RULES FOR CLASSIFICATION

Ships

Edition January 2017

Part 5 Ship types

Chapter 4 Passenger ships
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 document supersedes the January 2016 edition. Changes in this document are highlighted in red colour. However, if the changes involve a whole chapter, section or sub-section, normally only the title will be in red colour.

Main changes January 2017, entering into force July 2017

• Sec.1 General
  — Sec.1 [5.1.4]: Test requirements for glass side walls consisting of more than one element and glass side walls not supported on all four edges have been specified.

• Sec.2 Hull
  — Sec.2 [6.1]: Acceptance of glass side walls not supported on all four sides has been implemented.

Editorial corrections

In addition to the above stated changes, editorial corrections may have been made.
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SECTION 1 GENERAL

1 Introduction

1.1 Introduction
These rules apply to vessels intended for transportation of more than 12 passengers, with class notations Passenger ship or Ferry.

1.2 Scope
The rules in this chapter give requirements specific to passenger vessels.

1.3 Application
1.3.1 The requirements in this chapter are supplementary to the rules in Pt.2, Pt.3 and Pt.4 applicable for the assignment of the main class.
General reference is made to the Society's document DNVGL-CG-0138 Direct strength analysis of hull structures in passenger ships, for general ship type information, design concepts and a description of an acceptable rule assessment procedure.

1.3.2 For passenger vessels with class notation Ferry, Ch.3 shall be applied for the RO/RO spaces.

2 Class notations

2.1 Ship type notations

2.1.1 Vessels built in compliance with the requirements as specified in Table 1 will be assigned the class notations as follows:

Table 1 Ship type notations

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Qualifier</th>
<th>Design requirements, rule references</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger ship</td>
<td>Ship arranged for transport of more than 12 persons</td>
<td>&lt;none&gt;</td>
<td>Sec.1 to Sec.4</td>
</tr>
<tr>
<td>Ferry</td>
<td>Ship arranged for transport of more than 12 persons and arranged for carriage of vehicles on enclosed decks</td>
<td>A</td>
<td>Sec.1 to Sec.4, Ch.3 for RO/RO spaces</td>
</tr>
<tr>
<td></td>
<td>Ship arranged for transport of more than 12 persons and arranged for carriage of vehicles on weather deck only</td>
<td>B</td>
<td>Sec.1 to Sec.4, Ch.3 for RO/RO spaces</td>
</tr>
</tbody>
</table>
2.2 Additional notations

2.2.1 The following additional notations, as specified in Table 2, are typically applied to passenger ships with ship type notations according to Table 1:

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMF (C-crn)</td>
<td>Comfort class covering requirements for improved indoor climate. crn denotes comfort rating number.</td>
<td>Passenger ships</td>
</tr>
<tr>
<td>COMF (V-crn)</td>
<td>Comfort class covering requirements for noise and vibration. crn denotes comfort rating number.</td>
<td>Passenger ships</td>
</tr>
<tr>
<td>VIBR</td>
<td>Ship meets specified vibrations level criteria measured at pre-defined positions for machinery, components, equipment and structure</td>
<td>Passenger ships</td>
</tr>
</tbody>
</table>

3 Documentation

3.1 Documentation requirements

3.1.1 General
General requirements for documentation, including definition of the Info codes, see Pt.1 Ch.3 Sec.2 and Pt.1 Ch.3 Sec.3.

<table>
<thead>
<tr>
<th>Object</th>
<th>Documentation type</th>
<th>Additional description</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ship hull structure</td>
<td>H081 - Global strength analysis</td>
<td>When required by, Sec.2 [1.2]</td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>H085 - Fatigue analysis</td>
<td>When required by, Sec.2 [1.2]</td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>H050 - Structural drawing</td>
<td>Connections between door frames and bulkheads</td>
<td>AP</td>
</tr>
<tr>
<td>Superstructure</td>
<td>H080 - Strength analysis</td>
<td>Glass roofs</td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>Z261 - Test report</td>
<td>Prefabricated balconies, see [5.1.2]</td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>Z261 - Test report</td>
<td>Balcony railing, see [5.1.3]</td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>Z261 - Test report</td>
<td>Glass walls, see [5.1.4]</td>
<td>FI</td>
</tr>
<tr>
<td>Propulsion and steering</td>
<td>Z070 - Failure mode description</td>
<td>Shall be submitted prior to detail design plans. See also IACS UR M69.</td>
<td>AP</td>
</tr>
</tbody>
</table>
4 Product certificates

4.1 Certification requirements

4.1.1 General
Products shall be certified as required by Table 4.

Table 4 Certification requirements

<table>
<thead>
<tr>
<th>Object</th>
<th>Certificate type</th>
<th>Issued by</th>
<th>Certification standard</th>
<th>Additional description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo securing devices, fixed</td>
<td>PC</td>
<td>Society</td>
<td>DNVGL-ST-0068</td>
<td></td>
</tr>
<tr>
<td>Cargo securing devices, portable</td>
<td>PC</td>
<td></td>
<td></td>
<td>If certified by the Society, DNVGL-ST-0068, shall be applied.</td>
</tr>
</tbody>
</table>

For general certification requirements, see Pt.1 Ch.3 Sec.4.
For a definition of the certification types, see Pt.1 Ch.3 Sec.5.

5 Testing

5.1 Survey and testing during newbuilding

5.1.1 General
Survey and testing requirements are given in Pt.2.

5.1.2 Prefabricated balcony module
Prefabricated balcony modules shall be structurally tested with a test load of 0.25 t/m\(^2\). No visual damage or permanent deflections upon removal of the test load shall occur. A test report (TR), as defined in Pt.1 Ch.1 Sec.4 [2.1.1], signed by the manufacturer, shall be submitted to the Society.

5.1.3 Balcony railing
An impact test according to EN 12600, or equivalent, shall be carried out to demonstrate that the glass pane will not fall out under accidental loading.

5.1.4 Glass superstructure side
1) For glass side walls which extend between decks, an impact test shall be carried out as per EN 12600 pendulum test, to demonstrate that the glass pane will not fall out in case of an accidental load. A test report (TR), as defined in Pt.1 Ch.1 Sec.4 [2.1.1], signed by the manufacturer, shall be submitted to the society. If the glass wall consists of several elements, the elements within one meter from the lowest deck need to be tested.
2) For glass elements that are not supported along all four edges, a strength test shall be carried out. The glass pane for testing shall be supported with an similar arrangement as the actual arrangement on board the vessel. The test pressure shall be the actual design pressure \(P_d\). The test pressure shall be achieved gradually within 30 seconds and reduced to zero within 30 seconds. A minimum of 3 load cycles shall be done. After the load cycles, it shall be kept constant for 5 minutes (see Figure 1). The test will be considered successful if no visible damage occurs to the glass or its supporting arrangements. A test report (TR) shall be submitted to the society.
Figure 1 Load cycles for testing of side wall glass pane
SECTION 2 HULL

1 General

1.1 Arrangement

Passenger ships often have multiple decks and long superstructures with many openings. The side and end bulkheads of the superstructure shall be effectively supported. Adequate transition arrangements shall be fitted at the ends of effective continuous longitudinal strength members in the deck and bottom structures.

1.2 Calculation scope

1.2.1 Global strength

For passenger ships, the load carrying potential of the superstructure is typically accounted for in the longitudinal strength assessment. In order to determine the effectiveness of the superstructure and the normal and shear stress response of the hull girder, direct strength calculations using global finite element analysis may be required for ships with \( L > 150 \) m and where longitudinal shear members like ship side and longitudinal bulkheads are not fully effective.

The global direct strength model, when required, shall also be used for the strength assessment of the pillars in order to account for both the loads arising from the global hull girder deflection and the local design deck loads.

1.2.2 Local FE analysis in way of openings and discontinuities

To obtain a stress distribution in structural elements with discontinuities or geometrical irregularities, e.g. recesses for doors and windows, knuckles, etc., and to evaluate local peak stress and fatigue stress range, local models with fine mesh are required. Local structural strength analysis as given in Pt.3 Ch.7 Sec.4 applies to evaluate local peak stresses. The fatigue scope is defined in [4].

The required fine mesh analysis and the selection of critical locations will depend on the arrangement of the ship and the level of the global stresses.

1.2.3 Transverse strength

Required scope for transverse strength analysis will be considered case by case based on number of transverse bulkheads and other transverse strength members. When required, relevant dynamic load cases are described in [2.3.2].

1.2.4 Bow impact

The bow of ships with large flare angles and operating under medium to high service speeds plates, stiffeners and primary support members shall satisfy Pt.3 Ch.10 Sec.1. Additionally, for unconventional ship designs with extreme flare angle and where decks in the fore ship have large openings and steps, and with limited continuous longitudinal structure, a direct bow impact analysis may be required, to verify the overall strength of the bow structure.

For bow impact direct analysis, see Pt.3 Ch.10 Sec.1 [3.3.4], for design loads and acceptance criteria.

1.2.5 Docking

For large passenger ships that may have large docking weight, special strength calculation of the bottom structure in way of the docking blocks may be required. See Pt.3 Ch.3 Sec.5 [3.4] regarding requirements for docking.

Acceptance criteria for direct docking analysis based on beam- or FE analysis, to be taken according to:

— beam analysis: Pt.3 Ch.6 Sec.6 [2.2], AC-I
— FE analysis: Pt.3 Ch.7 Sec.3 Table 1, AC-I.
1.2.6 Wheel loading
Decks exposed to trolleys used in the handling of luggage shall satisfy the requirements given in Pt.3 Ch.10 Sec.5. The trolleys shall be regarded as cargo handling vehicles in harbour condition.
If one stiffener is subject to more than one load area, a direct strength analysis shall be used to determine the required section modulus.

2 Hull girder loads for direct strength analysis

2.1 Longitudinal strength analysis
For passenger vessels the hull girder stresses in finite element analysis may normally be determined by consideration of the most severe combinations of static and dynamic vertical hull girder bending moments and shear forces, corresponding to design load scenario 2 in Pt.3 Ch.4 Sec.7 Table 1.
For special design where the torsional response is considered critical, oblique sea conditions will be required.

2.2 Transverse strength analysis
2.2.1 Static loads for transverse strength analysis
Deck loads shall be applied as pressure loads to all decks above the bulkhead deck or life boat embarkation deck such that the sum of the ships steel weight and deck loads equal the displacement at the considered loading condition.

2.2.2 Dynamic loads for transverse strength analysis
The design wave load cases which shall be used to assess the transverse strength of the ship structure are the beam sea load cases, BSR (1P/2P) and/ or BSR (1S/2S).
For ship designs where the lower structure can be considered stiff i.e. the transverse displacement under transverse loading is not significant, only the transverse envelope accelerations can be applied with the structure fixed at bulkhead deck/life boat deck level.

2.3 Load application
Acceptable methods for load application are described in DNVGL-CG-0138 Direct strength analysis of hull structures in passenger ships.
The applied loads on the FE model should be controlled against the still water and wave achieved bending moment and shear force curves to ensure agreement with the rule required bending moment and shear force distributions.

3 Pillars

3.1 Below deck connection under compressive loads
Smooth transmission of forces between pillars above and below deck shall be provided. The stress in the contact area shall not exceed the yield stress of the material under the pillar loads.

3.2 Below deck connection under tension loads
For pillars under tension loads, the average stress based on the contact area shall not exceed the values given in Pt.3 Ch.6 Sec.6 [3.2]. Full penetration welding shall be used for connections of local elements.
4 Finite element analysis

4.1 Hull girder yield criteria
Stresses in plating of all effective hull girder structural members shall not exceed the permissible values as given in Table 1.

Table 1 Permissible stresses for global finite element analysis

<table>
<thead>
<tr>
<th>Permissible axial and principal stress</th>
<th>Permissible shear stress</th>
<th>Permissible von Mises stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>175/k</td>
<td>110/k</td>
<td>220/k</td>
</tr>
</tbody>
</table>

4.2 Local strength analysis

4.2.1 Control of peak stresses
In order to control the plastic deformation in corners of deck, bulkhead and wall openings, the peak stresses shall be calculated with the use of fine mesh local models. Peak stresses shall be calculated based on the loads described in [2].
Reference is made to Pt.3 Ch.7 Sec.4 [4.2] for acceptable stress criteria for peak stresses.

4.2.2 Shear stress control
To calculate shear stresses in areas with door and window openings or cut-outs, e.g. due to ventilation, piping cable ducts, in longitudinal bulkheads and side and vertical walls, local models with fine mesh shall be made.
Reference is made to Pt.3 Ch.7 Sec.4 [4.2] for acceptable stress criteria for peak stresses.

5 Fatigue strength

5.1 General
For detailed description of the fatigue requirements to main class and fatigue assessment procedure, reference is made to Pt.3 Ch.9 and the Society’s document DNVGL-CG-0129 Fatigue assessment of ship structures, respectively. This sub-section describes the scope. A prescriptive fatigue assessment procedure for passenger vessel is defined in the Society’s document DNVGL-CG-0138 Direct strength analysis of hull structures in passenger ships.

5.2 Structural details to be assessed using prescriptive analysis
End connections of longitudinal stiffeners in the outer shell below the freeboard deck shall be assessed according to Pt.3 Ch.9, for ships with \( L > 150 \) m. Relative deflections and double hull bending can be ignored.

5.3 Structural details to be assessed using FE analysis with rule loads
For vessels, for which direct hull girder strength calculation is required according to [1.2.1], the following areas shall be assessed according to the Society's document DNVGL-CG-0129 Fatigue assessment of ship structures, based on local FE models for free plate edges and hot spot models for welded details: for free plate edges and hot spot models for welded details:
— corner details of door and window openings in longitudinal bulkheads and side walls
— corners of large deck openings
— corners of openings in side shell
— critical details for racking response, described in Ch.3 Sec.2 [8.3], for combined passenger and RO/RO vessels, i.e. Ferry class notation, with multiple decks and limited extent of transverse bulkheads above bulkhead deck. Loads and methods shall be applied according to Ch.3.

Number of details and possible fatigue assessment requirements to other details will be determined on a case-by-case basis, depending on the nominal stress level from the global FE analysis.

5.4 Door and window openings in longitudinal structure
Corner radius, possibly in combination with a thicker insert plate, shall be provided in order to reduce the stress concentration.

6 Glass structure

6.1 Glass superstructure side
Glass walls which extend between decks shall satisfy the following requirements:
The thickness of the glass pane shall be calculated according to Pt.3 Ch.12 Sec.6 [4] as for windows. Glass panes shall be made from toughened safety glass. The glass pane shall be supported along all its four sides. Other supporting arrangements may be accepted provided testing according to Sec.1 [5.1.4] 2) is done.
Hand-railing shall be provided. Alternatively, laminated glass panes shall be used.

6.2 Balcony doors
The design pressure for the frames and the glass panes of the external doors in the balcony area of superstructure shall be taken according to Pt.3 Ch.4 Sec.5 [3.3].
Thickness of the door glass pane shall be calculated according to Pt.3 Ch.12 Sec.6 [4].
The minimum glass thickness for doors located 1.7\( C_w \) above scantling draft is 6 mm.
\( C_w \) is defined in Pt.3 Ch.1 Sec.4 [2.3].

6.3 Balcony railing
Protective railing shall be installed on all balconies as per Regulation 25 Anex I LL. Alternatively, railing with glass elements can be used provided they are made of:
1) Monolithic glass with a minimum thickness of 6.0 mm and top rail with a minimum section modulus of 17 cm\(^3\)
2) Laminated glass with a minimum thickness for each glass pane equal to 4 mm.
The height of the railing shall not be less than 1.0 m. Stanchions shall be fitted, not more than 3.0 m apart, with minimum section modulus of 40 cm\(^3\). The stanchions shall be rigidly fixed at their lower ends to resist rotational displacements.
The glass elements shall be supported at minimum two opposite sides by continuous line support.

6.4 Fixed- and movable glass roofs

6.4.1 Design loads
The minimum forces acting on the glass roof and the supporting structure shall normally be taken as:
Vertical force:

The pressure $P_{dl}$, in kN/m$^2$, due to this distributed load for the static plus dynamic (S+D) design load scenario shall be derived for each dynamic load case and shall be taken as:

$$P_{dl} = P_{dl-s} + P_{dl-d}$$

where:

$P_{dl-s}$ = static pressure, in kN/m$^2$, due to the distributed load, shall be defined by the designer. Minimum 0.15 t/m$^2$ + self weight of glass roof

$P_{dl-d}$ = dynamic pressure, in kN/m$^2$, due to the distributed load, in kN/m$^2$, shall be taken as:

$$P_{dl-d} = f_{\beta} a_z$$

$f_{\beta}$ = as defined in Pt.3 Ch.4 Sec.4

$a_z$ = vertical envelope acceleration, in m/s$^2$, at the centre of gravity of the distributed load, for the considered load case, shall be obtained according to Pt.3 Ch.4 Sec.3 [3.3]

$P_V = P_{dl} A_H$

$A_H$ = horizontal projected area of the glass roof in m$^2$.

Transverse force on side walls in kN:

$$P_T = P_{SI} A_T$$

$P_{SI}$ = side pressure taken from Pt.3 Ch.4 Sec.5 [3.3]

$A_T$ = transverse projected area of the glass roof in m$^2$.

Loads for horizontal stoppers in kN:

Combine $P_{VC}$ with $P_T$

$$P_{VC} = P_{固} g_o A_v$$

$A_v$ = vertical projected area of the glass roof in m$^2$.

6.4.2 Operational limitations

If the roof is intended to be operated in at wind speeds exceeding 15 m/s, additional direct calculations may be required.

The restriction shall be stated in the operation manual for the vessel.

6.4.3 Stoppers and locking devices

The stoppers and locking devices shall be provided such that in the event of failure of the hydraulic system, the roof will remain in open or closed position, respectively.
SECTION 3 SYSTEMS AND EQUIPMENT

1 Emergency source of electrical power and emergency installations

1.1 Electrical systems

1.1.1 General
Passenger vessels shall have an electrical installation complying with the requirements in Pt.4 Ch.8 with the clarifications and additions given in this sub-chapter.

1.1.2 Fire zones
Electrical distribution systems shall be so arranged that fire in any main vertical zone, as defined in Pt.4 Ch.11, will not interfere with services essential for safety in any other such zone. This requirement will be met if main and emergency feeders passing through any such zone are separated both vertically and horizontally as widely as is practicable.

1.1.3 Emergency generator
Where the emergency source of electrical power is a generator, it shall be started automatically. The emergency power supply system shall have capacity to supply the services listed in Pt.4 Ch.8 Sec.2 Table 1 for a period of 36 hours. In a ship engaged regularly on voyages of short duration, the Administration if satisfied that an adequate standard of safety would be attained may accept a lesser period than the 36 hour period specified, but not less than 12 hours. Except when shorter periods are specified in these rules.

1.1.4 Additional emergency consumers
In addition, the following systems shall be supplied by the emergency power supply system:

1) For a period of 36 hours:
   — in alleyways, stairways and exits giving access to the muster and embarkation stations, as required by regulation III/11.5
   — the public address system or other effective means of communication which is provided throughout the accommodation, public and service spaces
   — the means of communication which is provided between the navigating bridge and the main fire control station
   — the fire door holding and release system
   — the automatic sprinkler pump, if any
   — the emergency bilge pump, and all the equipment essential for the operation of electrically powered remote controlled bilge valves.

2) For a period of half an hour:
   — the emergency arrangements to bring the lift cars to deck level for the escape of persons. The passenger lift cars may be brought to deck level sequentially in an emergency.

1.2 Lighting

1.2.1 General
Passenger ships shall be provided with lighting systems as required by Pt.4 Ch.8. In addition, low-location lighting and supplementary lighting shall be installed as follows:

1.2.2 Low-location lighting
Passenger ships shall be provided with low-location lighting (LLL) complying with IMO Res. A.752(18).
1.2.3 Supplementary lighting general
In passenger ships, supplementary lighting shall be provided in all cabins to clearly indicate the exit so that occupants will be able to find their way to the door. Such lighting, which may be connected to an emergency source of power or have a self-contained source of electrical power in each cabin, shall automatically illuminate when power to the normal cabin lighting is lost and remain on for a minimum of 30 min. (SOLAS Ch. II-1/41.6)

1.2.4 Supplementary lighting Passenger RORO vessels
For RO-RO passenger ships (Reg. 11-1/42-1), in addition to the emergency lighting required by regulation 42.2 (200), on every passenger ship with ro-ro cargo spaces or special category spaces as defined in regulation 11-213 (F101):
1) All passenger public spaces and alleyways shall be provided with supplementary electric lighting that can operate for at least three hours when all other sources of electric power have failed and under any condition of heel. The illumination provided shall be such that the approach to the means of escape can be readily seen. The source of power for the supplementary lighting shall consist of accumulator batteries located within the lighting units that are continuously charged, where practicable, from the emergency switchboard. Alternatively, any other means of lighting which is at least as effective may be accepted by the Administration. The supplementary lighting shall be such that any failure of the lamp will be immediately apparent. Any accumulator battery provided shall be replaced at intervals having regard to the specified service life in the ambient conditions that they are subject to in service; and
2) A portable rechargeable battery operated lamp shall be provided in every crew space alleyway, recreational space and every working space which is normally occupied unless supplementary emergency lighting, as required by sub paragraph.1, is provided.

1.3 Services to be supplied

1.3.1 General
The electrical power available shall be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power shall be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation, as stated in the following items [1.3.2] to [1.3.7].

In a ship engaged regularly on voyages of short duration, the administration if satisfied that an adequate standard of safety would be attained may accept a lesser period than the 36 hour period specified in items [1.3.2] to [1.3.5] but not less than 12 hours.

1.3.2 Emergency lighting
For a period of 36 hours, emergency lighting:
1) at every muster and embarkation station and over the sides as required by regulations III/11.4 and III/16.7
2) in alleyways, stairways and exits giving access to the muster and embarkation stations, as required by regulation III/11.5
3) in all service and accommodation alleyways, stairways and exits, personnel lift cars
4) in the machinery spaces and main generating stations including their control positions
5) in all control stations, machinery control rooms, and at each main and emergency switchboard
6) at all stowage positions for firemen's outfits
7) at the steering gear; and
8) at the fire pump, the sprinkler pump and the emergency bilge pump referred to in [1.3.4] and at the starting position of their motors.
1.3.3 Navigation and communication
For a period of 36 hours:

1) The navigation lights and other lights required by the *International Regulations for Preventing Collisions at Sea* in force.

2) The VHF radio installation required by regulation IV/7.1.1 and IV/7.1.2; and, if applicable:
   - 2.1 the MF radio installation required by regulations IV/12.1.1, IV/12.1.2, IV/10.1.2 and IV/10.1.3
   - 2.2 the ship earth station required by regulation IV/10.1.1.; and
   - 2.3 the MF/HF radio installation required by regulations IV/10.2.1, IV/10.2.2 and IV/11.1.

3) All internal communication equipment required in an emergency shall include:
   - the means of communication which is provided between the navigating bridge and the steering gear compartment
   - the means of communication which is provided between the navigating bridge and the position in the machinery space or control room from which the engines are normally controlled
   - the means of communication which is provided between the bridge and the radio telegraph or radio telephone stations
   - the means of communication which is provided between the officer of the watch and the person responsible for closing any watertight door which is not capable of being closed from a central control station
   - the public address system or other effective means of communication which is provided throughout the accommodation, public and service spaces
   - the means of communication which is provided between the navigating bridge and the main fire control station.

4) The shipborne navigational equipment as required by regulation V/12.

5) The fire detection and fire alarm system, and the fire door holding and release system.

6) For intermittent operation of the daylight signalling lamp, the ship's whistle, the manually operated call points and all internal signals that are required in an emergency;

unless such services have an independent supply for the period of 36 hours from an accumulator battery suitably located for use in an emergency.

1.3.4 Fire pumps and bilge systems
For a period of 36 hours:

1) one of the fire pumps required by SOLAS II-2/10.2.2.2 and 10.2.2.3
2) the automatic sprinkler pump, if any; and
3) the emergency bilge pump, and all the equipment essential for the operation of electrically powered remote controlled bilge valves.

1.3.5 Steering gear
For the period of time required by regulation 29.14 (*Pt.4 Ch.10 Sec.1 [5.3]*) the steering gear if required to be so supplied by that subsection.

1.3.6 Watertight doors
For a period of half an hour:

- Any watertight doors required by SOLAS Reg. II-1/15 to be power operated together with their indicators and warning signals.
### 1.3.7 Lift cars
For a period of half an hour:
— The emergency arrangements to bring the lift cars to deck level for the escape of persons. The passenger lift cars may be brought to deck level sequentially in an emergency.

### 1.3.8 Generator as emergency source of electrical power
Where the emergency source of electrical power is a generator, it shall be:

1) Started automatically upon failure of the electrical supply from the main source of electrical power and shall be automatically connected to the emergency switchboard; those services referred to in 400 shall then be transferred automatically to the emergency generating set. The automatic starting system and the characteristic of the prime-mover shall be such as to permit the emergency generator to carry its full rated load as quickly as is safe and practicable, subject to a maximum of 45 seconds; unless a second independent means of starting the emergency generating set is provided, the single source of stored energy shall be protected to preclude its complete depletion by the automatic starting system; and

2) Provided with a transitional source of emergency electrical power according to [1.3.9].

### 1.3.9 Transitional source of emergency power
The transitional source of emergency electrical power required by item [1.3.8] 2) shall consist of an accumulator battery suitably located for use in an emergency which shall operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12% above or below its nominal voltage and be of sufficient capacity and so arranged as to supply automatically in the event of failure of either the main or emergency source of electrical power at least the following services, if they depend upon an electrical source for their operation:

For half an hour:

1) The lighting required by items [1.3.2] and [1.3.3] 1);

2) All services required by items [1.3.3] 3), [1.3.3] 5) and [1.3.3] 6), unless such services have an independent supply for the period specified from an accumulator battery suitably located for use in an emergency.

Power to operate the watertight doors, as required by SOLAS Reg. II-1/15, but not necessarily all of them simultaneously, unless an independent temporary source of stored energy is provided. Power to the control, indication and alarm circuits as required by SOLAS Reg. II-1/15, for half an hour.

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Rules for classification: Ships — DNVGL-RU-SHIP Pt.5 Ch.4. Edition January 2017
Passenger ships

DNV GL AS
SECTION 4 STABILITY

1 Stability

1.1 Application
Ships with class notation Passenger ship and Ferry shall comply with the requirements according to [1.2].

1.2 Intact stability

1.2.1 Intact stability criteria
Passenger ships shall comply with Pt.3 Ch.15 with the supplementing requirements as given in IMO 2008 Intact Stability Code (IMO Res. MSC.267(85)) Part A Ch. 3.1.1 and 3.1.2.

1.2.2 Loading conditions
Compliance with the stability requirements shall be documented for the standard loading conditions given in IMO 2008 Intact Stability Code (IMO Res. MSC.267(85)) Part B Ch. 3.4.1.1.
CHANGES – HISTORIC

January 2016 edition

Main changes January 2016, entering into force as from date of publication

• Sec.2 Hull
  — [1.2.3] and [2.2]: Scope and load combinations for global FE transverse strength analysis is clarified
  — [6.3]: More detailed requirements to balcony railings included

October 2015 edition

General
This is a new document.
The rules enter into force 1 January 2016.
Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16 000 professionals are dedicated to helping our customers make the world safer, smarter and greener.