \), computed as if the hull and the superstructure behaved as a single beam.
The superstructure efficiency $\psi$ may be determined using the formula:

$$\psi = 0.425 \cdot \chi - 0.0454 \cdot \chi^2$$

$\chi$ = dimensionless coefficient defined as:

$$\chi = 100 \cdot j \cdot \lambda \leq 4.5$$

$\lambda$ = superstructure half length [m]

$j$ = parameter [cm] defined as:

$$j = \frac{1}{A_{sh1} + A_{she}} \left( \frac{1}{\Omega} + \frac{1}{2.6} \right)$$

$A_{sh1}, A_{she}$ = independent vertical shear areas [cm$^2$] of hull and superstructure, respectively

$\Omega$ = parameter [cm$^{-4}$], defined as:

$$\Omega = \frac{(A_1 + A_e) \cdot (I_1 + I_e) + A_1 \cdot A_e \cdot (e_1 + e_e)^2}{(A_1 + A_e) \cdot I_1 \cdot I_e + A_1 \cdot A_e \cdot (I_1 \cdot e_e^2 + I_e \cdot e_1^2)}$$

$A_1, A_e$ = independent sectional areas [cm$^2$] of hull and superstructure, respectively, determined in compliance with Pt.3 Ch.3 Sec.11 [2].

$I_1, I_e$ = independent section moments of inertia, [cm$^4$] of hull and superstructure, respectively, determined in compliance with Pt.3 Ch.3 Sec.11 [2], about their respective neutral axes

$e_1, e_e$ = vertical distances [cm] from the main (upper) deck down to the neutral axis of the hull and up to the neutral axis of the superstructure respectively (see Figure 3).

**Figure 3 Parameters determining the superstructure efficiency**

An erection with large side entrances shall be split into sub-erections. The formulae given above are, therefore, to be applied to each individual sub-erection.

In the case of a multi-tier superstructure, the procedure shall be applied progressively to each tier $i$ until $\psi$ is less than 0.95, considering that the hull girder extends up to the superstructure deck $(i - 1)$.

If the superstructure material differs from that of the hull, the geometric area $A_e$ and the moment of inertia $I_e$ shall be reduced according to the ratio $E_e/E_1$ of the respective material Young moduli.

**8.1.2 Strength deck**

The deck of a superstructure extending within the central part of the vessel may be considered as a strength deck if its efficiency, determined according to [8.1.1] is at least $\psi = 0.95$. 
8.1.3 Hull girder section modulus
The hull girder section modulus to be used for the hull scantling shall be determined in compliance with Pt.3 Ch.3 Sec.11, considering the strength deck located just above the load waterline.

9 Scantlings

9.1 General

9.1.1 The hull scantlings shall be as specified in Pt.3 Ch.4.

9.1.2 Double hull
If a double bottom is provided, the height shall be at least 0.60 m and the minimum width of any side void spaces provided shall be at least 0.6 m.

9.2 Additional requirements

9.2.1 Primary supporting members
The design pressure of bottom primary supporting members shall be determined using $\gamma = 1$ for the draught coefficient.

9.2.2 Catamarans
Scantlings of primary structural members contributing to the transverse bending strength and torsional strength shall be supported by direct calculations carried out according to Pt.3 Ch.3 Sec.4.
Special attention shall be paid to the staggering of resistant members in the two hulls.
A method for the determination of scantlings of deck beams connecting the hulls of a catamaran subject to torsional moment is given in Pt.3 Ch.3 Sec.8.
Any other agreed method of calculation may be accepted by the Society.

9.3 Superstructures

9.3.1 The arrangement and scantlings of superstructures shall be in compliance with Pt.3 Ch.5 Sec.4.
Contributing superstructures are also to be in compliance with applicable requirements of Pt.3 Ch.4

9.3.2 Transverse strength
The existing constructive dispositions shall ensure an effective transverse strength of the superstructures and deckhouses notably the end bulkheads, the partial or complete intermediate bulkheads and the greatest possible number of continuous and complete gantries.
Scantlings of primary structural members contributing to the transverse strength of superstructures shall be supported by direct calculation, according to guidance defined in [9.4].

9.4 Racking analysis

9.4.1 General
The racking analysis is performed for checking strength of structure against lateral horizontal loads due to list and wind action defined in [7.4] and, eventually, to inertial loads induced by vessel motion.
The racking analysis shall be performed where no complete transverse bulkheads efficiently restrain the transverse loads.
9.4.2 Analysis methodology
The following methodology shall be followed for checking strength of structure above the lowest deck (so called deck 1 in Figure 2):

a) Calculation of transverse forces
   — determination of structural horizontal load on each deck above deck 1, according to [7.4.3] and, eventually, [7.5.3]
   — determination of non-structural horizontal load on each deck above deck 1, according to [7.4.4] and, eventually, [7.5.4]
   — determination of wind load on each deck above deck 1 according to [7.4.5]

b) Distribution of transverse forces
   — distribution of these loads on vertical structural members efficiently acting against racking

c) Analysis of transverse structures

9.4.3 Checking criteria
It shall be checked that the normal stress $\sigma$, the shear stress $\tau$ and the equivalent stress $\sigma_{VM}$ are in compliance with the following formulae:

$$\frac{0.98 \cdot R_{EH}}{\gamma_R} \geq \sigma$$

$$\frac{0.49 \cdot R_{EH}}{\gamma_R} \geq \tau$$

$$\frac{0.98 \cdot R_{EH}}{\gamma_R} \geq \sigma_{VM}$$

$R_{EH}$ = minimum yield stress [N/mm$^2$] of the material
$\gamma_R$ = partial safety factor covering uncertainties regarding resistance, to be taken equal to 1.20

9.5 Scantling of window stiles

9.5.1 General
The geometric characteristics of the hull girder to be used for the scantling of window stiles shall be determined in compliance with Pt.3 Ch.3 Sec.11, assuming that the hull girder extends up to the uppermost contributing superstructure deck.

9.5.2 Forces in the window stile
a) Local shear force [kN]
   — In general:

$$F = \frac{100 \cdot \psi \cdot T_5 \cdot \mu}{2 \cdot l} \cdot \ell$$

   — In way of highest contributing superstructure deck:
b) Maximum local bending moment [kN·m]

\[
F = \frac{100 \cdot \psi \cdot T_S \cdot A}{2 \cdot w_1} \cdot \ell
\]

\[
M_b = \frac{F \cdot h}{2}
\]

\[T_S\] = shear force [kN] to be determined according to Pt. 3 Ch. 3 Sec. 10 [3.1.1]
\[I\] = net hull girder moment of inertia [cm⁴] with respect to the hull girder neutral axis
\[\mu\] = net static moment [cm²] with respect to the hull girder neutral axis, of the part including lateral strip of plate and all contributing tiers of superstructure located above the window considered
\[w_I\] = net hull girder section modulus in way of the superstructure deck considered [cm³] with respect to the hull girder neutral axis
\[A\] = net sectional area of the superstructure deck considered [cm²] including lateral strip of plating above windows
\[h\] = window height [m]
\[\ell\] = distance [m] between centres of two successive windows

9.5.3 Checking criteria
It shall be checked that the stresses in the window stile are in compliance with [9.4.3].
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