RULES FOR CLASSIFICATION

Ships

Edition January 2017

Part 5 Ship types

Chapter 9 Offshore service 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 document supersedes the July 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 1 July 2017

• Sec.2 Offshore service vessels
  — Sec.2 [5.3.1]: Amended ice load on side structures from 15 kg/m$^3$ to 7.5 kg/m$^3$ to be in line with IMO requirements and initial intention/current practice.

• Sec.3 Anchor handling and towing vessels
  — Sec.3: Removed requirement to local operation of deck winches.

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 supporting offshore installations including towing- and anchor handling operations and rescue and standby services.

1.2 Scope
The rules in this chapter give requirements to hull strength, systems and equipment, safety and availability, and stability including openings and closing appliances and the relevant procedural requirements applicable to offshore service vessels.
In addition, for vessels intended for specific operations, this chapter gives additional requirements on strength, stability including openings and closing appliances and specific functions relevant for these operations.

1.3 Application
The requirements in this chapter shall be regarded as supplementary to those given for the assignment of main class Pt.2, Pt.3 and Pt.4.
## 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>Additional description</th>
<th>Design requirements, rule reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offshore service vessel</td>
<td>Ship intended for supporting offshore installations</td>
<td>&lt;none&gt;</td>
<td></td>
<td>Sec.1 and Sec.2</td>
</tr>
<tr>
<td>+</td>
<td></td>
<td>Designed for operations in harsh weather conditions, e.g. the North Sea</td>
<td></td>
<td>Sec.1 and Sec.2 [3]</td>
</tr>
<tr>
<td>Supply</td>
<td>For performing supply services to offshore installations</td>
<td></td>
<td></td>
<td>Sec.1, Sec.2 and Sec.4</td>
</tr>
<tr>
<td>Anchor handling</td>
<td>Equipped to handle subsurface deployment and lifting of anchoring equipment, including handling of floating objects on the surface or on the sea floor</td>
<td></td>
<td></td>
<td>Sec.1, Sec.2 and Sec.3</td>
</tr>
<tr>
<td>Towing</td>
<td>Equipped to handle towing of floating objects in open waters</td>
<td></td>
<td></td>
<td>Sec.1, Sec.2 and Sec.3</td>
</tr>
<tr>
<td>AHTS</td>
<td>Multi-purpose offshore service vessels complying with notations Anchor handling, Towing and Supply</td>
<td></td>
<td></td>
<td>Sec.1, Sec.2 and Sec.3</td>
</tr>
<tr>
<td>Windfarm maintenance</td>
<td>Equipped for maintenance and service of offshore wind farms</td>
<td></td>
<td></td>
<td>Sec.1, Sec.2 and Sec.6</td>
</tr>
<tr>
<td>Standby vessel</td>
<td>Ship designed to carry out standby and rescue services to offshore installations</td>
<td>&lt;none&gt;</td>
<td></td>
<td>Sec.1 and Sec.5</td>
</tr>
<tr>
<td>S</td>
<td>Designed specially to operate in harsh weather conditions, e.g. the North Sea</td>
<td></td>
<td></td>
<td>Sec.1 and Sec.5 [2.2]</td>
</tr>
</tbody>
</table>
### 2.2 Additional notations

#### 2.2.1 The following additional notations, as specified in Table 2, are typically applied to offshore service vessels:

**Table 2 Additional notations**

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Application</th>
<th>Rule reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAUT</td>
<td>Requirements to bridge design, instrumentation, location of equipment and bridge procedures for enhanced safety for manoeuvring of the ship</td>
<td>All ships</td>
<td>Pt.6 Ch.3 Sec.3</td>
</tr>
<tr>
<td>LFL</td>
<td>Vessel designed for carriage of liquids with low flashpoint</td>
<td>All ships except <strong>Tanker for oil</strong> and <strong>Tanker for chemicals</strong></td>
<td>Pt.6 Ch.5 Sec.9</td>
</tr>
<tr>
<td>Clean</td>
<td>Vessel designed for controlling and limiting operational emissions and discharges</td>
<td>All ships</td>
<td>Pt.6 Ch.7 Sec.2</td>
</tr>
<tr>
<td>DYNPOS/DPS</td>
<td>Vessel equipped with dynamic positioning system</td>
<td>All ships</td>
<td>Pt.6 Ch.3 Sec.2, Pt.6 Ch.3 Sec.1, Pt.6 Ch.3 Sec.6</td>
</tr>
<tr>
<td>COMF</td>
<td>Comfort class covering requirements for noise and vibration and indoor climate</td>
<td>All ships</td>
<td>Pt.6 Ch.8 Sec.1</td>
</tr>
<tr>
<td>OILREC</td>
<td>Recovered oil reception and transportation after a spill of oil in emergency situations</td>
<td>All ships except <strong>Tanker for oil</strong></td>
<td>Pt.6 Ch.5 Sec.11</td>
</tr>
<tr>
<td>Fire fighter</td>
<td>Vessels with special fire fighting capabilities</td>
<td>All ships intended for fighting fires on board ships and on offshore and onshore installations</td>
<td>Ch.10 Sec.9Sec.9</td>
</tr>
<tr>
<td>SF</td>
<td>Compliance with the damage stability requirements of IMO Res.MSC.235(82)(Guidelines for the Design and Construction of Offshore Supply Vessels, 2006), alternatively as amended by IMO Res. MSC.335(90) (Amendments to the Guidelines for the Design and Construction of Offshore Supply Vessels, 2006)</td>
<td><strong>Offshore service vessels</strong></td>
<td>Pt.6 Ch.5 Sec.6</td>
</tr>
<tr>
<td>HL(ρ)</td>
<td>Tanks or holds strengthened for heavy liquid, where ρ denotes the maximum density in t/m$^3$ in any of the cargo tanks</td>
<td><strong>Tanker for oil</strong> <strong>Tanker for oil products</strong> <strong>Tanker for chemicals</strong> <strong>Offshore service vessel</strong></td>
<td>Pt.6 Ch.1 Sec.3</td>
</tr>
</tbody>
</table>
### Part 5 Chapter 9 Section 1

#### Class notation

<table>
<thead>
<tr>
<th>Class notation</th>
<th>Description</th>
<th>Application</th>
<th>Rule reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengthened (DK)</strong></td>
<td>Decks strengthened for heavy cargo applicable when deck cargo $\geq 1.5 \text{ t/m}^2$</td>
<td>All ships</td>
<td>Pt.6 Ch.1 Sec.2</td>
</tr>
<tr>
<td><strong>HELDK</strong></td>
<td>Helicopter deck</td>
<td>All ships</td>
<td>Pt.6 Ch.5 Sec.5</td>
</tr>
</tbody>
</table>

2.2.2 For a full definition of all additional class notations see Pt.1 Ch.2.

#### 3 Definitions

##### 3.1 Terms

**Table 3 Definitions**

<table>
<thead>
<tr>
<th>Terms</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>anchor handling winch</td>
<td>winch used for towing and anchor handling as described in Sec.3 [3.3]. The towing and anchor handling functions may be covered/fulfilled by dedicated drums on the winch.</td>
</tr>
<tr>
<td>bollard pull (BP)</td>
<td>the maximum continuous pull obtained at static pull test on sea trial.</td>
</tr>
<tr>
<td>shark jaw</td>
<td>equipment for temporary securing of the inboard end of towline or rig chains.</td>
</tr>
<tr>
<td>stern roller</td>
<td>rollers, fairleads or other equipment at the towline exit on the vessel (irrespective of location onboard), supporting the towline during lifting to avoid chafing and excessive bending, and arranged to facilitate the launch and recovery of rig anchors etc.</td>
</tr>
<tr>
<td>towing pins</td>
<td>equipment for leading and maintain the towline to the intended path.</td>
</tr>
<tr>
<td>towing winch</td>
<td>winch used for towing as described in Sec.3 [3.3].</td>
</tr>
<tr>
<td>towline</td>
<td>rope/wire used for towing.</td>
</tr>
</tbody>
</table>

#### 4 Documentation

##### 4.1 Documentation requirements

**4.1.1 General**

For general requirements to documentation, including definition of the info codes, see Pt.1 Ch.3 Sec.2. For a full definition of the documentation types, see Pt.1 Ch.3 Sec.3.

**4.1.2 Offshore service vessel**

Documentation shall be submitted as required by Table 4.
### Table 4 Documentation requirements - Offshore service vessel

<table>
<thead>
<tr>
<th>Object</th>
<th>Documentation type</th>
<th>Additional description</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo securing devices, fixed</td>
<td>H050 – Structural drawing</td>
<td>Stow racks and their supporting structures</td>
<td>AP</td>
</tr>
<tr>
<td>Qualifier +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo independent tank</td>
<td>H050 – Structural drawing</td>
<td>Including design loads and reaction forces</td>
<td>AP</td>
</tr>
<tr>
<td>Windows</td>
<td>Z030 – Arrangement plan</td>
<td>Information on type of glass, frames, including references to standards, and deadlights where applicable</td>
<td>AP</td>
</tr>
<tr>
<td>Qualifier <strong>Supply</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo piping system</td>
<td>S010 – Piping diagram (PD)</td>
<td>Liquid mud system</td>
<td>AP</td>
</tr>
<tr>
<td>Cargo piping system</td>
<td>S010 – Piping diagram (PD)</td>
<td>Cement and dry mud system</td>
<td>AP</td>
</tr>
<tr>
<td><strong>Qualifiers Anchor handling and Towing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Anchor handling arrangement, towing winch arrangement | Z030 – Arrangement plan | Including:  
  - towline paths showing extreme sectors and wrap on towing-equipment  
  - towline points of attack  
  - maximum expected BP  
  - maximum design loads for each component  
  - emergency release capabilities. | FI   |
| Z253 – Test procedure for quay and sea trial | Bollard pull |                                                                                     | AP, L |
| Z263 – Report from quay and sea trial | Winch and other equipment required by the class notation |                                          | AP, L |
| Anchor handling winch, towing winch | C010 – Design criteria | Including:  
  - RL and the expected maximum BP  
  - hoisting capacity, rendering and braking force of the winch  
  - release capabilities (response time and intended remaining holding force after release). | FI   |
<p>| C020 – Assembly or arrangement drawing |                     |                                                                                        | FI   |
| C030 – Detailed drawing         |                     |                                                                                        | AP   |
| C040 – Design analysis          |                     | Strength calculation of the drum with flanges, shafts with couplings, framework and brakes. | FI   |
| C050 – Non-destructive testing (NDT) plan |                     |                                                                                        | AP   |</p>
<table>
<thead>
<tr>
<th>Object</th>
<th>Documentation type</th>
<th>Additional description</th>
<th>Info</th>
</tr>
</thead>
</table>
| Shark jaw, towing pins | C010 – Design criteria | Including:  
— Maximum design load  
— Emergency release capabilities in operational and dead ship condition. | FI |
|  | C020 – Assembly or arrangement drawing |  | FI |
|  | C030 – Detailed drawing | Components transmitting loads | AP |
|  | C040 – Design analysis |  | FI |
|  | C050 – Non-destructive testing (NDT) plan |  | AP |
| Stern roller supporting structure, Shark jaw supporting structure, Towing pin supporting structure | H050 – Structural drawing | Including maximum applicable design loads | AP |
| Anchor handling supporting structure, Towing winch supporting structure | H050 – Structural drawing | Including:  
— The maximum forces acting on the winches (see Sec.3 [2.1])  
— Foot print loads. | AP |

**Qualifier Windfarm maintenance**

| Position keeping systems | Z201 – Position keeping capability plot |  | AP |
| Work boat davit winch, Work boat davit | C010 – Design criteria | Safe working load, heel/trim if applicable, dynamic factor if above 1.5 | FI |
|  | C020 – Assembly or arrangement drawing |  | FI |
|  | C030 – Detailed drawing | Components transmitting loads | AP |
|  | C040 – Design analysis |  | FI |
|  | Z161 – Operation manual |  | FI |
|  | Z162 – Installation manual |  | FI |
|  | Z163 – Maintenance manual |  | FI |

**Personnel transfer system**

| Personnel transfer system | Z030 – Arrangement plan | Including foundation and hoisting arrangements | FI |
| Personnel transfer system supporting structure | H050 – Structural drawing | Including design loads, footprint loads, fastening (welding) details | AP |

AP = For approval; FI = For information  
ACO = As carried out; L = Local handling; R = On request; TA = Covered by type approval; VS = Vessel specific
### 4.1.3 Standby vessel

Documentation shall be submitted as required by Table 5.

#### Table 5 Documentation requirements - Standby vessel

<table>
<thead>
<tr>
<th>Object</th>
<th>Documentation type</th>
<th>Additional description</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability</td>
<td>B030 - Internal watertight integrity plan</td>
<td></td>
<td>FI</td>
</tr>
<tr>
<td></td>
<td>B070 – Preliminary damage stability calculation</td>
<td></td>
<td>AP</td>
</tr>
<tr>
<td></td>
<td>B130 – Final damage stability calculation</td>
<td></td>
<td>AP</td>
</tr>
<tr>
<td>Rescue and recovery arrangements</td>
<td>Z030 – Arrangement plan</td>
<td>Rescue zones including contingency equipment, and accommodation, furnishings and medical equipment for rescued persons and spaces for survivors</td>
<td>AP</td>
</tr>
<tr>
<td>Safety, general</td>
<td>Z090 – Equipment list</td>
<td>Contingency equipment for standby vessel</td>
<td>AP</td>
</tr>
<tr>
<td>Towing arrangement</td>
<td>Z030 – Arrangement plan</td>
<td>Including: towline paths showing extreme sectors and wrap on towing-equipment, towline points of attack, maximum expected BP, maximum design loads for each component, emergency release capabilities.</td>
<td>FI</td>
</tr>
<tr>
<td>Towing hook supporting structure</td>
<td>H050 – Structural drawing</td>
<td>Maximum braking force of winch and breaking strength of the towline (if applicable)</td>
<td>AP</td>
</tr>
<tr>
<td>Towing hook</td>
<td>C030 – Detailed drawing</td>
<td>Including emergency release mechanism</td>
<td>AP</td>
</tr>
<tr>
<td>Qualifier (S)</td>
<td>Z030 – Arrangement plan</td>
<td>Including type of glass, frames, references to standards, and deadlights where applicable</td>
<td>AP</td>
</tr>
</tbody>
</table>

AP = For approval; FI = For information; ACO = As carried out; L = Local handling; R = On request; TA = Covered by type approval; VS = Vessel specific
## 5 Certification

### 5.1 Certification requirements

#### 5.1.1 Supply

Products shall be certified as required by Table 6.

Table 6 Certification requirements - Supply

<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 pumps</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td>Pumps for transfer of liquid mud, fuel oil and base oil</td>
</tr>
<tr>
<td>Cargo system valves</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td>Manufacturer’s certificate may be accepted subject to approval by the Society</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td>Electrical equipment (motors, frequency converters, switchgear and control gear) defined as important equipment (see Pt.4 Ch.8 Sec.1 [2.3.2]) shall be delivered with the Society’s product certificate</td>
</tr>
<tr>
<td>Cement and dry mud tanks</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td>Only applicable for independent pressure vessels, see Pt.4 Ch.7</td>
</tr>
</tbody>
</table>

* Unless otherwise specified the certification standard is the rules.

Guidance note:

Other pumps in the cargo systems, including hydraulic power systems, need not to be delivered with the Society's certificate.
### 5.1.2 Anchor handling and towing

Products shall be certified as required by Table 7.

<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>Anchor handling/towing winch</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towing hook</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shark jaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Towing pins</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shark jaw and towing pins with attachment</td>
<td>MC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winch drum and flanges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shafts for drum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Couplings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winch framework</td>
<td>PC</td>
<td>Manufacturer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear shaft and wheels</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td>Details: Electrical equipment (motors, frequency converters, switchgear and control gear) defined as important equipment (see Pt.4 Ch.8 Sec.1 [2.3.2]) shall be delivered with the Society’s product certificate</td>
</tr>
</tbody>
</table>
5.1.3 Standby vessel
Products shall be certified as required by Table 8.

Table 8 Certification requirements - Standby vessel

<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>Loose gear of towing equipment</td>
<td>PC</td>
<td>Manufacturer</td>
<td></td>
<td>Including shackles, rings, wire and rope</td>
</tr>
</tbody>
</table>

* Unless otherwise specified the certification standard is the rules.

5.1.4 Windfarm maintenance
Products shall be certified as required by Table 9.

Table 9 Certification requirements - Windfarm maintenance

<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>Work boat davits</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winch for work boat davit</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crane</td>
<td>PC</td>
<td>Society</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offshore transfer system</td>
<td>PC</td>
<td>Society</td>
<td>DNVGL-ST-0358 Certification of offshore gangways for personnel transfer</td>
<td></td>
</tr>
<tr>
<td>Work boat</td>
<td>PC</td>
<td>Society</td>
<td>DNVGL-ST-0342 Craft</td>
<td></td>
</tr>
</tbody>
</table>

* Unless otherwise specified the certification standard is the rules.

5.1.5 For a definition of the certificate types see Pt.1 Ch.3 Sec.5.

6 Testing

6.1 Testing during newbuilding

6.1.1 Testing requirements for class notations Anchor handling and Towing are given in Sec.3 [1.4], and for Windfarm maintenance in Sec.6 [2].
SECTION 2 OFFSHORE SERVICE VESSELS

Symbols

For symbols not defined in this section, see Pt.3 Ch.1 Sec.4.

$s_s$ = standard frame spacing in m
  = $0.48 + 0.002 \ L$
  = maximum 0.61 m forward of the collision bulkhead and aft of the after peak bulkhead

$L_{90}$ = rule length, $L$, but need not be taken greater than 90 m.

1 Introduction

1.1 Introduction

These rules provide requirements for vessels intended for offshore services. This includes also operations in harsh weather conditions.

1.2 Scope

These rules include requirements for hull strength, systems and equipment, and stability including openings and closing appliances applicable to offshore service vessels.

1.3 Application

Vessels built in compliance with the relevant requirements in Sec.1 and Sec.2 may be given the class notation Offshore service vessel.

If in addition the vessel complies with the additional requirements given in [3] and relevant parts of [6], the notation may be extended to Offshore service vessel(+).

Guidance note:
The extended notation Offshore service vessel(+) is recommended for vessels primarily intended to operate in harsh weather conditions, e.g. the North Sea.

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

If the damage stability requirements in Pt.6 Ch.5 Sec.6 are satisfied in addition to the general requirements in [5], then the additional notation SF may be given.

2 Hull

2.1 Loads

2.1.1 Design still water bending moments and shear forces

The still water bending moment and shear force limits, in seagoing and in harbour/sheltered water conditions, are normally taken as the design still water bending moments and shear forces as given in Pt.3 Ch.4 Sec.4 [2.2] and Pt.3 Ch.4 Sec.4 [2.4]. This may also be applicable for ships with length $L \leq 65$m after special considerations.

2.1.2 The limits calculated in [2.1.1] may have to be calculated for extreme non-homogeneous loading conditions after special consideration of tank arrangement and cargo deck loading.
2.1.3 If the calculated bending moments and shear forces in [2.1.2] exceed the design values given in [2.1.1], the calculated values shall be applied in the hull girder scantling check.

2.2 Hull local scantling

2.2.1 Yield check of plate and stiffeners
General reference is given to Pt.3 Ch.6 Sec.4 and Sec.5 for prescriptive requirements to plate and stiffeners respectively. For wheel loading, reference is given to Pt.3 Ch.10 Sec.5.

Additional hull local scantling requirements for offshore service vessels are given in [2.3] to [2.6].

2.3 Ship’s sides and stern

2.3.1 Longitudinal steel fenders shall be fitted on the ship’s sides at freeboard cargo deck and second deck above. The fenders shall extend not less than 0.02 \( L \) forward of the section where the deck has its full breadth.

Additional steel fenders shall be arranged aslope between the longitudinal steel fenders. The steel fenders may be omitted if the side shell scantlings are increased as specified in [2.3.2].

2.3.2 The net thickness, in mm, of side plating including bilge strake, up to second deck above freeboard deck, shall not to be less than:

\[
t = \max \left( \frac{(4.5 + 0.05L_{g0})b}{s} \sqrt{k}; 7.0 \right)
\]

The ratio \( b/s \) shall not be taken as less than 1.0. Requirements given for side plating in Pt.3 Ch.6 Sec.4 shall be complied with as applicable.

In way of fender area described in [2.3.1], steel fenders can be omitted when the side plate thickness is at least twice that required above, for a breadth not less than 0.01 \( L \), along the level of the freeboard deck and at the second deck above.

2.3.3 The net section modulus, in cm\(^3\), of transverse stiffeners or side longitudinals shall not in any region be less than:

\[
Z_1 = 1.15 Z
\]

where:

\[
Z = \text{required net section modulus, in cm}^3, \text{ as given in Pt.3 Ch.6 Sec.5 and Pt.3 Ch.6 Sec.8.}
\]

All stiffeners up to second deck above freeboard deck, and forward of 0.2 \( L \) from FP\( _{LL} \) up to forecastle deck, shall have end connections with brackets.

2.3.4 Non-continuous welds shall not be used in connections between stiffeners and shell plating.

2.4 Weather deck for cargo

2.4.1 The deck shall have scantlings based on a minimum cargo load of 1.5 t/m\(^2\), in combination with 80% of the design sea pressure as specified for the main class. If the deck scantlings are based on cargo load exceeding 1.5 t/m\(^2\), the notation strengthened(DK) may be added. The design cargo load in t/m\(^2\) will be given in the appendix to the classification certificate. Cargo loads exceeding 4 t/m\(^2\) need not be combined with sea pressure. For intermediate loads the percentage of the design sea pressure to be added shall be varied linearly.
2.4.2 The net deck plating thickness shall not be less than 7.0 mm.

2.4.3 In deck areas for heavy cargo units, e.g. drilling rig anchors, the deck structure shall be strengthened against the maximum expected anchor weight.

2.4.4 Air pipes, valves, smaller hatches etc. shall be located inside the stow racks, and be protected and strengthened.

2.4.5 Scantlings of flush hatch covers in the cargo deck areas shall normally be based on the same load as the adjacent deck. In case the flush hatch cover is designed for a different load then this shall be stated in the appendix to the classification certificate.

2.5 Stow racks

2.5.1 Stow racks for pipes as deck cargo shall be provided. The stow racks shall be efficiently attached and supported at deck.

The scantling of the stow racks shall be designed for a transverse load taking into account a deck load of not less than $F_S = 6A$, in kN, acting evenly distributed on one side of the vessel. In addition, the stow racks shall withstand the deck load at an angle of heel of 30 degrees assumed to be evenly distributed on one side of the vessel, where:

$A = \text{total deck area between the stow racks in m}^2$.

2.5.2 Allowable stresses

Acceptable stresses, in N/mm$^2$, for the stow rack scantlings and respective supporting structure resulting from bending moments and shearing forces calculated for the load given above shall be according to AC-II for primary supporting members given in Pt.3 Ch.6 Sec.6 [2].

In case of direct strength calculations the equivalent von Mises stress, in N/mm$^2$, shall satisfy:

$$\sigma_{vm} \leq 0.9R_{eh}$$

2.6 Primary supporting members

2.6.1 Direct strength analysis

The strength of primary structural members that form part of a grillage system, such as deck girders, side web frames, pillars, floors and girders in double bottom may be determined by using direct strength analysis, i.e. by use of beam analysis as described in [2.6.2].

Primary supporting members shall be evaluated in accordance with Pt.3 Ch.6 Sec.6.

2.6.2 Beam analysis

Beam analysis will in general be accepted to evaluate bending and shear stresses in webs and flanges of grillage structure under lateral loads such as decks, double bottom and side structure under cargo or liquid pressure, e.g. sea and tank pressures. The effective plate breadth in bending of the primary strength members shall be calculated according to Pt.3 Ch.3 Sec.7 [1.3].

2.6.3 Design load sets

General reference is made in Pt.3 Ch.6 Sec.2 Table 2 where the load combinations of static and dynamic loads for tank and watertight boundary structure, external shell envelope structure e.g. bottom structure, side shell primary members and deck structure is given.

Other load combinations than those given in Pt.3 Ch.6 Sec.2 Table 2, may be accepted after consideration by the Society on a case-by-case basis. In addition to the prescriptive design load sets and load combinations given in Pt.3 Ch.6 Sec.2 Table 2, the load sets and load combinations given in Table 1 shall be applied to check the primary supporting structure on offshore service vessels, if applicable.
### Table 1 Design load sets for primary supporting members

<table>
<thead>
<tr>
<th>Description</th>
<th>Primary supporting members</th>
<th>Design load set</th>
<th>Load component</th>
<th>Hull girder loads</th>
<th>Draught</th>
<th>Acceptance criteria</th>
<th>Loading condition for definition of GM and k&lt;sub&gt;r&lt;/sub&gt;</th>
<th>Load pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transverse deck girders, side web frames and floors</td>
<td>UDL-1 + SEA-1</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributed deck load on internal or external decks (adjacent tanks empty), including external shell</td>
<td>UDL-1h + SEA-1h</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{wv-h} + M_{sw-h}^{2})</td>
<td></td>
<td>T&lt;sub&gt;BAL&lt;/sub&gt;</td>
<td>AC-II</td>
<td>Normal ballast condition</td>
<td></td>
</tr>
<tr>
<td>Longitudinal deck and bottom girders/grillage, stringers</td>
<td>UDL-1s + SEA-1s</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{wv-s} + M_{sw-s}^{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UDL-1s + SEA-1s</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{wv-s} + M_{sw-s}^{2})</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>UDL-1s + SEA-1s</td>
<td>((P_{dl-s} + P_{dl-d}, F_{U-s} + F_{U-d}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{wv-s} + M_{sw-s}^{2})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transverse deck girders, side web frames and floors</td>
<td>UDL-2 + SEA-2</td>
<td>((P_{dl-s}, F_{U-s}^{5}) - P_{ex}^{1,4})</td>
<td>N/A</td>
<td></td>
<td>T&lt;sub&gt;BAL&lt;/sub&gt;</td>
<td>AC-I</td>
<td>Normal ballast condition</td>
<td></td>
</tr>
<tr>
<td>Longitudinal deck and bottom girders/grillage, stringers</td>
<td>UDL-2h + SEA-2h</td>
<td>((P_{dl-s}, F_{U-s}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{sw-h})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UDL-2s + SEA-2s</td>
<td>((P_{dl-s}, F_{U-s}^{5}) - P_{ex}^{1,4})</td>
<td>(M_{sw-s})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Primary supporting members</td>
<td>Design load set</td>
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<td>Acceptance criteria</td>
<td>Loading condition for definition of GM and k&lt;sub&gt;r&lt;/sub&gt;</td>
<td>Load pattern</td>
</tr>
<tr>
<td>-------------</td>
<td>---------------------------</td>
<td>----------------</td>
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<td>-----------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Local load&lt;sup&gt;6)&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) The EDW giving the highest sea pressure with corresponding distributed or concentrated loads to be applied.
2) The EDW giving the highest pressure with corresponding bending moment to be applied.
3) The EDW giving the highest bending moment with corresponding pressure to be applied.
4) \( P_{ex} \) shall be considered for external shell only.
5) Distributed or concentrated loads only. Need not to be combined with simultaneously occurring green sea pressure.
6) Local loads are defined in Pt.3 Ch.4 Table 1.
7) The EDW giving the highest acceleration with corresponding sea pressure to be applied.
2.6.4 Allowable stresses
See Pt.3 Ch.6 Sec.6 [2.2].

2.6.5 Buckling check of plate panels based on beam analysis
The normal stresses and shear stresses taken from the strength assessment in [2.6.2] are subject for buckling capacity calculation of plate panels as given in Pt.3 Ch.8 Sec.4 and the stresses shall be corrected as given in the Society's document DNVGL-CG-0128 Sec.3 [2.2.7].

3 Hull local scantling for ships assigned class notation Offshore service vessel(+)

3.1 Ship's sides and stern

3.1.1 Where subjected to heavy loads when handling anchors for offshore floating units drilling rigs, the stern shall be adequately strengthened. The net plate thickness, in mm, adjacent to the stern roller and shark jaw shall not be taken less than:

\[ t = 8 + 0.2 L \]

The deck adjacent to the stern shall be strengthened accordingly. If a substantial sheathing is fitted on the deck, the requirement may be modified.

3.1.2 The net thickness of the side plating up to forecastle deck shall not be less than as given in [2.3.2].

3.1.3 The net section modulus, in cm\(^3\), of transverse stiffeners or side longitudinals up to second deck above the freeboard deck shall not be taken less than:

\[ Z_1 = 0.0014 \cdot L_{90} \cdot l_{bdg} \cdot s \cdot k \]

If steel fenders are omitted:

\[ Z_1 = 0.0023 \cdot L_{90} \cdot l_{bdg} \cdot s \cdot k \]

The net section modulus, in cm\(^3\), of transverse stiffeners or side longitudinals shall, however, not in any region be taken less than:

\[ Z_{\text{min}} = 1.25 Z \]

where:

\[ Z \] = required net section modulus, in cm\(^3\), as given in Pt.3 Ch.6 Sec.5 and Pt.3 Ch.6 Sec.8
\[ l_{bdg} \] = effective bending span of stiffener, in m, as defined in Pt.3 Ch.3 Sec.7 [1.1.2]
\[ s \] = stiffener spacing in mm, as defined in Pt.3 Ch.3 Sec.7 [1.2.1].

The requirement for \(Z_1\) given above refers to the ship's sides, which have an inclination to the vertical (along the ship's depth) less than 15°. For greater inclinations the requirement given for \(Z_{\text{min}}\) shall be applied.

All stiffeners up to second deck above freeboard deck, and stiffeners forward of 0.2 \(L\) from F.E. up to forecastle deck, shall have end connections with brackets.

3.1.4 Non-continuous welds shall not be used in connections between stiffeners and shell plating up to second deck above the freeboard deck.
3.1.5 In the ship sides up to second deck above freeboard deck, the net section modulus, in \( \text{cm}^3 \), of primary supporting member (PSM) shall not be taken less than:

\[
Z_2 = 1.4 \cdot L_{90} \cdot \ell_{bdg} \cdot k
\]

If steel fenders are omitted:

\[
Z_2 = 2.3 \cdot L_{90} \cdot \ell_{bdg} \cdot k
\]

where:

\[\ell_{bdg} = \text{effective bending span of primary supporting member, in m, as defined in Pt.3 Ch.3 Sec.7 [1.1.8]}.\]

However, the net section modulus, in \( \text{cm}^3 \), of PSM’s shall not be less than:

\[Z_{\text{min}} = 1.25 \ Z \text{ in cm}^3.\]

\[Z = \text{net section modulus, as given in Pt.3 Ch.6 Sec.6 [2]}.\]

The PSM’s are assumed to have substantial connections at both ends.

3.2 Bulwark

3.2.1 The bulwark gross plate thickness shall not be less than 7 mm. Bulwark stays shall have a depth not less than 350 mm at deck. Stays shall be fitted on every second frame. Open rails shall have ample scantlings and efficient supports.

3.3 Support of heavy components

3.3.1 General
Primary supporting members supporting deck cargo and equipment, foundations for separate cargo tanks, as well as supports of other heavy components, shall have scantlings based on the supported mass, forces due to the ship motions and reaction forces at supports of deck machinery.

3.3.2 Strength analysis of primary supporting members
Strength analysis of primary supporting members may follow the principles given in [2.6].

3.3.3 Pressure due to distributed deck load
The total pressure \( P_{dl} \text{ in kN/m}^2 \), for the static plus dynamic (S+D) design load scenarios applied for strength analysis of primary supporting members shall be in accordance with Pt.3 Ch.4 Sec.5 [2.3.1].

For vessels with \( L < 100 \text{ m} \), the total pressure \( P_{dl} \text{ in kN/m}^2 \), for the static plus dynamic (S+D) design load scenarios applied for strength analysis of primary supporting members may be based on the simplified calculation as follows:

- aft of 0.2 \( L \) from A.E. and forward of 0.2 \( L \) from F.E:
  \[ P_{dl} = 20q \]

- amidships within 0.4 \( L \):
  \[ P_{dl} = 16q \]

- between specified regions, \( P_{dl} \) shall be varied linearly.
where:

\[ q = \text{specified distributed deck load, in t/m}^2. \]

### 3.3.4 Concentrated forces due to unit load

The force \( F_{U} \), in kN, due to the loads described in [3.3.1] for the static plus dynamic (S+D) design load scenarios shall be in accordance with Pt.3 Ch.4 Sec.5 [2.3.2].

### 3.3.5 Allowable stresses

Acceptable stresses, in N/mm\(^2\), for the supporting structure resulting from bending moments and shearing forces calculated for the load given above, shall be according to AC-I for primary supporting members given in Pt.3 Ch.6 Sec.6 [2.1] or Pt.3 Ch.6 Sec.6 [2.2], depending on calculation method used.

In case of direct strength calculations the equivalent von Mises stress, in N/mm\(^2\), shall satisfy:

\[ \sigma_{vm} \leq 0.9 R_{eH} \]

### 3.4 Deckhouses and superstructures

#### 3.4.1

The net section modulus, in cm\(^3\), of stiffeners and beams not contributing to longitudinal strength shall not be taken less than:

\[ Z = \frac{f_u \cdot P}{f_{bg} \cdot C_s \cdot R_{eH}} \]

where:

\[ P = \text{design pressure in kN/m}^2 \]

\[ = P_D \text{ for exposed decks} \]

\[ = \max(P_{SI}; P_W) \text{ for exposed superstructure side} \]

\[ = P_A \text{ for exposed end bulkheads and deckhouse boundaries} \]

\[ = \text{minimum 10 kN/m}^2 \text{ for weather decks} \]

\[ = \text{minimum 5 kN/m}^2 \text{ for top of the wheelhouse} \]

\[ = 8 \text{ kN/m}^2 \text{ for accommodation decks, aft of 0.2 \(L\) from A.E. and forward of 0.2 \(L\) from F.E.} \]

\[ = 6.5 \text{ kN/m}^2 \text{ elsewhere} \]

\[ P_D = \text{design sea pressure, in kN/m}^2, \text{ as given in Pt.3 Ch.4 Sec.5 [2] and Pt.3 Ch.4 Sec.5 [3], as applicable} \]

\[ P_{SI} = \text{design sea pressure, in kN/m}^2, \text{ for superstructure side as given in Pt.3 Ch.4 Sec.5 [2]} \]

\[ P_W = \text{wave pressure, in kN/m}^2, \text{ for superstructure side as given in Pt.3 Ch.4 Sec.5 [3]} \]

\[ P_A = \text{design sea pressure, in kN/m}^2, \text{ for end bulkheads of superstructure and deckhouse boundaries as given in Pt.3 Ch.4 Sec.5 [1.3]} \]

\[ f_{bg} = \text{bending moment factor as defined in Pt.3 Ch.6 Sec.6 Table 1. For stiffeners with end fixity deviating from the ones included in Table 1, with complex load pattern, or being part of a grillage, the requirement in Pt.3 Ch.6 Sec.5 [1.2] applies} \]

\[ f_u = \text{Factor for unsymmetrical profiles, as given in Pt.3 Ch.6 Sec.5 [1.1.2]} \]

\[ C_s = \text{permissible bending stress coefficient, taken as:} \]

\[ C_s = 0.75 \text{ for acceptance criteria set AC-II.} \]

#### 3.4.2

Stiffeners shall have effective end connections, i.e. with brackets or welded webs. Stiffeners on lower front bulkhead on weather deck forward shall have brackets at the lower ends.
3.4.3 The net plate thickness, in mm, in superstructures and deckhouses shall not be less than:

\[ t = (t_0 + 0.02L)\cdot c \cdot \sqrt{k} \]

where:

- \( t_0 \) = 4.5 mm for front bulkheads and weather deck forward of the lowest tier of the front bulkhead
- = 3.5 mm for sides and aft end bulkheads and weather decks elsewhere
- = 3.0 mm for superstructure and deckhouse decks (in way of accommodation).

\( c \) = coefficient taken as:

\[ c = \max\left(\frac{b}{650}, 1.0\right) \]

3.5 Loading conditions

3.5.1 The following loading conditions shall be presented:

- vessel in fully loaded departure condition with cargo distributed below deck and with deck cargo specified by position and weight, with full stores and fuel, corresponding to the worst service condition in which all stability criteria are met
- vessel in fully loaded arrival condition with cargo as specified, but with 10% stores and fuel
- vessel in ballast departure condition, without cargo but with full stores and fuel
- vessel in ballast arrival condition, without cargo but with 10% stores and fuel
- vessel in the worst anticipated operating condition
- if the vessel is equipped with towing gear, vessel in a typical condition ready for towing.

3.5.2 Assumptions for calculating loading conditions:

- if a vessel is fitted with cargo tanks, the fully loaded conditions as described in [3.5.1] shall be modified, assuming first the cargo tanks full and then the cargo tanks empty
- in all cases when deck cargo is carried a realistic stowage weight shall be assumed and stated in the stability information, including the height of the cargo and its centre of gravity
- where pipes are carried on deck, a quantity of trapped water equal to a certain percentage of the net volume of the pipe deck cargo shall be assumed in and around the pipes. The net volume shall be taken as the internal volume of the pipes plus the volume between the pipes. This percentage shall be 30 if the freeboard amidships is equal to or less than \( 0.015 L_{\text{LL}} \) and 10 if the freeboard amidships is equal to or greater than \( 0.03 L_{\text{LL}} \). For intermediate values of the freeboard amidships the percentage may be obtained by linear interpolation.

4 Systems and equipment

4.1 Steering gear

The steering gear shall be capable of bringing the rudder from 35° on one side to 30° on the other side in 20 s, when the vessel is running ahead at maximum service speed.

4.2 Exhaust outlets

Exhaust outlets from diesel engines shall have spark arrestors.
4.3 Anchoring equipment

For vessels without means for dynamic positioning, but intended for anchoring close to offshore installations/fields, safety precautions shall be considered.

**Guidance note:**

Safety precautions may consist of increasing the diameter and length of the chain cables above the minimum class requirements given in Pt.3 Ch.11 Sec.3. In such case, for operation in the North Sea or areas with similar environmental conditions, it is recommended to have the diameter of chain cables based on an equipment letter at least two steps higher than the corresponding vessel’s equipment number and length of the chain cables 85% greater than the table value corresponding to the increased diameter.

---end of guidance note---

5 Stability

5.1 Stability manual

5.1.1 The requirements given in this sub-section are applicable to vessels with a freeboard length $L_{LL}$ of 24 m and above.

5.1.2 The stability manual shall contain the following information:

- report on inclining test and determination of light ship data
- capacities and centres of gravity of all tanks and spaces intended for cargo and consumables
- free surface particulars for all tanks
- information on types, weights, centres of gravity and distribution of deck cargoes that can be carried within the limits as set out in Pt.3 Ch.15 Sec.1 [4]. Possible restrictions, such as plugging of pipes, shall be clearly stated
- where applicable, instructions related to the vessel when towing shall be included
- hydrostatic data
- cross curves of stability
- loading conditions including righting lever curves and calculation of metacentric height $GM$ including free surface corrections
- curves for limiting $VCG$ (centre of gravity above keel) or $GM$ values for intact conditions and a curve showing the permissible area of operation.
- stillwater bending moment and shear force limit curves.

5.2 Loading conditions

For loading conditions see [3.5].

5.3 Icing

5.3.1 If the vessel is intended to operate in zones where icing is expected, this shall be included in the calculation of the stability. The vessel shall in any service condition satisfy the stability criteria set out in Pt.3 Ch.15 Sec.1 including the additional weight imposed by the ice. Weight distribution shall be taken as at least 30 kg/m$^2$ for exposed weather decks, passageways and fronts of superstructures and deckhouses, and at least 7.5 kg/m$^2$ for projected lateral planes on both sides of the vessel above the waterline. The weight distribution of ice on un-composite structures such as railings, rigging, posts and equipment shall be included by increasing the total area for the projected lateral plane of the vessel’s sides by 5%. The static moment of this area shall be increased by 10%.
5.4 Intact stability

5.4.1 The freeboard at the stern in the upright condition shall not be less than 0.005 $L_{LL}$ in any loading condition.

5.4.2 In addition to the stability criteria for main class the vessel shall comply with the requirements in Ch.10 Sec.11 [5.1] in all towing conditions.

6 Openings and closing appliances

6.1 Weathertight doors

6.1.1 Where necessary, an arrangement for protecting the doors against deck cargo shall be provided.

6.1.2 For scuttles or windows fitted in weathertight doors, they shall comply with Pt.3 Ch.12 Sec.6.

6.1.3 For ships assigned the class notation Offshore service vessel(+) the arrangements and sill heights of weathertight doors are in general to comply with Pt.3 Ch.12 Sec.6. Unprotected doors in exposed positions on a weather deck for cargo shall be made of steel.

6.1.4 For ships assigned the class notation Offshore service vessel(+), the doors located in exposed positions in sides and front bulkheads, the requirements to sill heights apply one deck higher than given by Pt.3 Ch.6 Sec.6.

6.1.5 For ships assigned the class notation Offshore service vessel(+), doorways to the engine room and other compartments below the weather deck are, as far as is practicable, to be located at a deck above the weather deck. Alternatively, two weathertight doors in series may be accepted.

6.1.6 For ships assigned the class notation Offshore service vessel(+) scuttles or windows fitted in weathertight doors shall comply with [6.3].

6.2 Freeing ports and scuppers

The area of the freeing ports in the side bulwarks on the cargo deck is at least to meet the requirements of Pt.3 Ch.12 Sec.10.

The disposition of the freeing ports shall be carefully considered to ensure the most effective drainage of water trapped in pipe deck cargoes and in recesses at the after end of the forecastle. In such recesses appropriate scuppers with discharge pipes led overboard may be required.

If an emergency exit is located in a recess, freeing ports should be located nearby.

6.3 Windows and side scuttles for ships assigned class notation Offshore service vessel(+)

6.3.1 Typical arrangements complying with the requirements given below are shown in Figure 2 and Figure 3. Side scuttles will normally not be accepted in the ship sides below 3° tier forward of 0.1 $L_{LL}$ from forward perpendicular.
Guidance note:
Side scuttles below 3rd tier forward of 0.1 \(L_L\) from forward perpendicular may be accepted upon special consideration with respect to strength and position.

---end_of_guidance_note---

6.3.2 In the after end bulkhead of deckhouses and superstructures, in sides of deckhouses and of superstructures that are not part of the shell plating, windows will be accepted in second tier and higher, above the freeboard deck. In front bulkheads of deckhouses and superstructures, windows will be accepted in third tier and higher, above the freeboard deck. In the first tier of the front bulkhead above the weather deck (forecastle deck) only side scuttles will be accepted.

6.3.3 Hinged deadlights shall be fitted to:
- side scuttles in the vessel’s hull, i.e. shell plating
- windows and side scuttles in the sides of deckhouses and superstructures up to and including the third tier above the freeboard deck.
- all windows and side scuttles in front bulkheads of superstructures and deckhouses
- windows and side scuttles in the after end of bulkheads of superstructures and deckhouses, casings and companionways in the first and second tier above the freeboard deck
- windows and side scuttles in all bulkheads of the first tier on the weather deck.

6.3.4 Deadlights fitted in the side of third tier may be portable if they are stored near by
For tier four and above, unless it is the first tier above the forward weather deck, the deadlights may be portable if they are stored nearby.
In the second tier above the freeboard deck and higher, deadlights on windows may be arranged externally, provided there is easy and safe access for closing.
Other deadlights shall be internally hinged.

6.3.5 Deadlights shall be available for each type of window sited on the front of a wheelhouse that is located on the forward part of the vessel, unless the wheelhouse is located on fifth tier (or above) and is at least two decks above the forward weather deck. For externally fitted deadlights an arrangement for easy and safe access shall be provided (e.g. gangway with railing). The deadlights of portable type shall be stowed adjacent to the window for quick mounting. For the wheelhouse front windows, at least two deadlights shall have means for providing a clear view.

6.3.6 The strength of side scuttles with internally hinged deadlights and toughened glass panes shall comply with International Standard ISO 1751 as follows:

Type A (heavy): In the hull, in the sides of superstructures and in the front of superstructures and deckhouses (weather deck tier).

Type B (medium): In the after end of superstructures and in the sides and ends of deckhouses (except front in weather deck tier).

6.3.7 Windows shall have toughened safety glass panes of thickness, in mm, not less than as given below:

\[ t = \frac{b}{S} \sqrt{P \beta} \]

where:

\( \beta \) = factor obtained from the Figure 1
\( S \) = safety factor obtained from the Table 2
\( b \) = smaller dimension of the glass pane, in mm
\[ P = \text{local sea pressure as given in [3.4.1], in kN/m}^2. \]

**Figure 1 Curve for factor \( \beta \) based on window size ratio**

Furthermore, the thickness of windows should not be taken less than 10 mm.

When laminated glass panes are used, equivalent thickness according to formula given in Pt.3 Ch.12 Sec.6 [4.1.3] shall be applied.
Table 2 Safety factor (S)

<table>
<thead>
<tr>
<th>Window and tier</th>
<th>2\textsuperscript{nd}</th>
<th>3\textsuperscript{rd}</th>
<th>4\textsuperscript{th} and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front or side</td>
<td>100</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>Aft</td>
<td>100</td>
<td>150</td>
<td>200</td>
</tr>
</tbody>
</table>

6.3.8 Windows of design not in accordance with recognised international standards shall be approved by the Society on a case-by-case basis. Drawings showing details of the frame design, its fixation and material specification shall be submitted for approval.

6.3.9 For large windows with the lower edge positioned at or less than 900 mm above the deck, provision of handrails at a level approximately 1 m above the deck shall be considered when applicable.

Figure 2 Side scuttles and windows in supply vessel with complete superstructure and uppermost forecastle
Figure 3 Side scuttles and windows in supply vessel with forecastle only
SECTION 3 ANCHOR HANDLING AND TOWING VESSELS

Symbols
For symbols not defined in this section, see Pt.3 Ch.1 Sec.4.

1 Introduction

1.1 Introduction
The requirements in this section apply to vessels intended for anchor handling and towing operations offshore. Anchor handling operations implies towing of floating objects in open waters and objects on sea bed in addition to subsurface deployment and lifting of anchoring equipment. Towing operations implies towing of floating objects in open waters.

1.2 Scope
The following is covered by this section:
— design and testing requirements to towing and anchor handling equipment
— hull arrangement and supporting structure
— stability and watertight integrity.

Basic requirements for anchor handling and towing vessels are given in Sec.1 and Sec.2.

1.3 Application
Vessels with class notation Offshore service vessel intended for anchor handling operations built in compliance with the requirements in this section may be given the class notation qualifier Anchor handling. Vessels with class notation Offshore service vessel intended for towing operations built in compliance with relevant requirements in this section may be given the class notation qualifier Towing.

1.4 Testing requirements

1.4.1 The winch and other equipment made mandatory in this section shall be function tested according to approved procedure in order to verify
— the ability for the arrangement and equipment to operate within the specified limitations, towline paths, towline sectors etc. specified by the arrangement drawing
— the correct function of the normal operation modes
— the correct function of the emergency operation modes, including emergency release and dead ship operations.

1.4.2 The winch shall be load tested during hoisting, braking, and pay out. Design loads to be applied. However, a maximum load equal to BP may be accepted if the winch is not of novel design or complex structure.

1.4.3 The BP testing shall comply with applicable requirements in Ch.10 Sec.11 [1.4].
2 Hull

2.1 Deck structure

2.1.1 Scantlings of foundations and supports of towing pins shall be based on 2 times the specified maximum static working load specified by the designer.

2.1.2 Scantlings of foundations and supports of winches intended for towing functions shall be based on minimum 2.2 times the maximum BP of the vessel.

2.1.3 Scantlings of foundations and supports of winches intended for anchor handling functions shall be based on 1.5 times the specified maximum hoisting capacity or the maximum brake holding capacity of the winch whichever is the greater.

2.1.4 Scantlings of foundations and supports of stern roller shall be based on 2 times the maximum static working load as specified by the designer or 2 times the specified maximum hoisting capacity of the anchor handling winch whichever is the greater.

2.1.5 Scantlings of foundations and supports of shark jaws shall be based on 2 times the maximum static working load as specified by the designer.

2.1.6 Acceptable stresses, in N/mm², for the scantlings of the supporting structure resulting from bending moment $M$, in kNm, and shear force $Q$, in kN, calculated for the load given above are:

$$\sigma_b = \text{bending stress, in N/mm}^2, \text{taken as:}$$

$$\sigma_b = \frac{1000 \cdot M}{Z}$$

$$\sigma_b \leq 0.9 R_{eh}$$

$$\tau = \text{average shear stress, in N/mm}^2, \text{taken as:}$$

$$\tau = \frac{10 \cdot Q}{A_{shr}}$$

$$\tau \leq 0.9 \tau_{eh}$$

$Z = \text{net section modulus, in cm}^3$

$A_{shr} = \text{net shear area, in cm}^2$.

In case of direct strength calculations the equivalent von Mises stress, in N/mm², shall satisfy:

$$\sigma_{vm} \leq R_{eh}$$

2.2 Ship’s sides and stern

2.2.1 Where subjected to heavy loads when handling anchors, the stern and the flat part of bottom in way of stern shall be adequately strengthened. The net plate thickness shall not be less than twice the basic requirement stated in Sec.2 [2.3.2]. The deck adjacent to the stern shall be strengthened accordingly. If a substantial sheathing is fitted on the deck, the requirement may be modified.
3 Systems and equipment

3.1 General

3.1.1 The equipment shall meet the requirements in this section. Alternatively, equipment complying with a recognized standard may be accepted upon special considerations provided such standard gives a reasonable equivalence to the requirements of this section and fulfills the intention.

3.1.2 Arrangement drawing for anchor handling and towing with the content listed under documentation requirement in this section shall be posted on the bridge.

3.1.3 Structural elements, e.g. cargo rails, bulwarks, etc., that may support the towline during normal operation, shall have a radius of bend sufficient to avoid damage to the towline.

3.1.4 The arrangement shall be such that the heeling moment arising when the towline is running in the athwart ships direction, will be as small as possible.

3.1.5 Vessel with class notation qualifier Anchor handling shall be fitted with the following items:
— anchor handling winch
— shark jaw
— towing pins
— stern roller.

3.1.6 Vessel with class notation qualifier Towing shall be fitted with the following items:
— towing winch or towing hook.

3.1.7 The arrangement shall be such that the towline is led to the winch drum in a controlled manner under all foreseeable conditions (directions of the towline) and provide proper spooling on drum.

3.2 Materials for equipment

3.2.1 Shark jaw and towing pins with attachment shall be made of rolled, forged or cast steel in accordance with Pt.2 Ch.2.

3.2.2 For anchor handling and towing winch materials shall comply with relevant specifications given in Pt.2.

3.2.3 For forged and cast steel with minimum specified tensile strength, $R_m$ above 650 N/mm$^2$, specifications of chemical composition and mechanical properties shall be submitted for approval for the equipment in question.

3.2.4 Plate material in welded parts shall be of the grades as given in Pt.3 Ch.11 Sec.1 Table 11.

3.2.5 When $R_{eH}$ is greater than 80% of $R_m$, the following value shall be used as $R_{eH}$ in calculations for structural strength as given in [3.3]:

$$R_{eH} = \min\{R_{eH}, 0.8R_m\}$$

3.2.6 Fabrication of items in [3.4.1] shall be in accordance with the Society’s document DNVGL-ST-0378 Offshore and platform lifting appliances or a standard recognised by the Society.
3.3 Anchor handling and towing winch

3.3.1 Control system
The control stands shall provide a safe and logical interface to the operator with operating levers returning to stop position when released and in addition provide a clear view to the drums.
The anchor handling winch shall be capable of controlled operation during lowering and hoisting of anchors both submerged and over the stern roller.

3.3.2 Monitoring system
Device for measuring tension in tow rope should be fitted.

3.3.3 Emergency release
The winch shall be designed to allow drum release in an emergency, and in all operational modes. The release capabilities shall be as specified on arrangement drawing as required in [3.1.2].
The action to release the drum shall be from a position at the bridge with full view and control of the operation. Identical means of equipment for the release operation to be used on all release stations. After an emergency release the winch brake shall be in normal function without delay. It shall always be possible to carry out the emergency release sequence (emergency release and/or application of brake), even during a black-out. Control handles, buttons etc. for emergency release shall be protected against unintentional operation.

3.3.4 Structural strength of winch for anchor handling function
Winch for anchor handling function shall be capable of withstanding the maximum forces from hoisting, rendering and braking, including dynamic effects, without exceeding the following stress levels:
— hoisting including dynamic effect at relevant layer: $0.67 R_{eH}$
— braking at relevant layer as specified in [3.3.10]: $0.67 R_{eH}$
— rendering load/load in towline when drum starts to rotate in the opposite direction of the applied driving torque: $0.85 R_{eH}$.
Buckling and fatigue shall be considered according to a recognized standard or code of practice.

3.3.5 Structural strength for winch for towing function
The design and scantlings shall be capable of withstanding the winch holding capacity as given in Ch.10 Sec.11 [3.3] without permanent deformations at relevant layer. Buckling and fatigue shall be considered according to a recognized standard or code of practice.

3.3.6 Winch intended for both functions shall meet requirements both in [3.3.4] and [3.3.5].

3.3.7 Drums
The drum design shall be carried out with due consideration to the relevant operations. The drum diameter for steel wire rope should not be less than 14 times the maximum intended diameter of the rope. However, for all rope types, the rope bending specified by the rope manufacturer should not be exceeded.

3.3.8 Towline attachment
The end attachment of the towline to the winch barrel shall be of limited strength making a weak link in case the towline has to be run out.
At least 3 dead turns of rope are assumed on the drum under normal operation to provide proper attachment.
3.3.9 Brake on drum intended for towing
The brake shall normally act directly on drum and should be capable of holding the winch holding capacity as given in Ch.10 Sec.11 [3.3] at inner layer. It shall be arranged for manual operation or other means for activation during failure of the power supply.

3.3.10 Brake on drum intended for anchor handling
The brake shall normally act directly on drum. It shall be capable of holding at least 1.25 times the maximum torque created from towline pull including dynamic effect. In addition, the brake shall be capable of stopping the rotation of the drum from its maximum speed.

The holding load of the winch shall not be affected by failure in the power supply and the brake shall be actuated at power failure if the load is not controlled by the winch motors or similar. Means shall however be provided for overriding such systems at any time.

3.3.11 Brake on drums intended for both functions shall meet the requirements in [3.3.9] and [3.3.10].

3.4 Other equipment

3.4.1 The shark jaw shall be capable of sustaining the load defined on the arrangement drawing given in [3.1.2] without exceeding a stress level of \(0.67 R_{eH}\). Dynamic effect shall be included.

3.4.2 The towing pins shall withstand forces and towline sectors defined on the arrangement drawing given in [3.1.2] without exceeding a stress level of \(0.67 R_{eH}\). Dynamic effect shall be included.

3.4.3 If an emergency release on shark jaw and towing pins is arranged, the capabilities shall be as specified on the arrangement drawing given in [3.1.2].

3.4.4 When towing hook is fitted, applicable requirements in Ch.10 Sec.11 [3.5] shall be complied with.

3.5 Marking

3.5.1 Equipment shall be marked to enable them to be readily related to their specifications and manufacturer. When the Society's product certificate is required, the equipment shall be clearly marked by the Society for identification.

4 Stability

4.1 General requirements

4.1.1 For towing operations, stability shall comply with applicable requirements in Ch.10 Sec.11 [5.1].
SECTION 4 PLATFORM SUPPLY VESSELS

1 Introduction

1.1 Introduction
The requirements in this section apply to vessels designed specially for platform supply services.

1.2 Scope
In addition to the basic requirements given in Sec.1 and Sec.2, the section contains additional requirements for cargo handling arrangement and certification of cement and dry mud tanks onboard platform supply vessels.

1.3 Application
Vessels with class notation Offshore service vessel built in compliance with the relevant requirements in this section may be given the qualifier Supply.

2 Systems and equipment

2.1 General requirements for cargo handling arrangement

2.1.1 Systems and arrangements shall in general comply with the relevant requirements for main class given in Pt.4 Ch.6.
Redundancy requirements for cargo pumps as specified in Ch.5 Sec.4 [3.1.1] and Ch.6 Sec.6 [2.2.1] are not applicable.

2.1.2 Cargo pumps shall be provided with remote shut down devices capable of being activated from a dedicated cargo control location which is manned at the time of cargo transfer. Remote shut down shall also be capable of being activated from at least one other location outside the cargo area and at a safe distance from it.

2.1.3 Segregation between cargo piping systems where cross-contamination causes safety hazards or marine pollution hazards shall be by means of spectacle flanges, spool pieces or equivalent. Valve segregation is not considered equivalent.

2.1.4 Vessels intended for transportation of liquids with flashpoint below 60°C shall comply with Pt.6 Ch.5 Sec.9. Vessels that occasionally handle, store and transport recovered oil from a spill shall comply with Pt.6 Ch.5 Sec.11.

2.2 Cement and dry mud systems

2.2.1 Cement and dry mud tanks and piping systems shall in general be separated from the engine room.
Where cement and dry mud tanks are situated in way of engine room, at least the upper parts of the tanks with hatches, pipe connections and other fittings, shall be segregated from the engine room by a steel deck and bulkhead.

2.2.2 Where cement and dry cargo piping is led through the engine room, the wall gross thicknesses of the pipes shall not be less than given in Table 1. Pipe connections located in the engine room shall be welded as
far as practicable. Necessary detachable connections shall be of such design that blow-out is prevented. The arrangement will be specially considered in each particular case.

2.2.3 Access doors between the engine room and spaces in which cement and dry mud systems are located, shall be provided with signboard stating that the doors shall be kept closed while the system is under pressure.

2.2.4 Cement and dry mud tanks shall be certified in accordance with the requirements for pressure vessels given in Pt.4 Ch.7.

Table 1 Pipes for cement and dry mud. Minimum nominal wall gross thickness for steel pipes in engine room

<table>
<thead>
<tr>
<th>External diameter (mm)</th>
<th>Wall gross thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38 to 82.5</td>
<td>6.3</td>
</tr>
<tr>
<td>88.9 to 108</td>
<td>7.1</td>
</tr>
<tr>
<td>114.3 to 139.7</td>
<td>8.0</td>
</tr>
<tr>
<td>152.4 to 273</td>
<td>8.8</td>
</tr>
</tbody>
</table>

2.3 Liquid mud systems

2.3.1 Liquid mud carried onboard supply vessels shall have a flash point not lower than 60°C.

2.3.2 Means for relief of overflow shall be provided, e.g. through a non-return valve fitted in a branch connection to the air pipe. The sectional area of the overflow pipe shall be at least twice that of the filling pipe.
SECTION 5 STANDBY VESSELS

Symbols

For symbols not defined in this section, see Pt.3 Ch.1 Sec.4.

\[ s_s = \text{standard frame spacing in m} \]
\[ = 0.48 + 0.002 L \]
\[ = \text{maximum 0.61 m forward of collision bulkhead and aft of the after peak bulkhead.} \]

1 Introduction

1.1 Introduction

The requirements in this section apply to vessels especially designed to carry out rescue and standby services to offshore installations.

1.2 Scope

This section contains requirements for hull arrangement, strength and equipment.

1.3 Application

Vessels built in compliance with the requirements in [1] to [6] of this section, except [2.2], may be given the class notation Standby vessel.

Guidance note:

The flag administration may have requirements for the same items found in these rules. The stricter one is expected to prevail.

If in addition the vessel complies with requirements on strengthening of the superstructure and deckhouses given in [2.2], the notation may be extended to Standby vessel(S).

Guidance note:

The notation Standby vessel(S) is recommended for vessels primarily to operate in harsh weather conditions, e.g. the North Sea.

2 Hull

2.1 Ship’s sides

2.1.1 The net section modulus of transverse stiffeners or side longitudinals, in cm³, shall not in any region be taken less than:

\[ Z_1 = 1.25 Z \]

where:

\[ Z = \text{net section modulus, as given in Pt.3 Ch.6 Sec.5 and Pt.3 Ch.6 Sec.8.} \]

All stiffeners up to second deck above freeboard deck, and forward of 0.2 \( L \) from F.E. up to forecastle deck, shall have end connections with brackets.
2.1.2 Longitudinal steel fenders shall be fitted on the ship’s sides at freeboard cargo deck and second deck above. The steel fenders shall extend not less than 0.02 \( L \) forward of the section where the deck has its full breadth.

In way of steel fender area along the level of the freeboard cargo deck and second deck above, the net thickness, in mm, for a breadth not less than \( 800 + 5 \, L \), in mm, shall not be taken less than:

\[
t = (4.5 + 0.05L) \frac{b}{s_s}
\]

The ratio \( b/s_s \) shall not be taken as less than 1.0. If steel fenders are omitted, as for instance within the rescue zone, the above minimum thickness shall be increased by 50%, for a breadth not less than 0.01\( L \), in m, along the level of the freeboard cargo deck and the second deck above.

If the vessel is not assigned with class notation Offshore service vessel, the net side plate thickness above the bilge, in mm, in way of the rescue zone, shall not be less than:

\[
t = \max\left[(4.5 + 0.04L) \frac{b}{s_s} ; 6.5\right]
\]

2.1.3 The net plate thickness of the exposed weather deck at the rescue zone, in mm, within at least 1.0 m from the ship side, shall not be less than:

\[
t = 6.0 + 0.02 \, L
\]

2.1.4 Bulwark gross plate thickness shall not be less than 7 mm. On the main weather deck the bulwark stays shall have a depth not less than 350 mm at deck and positioned at every second frame. Open rails shall have ample scantlings and efficient supports.

2.1.5 Scantlings of foundations and supports of towing winch and towing hook shall withstand a load 0.04 \( P_S \) tonnes, where \( P_S \) is the total power of the propulsion engines in kW. Acceptable stresses, in N/mm\(^2\), in the supporting structure resulting from bending moment \( M \), in kNm, and shear force \( Q \), in kN, calculated for the load given above are:

\[
\sigma_b = \text{bending stress, in N/mm}^2, \text{ taken as:}
\]

\[
\sigma_b = \frac{1000 \cdot M}{Z}
\]

\[
\sigma_b \leq 0.9 \, R_{eH}
\]

\[
\tau = \text{average shear stress, in N/mm}^2, \text{ taken as:}
\]

\[
\tau = \frac{10 \, Q}{A_{shr}}
\]

\[
\tau \leq 0.9 \, \tau_{eH}
\]

\[
Z = \text{net section modulus, in cm}^3
\]

\[
A_{shr} = \text{net shear area, in cm}^2
\]

In case of direct strength calculations the equivalent von Mises stress, in N/mm\(^2\), shall satisfy:

\[
\sigma_{vm} \leq R_{eH}
\]
2.2 Steel deckhouses and superstructures for ships assigned class notation

**Standby vessel(S)**

2.2.1 Scantling for superstructures and deckhouses

The net section modulus, in cm³, of stiffeners and beams not contributing to longitudinal strength shall not be less than:

\[ Z = \frac{f_u \cdot P \cdot s \cdot e_{bdg}^2}{f_{bdg} \cdot C_s \cdot R_{eH}} \]

where:

- \( P \) = design pressure in kN/m²
  - \( P_D \) for exposed decks
    - \( \max(P_{SI}; P_W) \) for exposed superstructure side
    - \( P_A \) for exposed end bulkheads and deckhouse boundaries
  - minimum 10 kN/m² for weather decks
  - minimum 5 kN/m² for top of the wheelhouse
  - 8 kN/m² for accommodation decks, aft of 0.2 \( L \) from A.E. and forward of 0.2 \( L \) from F.E.
  - 6.5 kN/m² elsewhere

- \( P_D \) = design sea pressure, in kN/m², as given in Pt.3 Ch.4 Sec.5 [2] and [3], as applicable
- \( P_{SI} \) = design sea pressure, in kN/m², for superstructure side as given in Pt.3 Ch.4 Sec.5 [3]
- \( P_W \) = wave pressure, in kN/m², for superstructure side as given in Pt.3 Ch.4 Sec.5 [1.3]
- \( P_A \) = design sea pressure, in kN/m², for end bulkheads of superstructure and deckhouse boundaries as given in Pt.3 Ch.4 Sec.5 [3]

- \( f_{bdg} \) = bending moment factor as defined in Pt.3 Ch.6 Sec.6 Table 1. For stiffeners with end fixity deviating from the ones included in Pt.3 Ch.6 Sec.6 Table 1, with complex load pattern, or being part of a grillage, the requirement in Pt.3 Ch.6 Sec.5 [1.2] applies

- \( f_u \) = Factor for unsymmetrical profiles, as given in Pt.3 Ch.6 Sec.5 [1.1.2].
- \( C_s \) = permissible bending stress coefficient, taken as:
  - \( C_s = 0.75 \) for acceptance criteria set AC-II.

2.2.2 Stiffeners shall have effective end connections, i.e. with brackets or welded webs. Stiffeners on lower front bulkhead on weather deck forward shall have brackets at the lower ends.

2.2.3 The net plate thickness, in mm, in superstructures and deckhouses shall not be less than:

\[ t = (t_0 + 0.02L) \cdot c \cdot \sqrt{k} \]

where:

- \( t_0 \) = 4.5 for front bulkheads and weather deck forward of the lowest tier of the front bulkhead
  - 3.5 for sides and aft end bulkheads and weather decks elsewhere
  - 3.0 for superstructure and deckhouse decks (in way of accommodation).
- \( c \) = coefficient taken as:
  - \( c = \max\left(\frac{b}{650}, 1.0\right) \)
3 Systems and equipment

3.1 Towing arrangement

3.1.1 When the vessel is fitted with means for emergency towing, the towing winch and or towing hook shall satisfy the requirements given in Ch.10 Sec.11 [3.3.2], Ch.10 Sec.11 [3.5.2] and Ch.10 Sec.11 [3.7.6].

3.1.2 For ships which are not built according to the rules for Tug, Towing, Anchor handling or AHTS notation, the towing wire and all connected parts shall have a minimum breaking load of 0.04 $P_S$ tonnes, where $P_S$ is the total power of the propulsion engines in kW.

3.1.3 All loose gear of the towing equipment, like shackles, rings, wire and ropes shall be delivered with a work's certificate.

3.2 Exhaust outlets

3.2.1 Exhaust outlets from diesel engines shall have spark arrestors.

3.3 Propulsion

3.3.1 The vessel shall be fitted with 2 propulsion systems or similar capable of moving the vessel in the forward/aft direction.

4 Fire safety and lifesaving appliances

4.1 Rescue zone arrangement, equipment and facilities

4.1.1 The vessel shall be arranged on each side with a rescue zone with minimum 8 m length. The area shall be clearly marked on the ship's side. Its location shall be sufficiently far away from the propellers and clear of any ship side discharges up to 2 m below the loaded waterline.

4.1.2 Access routes from the rescue zones to survivors' accommodation and to helicopter winch zone if provided shall have slip-resistant deck coating or wooden lining with surface treatment giving equivalent properties.

4.1.3 The ship's side in way of the rescue zone shall be free of any obstruction, like for example, fenders, and clear of any discharge pipe connections.

4.1.4 Satisfactory lighting shall be available along the rescue zone capable of providing minimum illumination level of 150 lux at the rescue zone and 50 lux at 20 m from the vessel.

4.1.5 Deck area in way of the rescue zone should preferably be free from air pipes, valves, smaller hatches etc. However, when this becomes impractical, proper arrangement shall be provided to protect against personnel injury.

4.1.6 To enable direct boarding on the deck, bulwark or railings in the rescue zone shall be easy to open or remove.
4.1.7 A searchlight shall be available on each side and operated from the navigation bridge. The searchlights should be able to provide an illumination level of 50 lux in clear air, within an area not less than 10 m diameter, to a distance of 250 m.

4.1.8 Each rescue zone shall be provided with a scrambling net made of corrosion resistant and non-slip material.

4.1.9 The vessel shall be provided with power assisted means capable of ensuring careful recovery of disabled persons from the sea.

4.1.10 A decontamination area equipped with a shower system shall be arranged for cleaning survivors and crew before entering the superstructure.

4.2 Survivors spaces

4.2.1 The vessel shall have a treatment room for casualties, a recovery room with berths, and enclosed space to accommodate survivors. These spaces shall be provided with lighting and means to control temperature and humidity suitable for the area of operation. The survivors may be accommodated in crew spaces, excluding sanitary rooms, treatment rooms, galley, wheelhouse, radio room, cabins for captain and two crew members. The designed capacity of survivors shall be determined considering 0.75 m$^2$ per person. This includes free floor space and floor space with loose furniture, fixed seating and/or fixed beds. Other fixed furniture, toilets and bathrooms shall be excluded. Corridors and doors giving access to the treatment room for casualties and recovery room shall be dimensioned to allow adequate transport of survivors by stretchers.

4.2.2 Sanitary facilities shall be available exclusively for the survivors. At least one installation comprising a toilet, a wash basin and shower shall be provided for each group of 50 survivors.

4.3 Safety equipment

4.3.1 The vessel shall be equipped with at least one fast rescue boat of type complying with IMO MSC/Circ.809, arranged and maintained to be permanently ready for use under severe weather conditions. The launching arrangement shall be a SOLAS approved type.

4.3.2 The following minimum safety equipment shall be provided when the vessel has a gross tonnage less than 500:
   — one line-throwing appliance with not less than four projectiles and four lines
   — one daylight signalling lamp
   — six lifebuoys, 4 being with a self-igniting light and buoyant line (SOLAS approved type)
   — one SOLAS type approved immersion suit for each crew member
   — one SOLAS type approved lifejacket for each crew member plus 25% of the number of survivors for which the vessel is intended to carry.

4.4 Care of personal

4.4.1 The treatment room shall have adequate equipment and medical supplies.

4.4.2 Treatment room equipment and medical stores shall be arranged as required by local regulations or based on recognised standards.
5 Stability

5.1 Intact and damage stability

5.1.1 The vessel shall comply with intact stability requirements as given in Sec.2 [5] and damage stability requirements as given in Pt.6 Ch.5 Sec.6.

Guidance note:
A detailed description of stability documentation is given in the Society’s document DNVGL-CG-0157 Stability documentation for approval.

6 Openings and closing appliances

6.1 Freeing ports

6.1.1 The area of the freeing ports in the side bulwarks on the cargo deck shall at least meet the requirements of Pt.3 Ch.12 Sec.10. The arrangement of the freeing ports shall be carefully considered to ensure the most effective drainage of water trapped on the weather deck.

6.2 Weathertight doors

6.2.1 The arrangement and sill heights of weathertight doors shall comply with Pt.3 Ch.12 Sec.6. Doors in exposed positions on the lowest weather deck and in lowest unprotected fronts and sides shall be of steel.

6.2.2 For doors located in exposed positions in sides and front bulkheads, the requirements to sill heights apply one deck higher than given by Pt.3 Ch.12 Sec.6.

6.2.3 Doorways to the engine room and other compartments below the weather deck shall, as far as practicable, be located at a deck above the weather deck. Alternatively, two weathertight doors in series may be accepted.

6.3 Windows and side scuttles

6.3.1 Arrangement of windows and scuttles shall comply with the requirements given in Sec.2 [6.3].
SECTION 6 WINDFARM MAINTENANCE VESSELS

1 Introduction

1.1 Introduction

1.1.1 The requirements in this section apply to vessels intended for maintenance of offshore wind farms. Wind farm maintenance may include:
— being a mother craft for smaller craft transferring technicians to and from offshore wind turbines
— transferring technicians directly to the wind turbine
— transferring supplies to the wind turbine
— perform smaller lifting operations onto the wind turbine.

1.2 Scope

1.2.1 This section contains requirements to hull arrangement, strength, and equipment.

Guidance note:
Coastal state and/or statutory regulations may include requirements in excess of the provisions of these rules depending on the size, type, location and intended service of the unit/installation. These requirements are excluded from this section.

1.3 Application

1.3.1 Vessels with class notation Offshore service vessel intended for maintenance of offshore wind farms built in compliance with the requirements in this section may be given the class notation qualifier Windfarm maintenance.

2 Testing requirements

2.1 Cranes

2.1.1 After completed installation on board, load- and functional testing of the crane shall be carried out as specified in DNVGL-ST-0378 Offshore and platform lifting appliances.

2.2 Work boat davits

2.2.1 Testing at factory and after installation on board shall be performed in line with IMO MSC. 81(70) part 2.
3 Hull

3.1 Hull arrangement and strength

3.1.1 The hull structural strength shall be as required for the main class taking into account necessary strengthening of supporting structures for equipment applied during the maintenance and service of offshore wind farms.

3.1.2 All load effects caused by deck cargo and heavy equipment shall be accounted for in the design calculations for all operational phases.

4 Systems and equipment

4.1 Cranes

4.1.1 For wind farm maintenance vessels equipped with cranes, the class notation Crane shall be complied with, see Pt.6 Ch.5 Sec.3.

4.1.2 The crane shall be delivered with the Society's product certificate to confirm compliance with DNVGL-ST-0378 Offshore and platform lifting appliances.

4.2 Offshore transfer systems

4.2.1 If the vessel is equipped with an offshore transfer system to transfer technicians from the ship to the wind turbine, the transfer system shall be delivered with the Society's product certificate to confirm compliance with DNVGL-ST-0358 Certification of offshore gangways for personnel transfer.

4.3 Work boat davits

4.3.1 Where fitted, work boat davits and winches shall comply with SOLAS 1974 and the LSA Code.

4.3.2 Functional and operational requirements:
— no requirements to heel or trim unless specified by operator
— stored mechanical power not required, however lowering in dead ship condition shall be possible
— no requirements to hoisting or lowering speed unless specified by the flag administration
— if estimated dynamic factor exceed 1.5, shock damper arrangement is required.

4.3.3 In addition to strength requirements given in the above regulations, fatigue check according to a recognised standard shall be performed.

4.4 Work boats

4.4.1 All work boats fitted onboard shall be certified by the Society according to the Society’s document DNVGL-ST-0342, Craft

4.4.2 The ship side in way of the work boats shall be equipped with fenders to reduce the impact during launch and recovery of the craft.
5 Dynamic positioning

5.1 Dynamic positioning system

5.1.1 The vessel shall be built, as a minimum, according to class notation DYNPOS(AUTR), DPS(2) or DYNPOS(E).

5.2 Capability plots

5.2.1 The position keeping ability of the vessel shall be calculated and presented in form of capability plots as outlined in these rules. The capability plots shall be kept onboard.

Guidance note:
It is recommended that DNV GL standard DNVGL-ST-111 *Assessment of station keeping capability of dynamic positioning vessels* is used as a guideline for making capability plots.

5.2.2 The capability plots shall be produced in polar form, as a static analysis with coincident forces of wind, waves, and current. In the analysis the vessel shall maintain fixed position and heading, and shall be exposed to forces from a fixed current speed corresponding to the intended location of operation but in any case not less than 1.5 m/s with correlating wind and waves. The fixed current speed applied shall be specified in the appendix to classification certificate.

5.2.3 Thus there shall at the same time be a balance of forces and a balance of moments, i.e. including all moments generated by the thrusters, and those caused by environmental forces.

5.2.4 The limiting wind speed where the current, wind and wave forces equals the maximum available thruster forces shall be plotted at least every 15° around the vessel. Linear interpolation between points is acceptable.

5.2.5 The environmental forces caused by wind, waves, and current shall be calculated by recognised methods.

Guidance note:
Alternatively, environmental forces established by model testing may be used. The correlation between wind and waves used for DNV GL DP capability numbers is given in Pt.6 Ch.3 Sec.1.

5.2.6 The capability plots shall be based upon available power and the thrust output that is under control, in the most efficient control mode.

5.2.7 A minimum of four plots is required:
- Case 1 shall represent optimal use of all thrusters
- Case 2 shall represent minimum effect of single-thruster failure
- Case 3 shall represent the maximum effect of single-thruster failure
- Case 4 shall represent the worst case failure modes. There shall be one plot for failure of each redundancy group or an amalgamated plot shall be provided with the lowest result for each heading across all the redundancy groups.

All plots shall be produced on the same scale.
**Guidance note:**

It is recommended that the wind speed scale is 15 mm = 10 m/s and with range 0 to 50 m/s.

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**Guidance note:**

An amalgamated plot shall represent the vessel capability in all directions and can therefore in many cases represent several different failure conditions, as the WCSF typically will be heading dependent.

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CHANGES – HISTORIC

July 2016 edition

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

- Sec.2 Offshore service vessels
  - Sec.2 [2.3.3]: Amended the application of end brackets for transverse and side longitudinal stiffeners.
  - Sec.2 [3.4.1]: Updated rule reference to Pt.3 Ch.4 Sec.5 [1.3] for wave pressure on exposed superstructure.

- Sec.5 Standby vessels
  - Sec.5 [2.1.1]: Amended the application of end brackets for transverse and side longitudinal stiffeners.
  - Sec.5 [2.1.2]: The plate width of the increased fender plate thickness has been amended in order to get in line with current industry practice.
  - Sec.5 [2.1.3]: The minimum thickness requirement on exposed weather deck at the rescue zone has been corrected after adjustments made to the general minimum thickness requirement in Pt.3 for weather decks. The minimum thickness requirement will be in line with current industry practice.
  - Sec.5 [2.2.1] Updated rule reference to Pt.3 Ch.4 Sec.5 [1.3] for wave pressure on exposed superstructure.

October 2015 edition

This is a new document.
The rules enter into force 1 January 2016.

Amendments January 2016

- Sec.2 Offshore service vessels
  - Table 1: Amended the reference notes for acceptance criteria AC-I.
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