

STANDARD

DNVGL-ST-E272

Edition February 2016

2.7-2 Offshore service modules

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FOREWORD

DNV GL standards contain requirements, principles and acceptance criteria for objects, personnel, organisations and/or operations.

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CHANGES – CURRENT

General

This document supersedes DNV Standard for Certification 2.7-2, May 2013.

Text affected by the main changes in this edition is 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.

On 12 September 2013, DNV and GL merged to form DNV GL Group. On 25 November 2013 Det Norske Veritas AS became the 100% shareholder of Germanischer Lloyd SE, the parent company of the GL Group, and on 27 November 2013 Det Norske Veritas AS, company registration number 945 748 931, changed its name to DNV GL AS. For further information, see www.dnvgl.com. Any reference in this document to "Det Norske Veritas AS", "Det Norske Veritas", "DNV", "GL", "Germanischer Lloyd SE", "GL Group" or any other legal entity name or trading name presently owned by the DNV GL Group shall therefore also be considered a reference to "DNV GL AS".

Main changes February 2016

- Title
 - Addition of 2.7-2 in title of document.
- All sections
 - Reference to DNV has been changed to DNV GL.
 - Reference to DNV Offshore Service Module Certificate has been changed to DNV GL product certificate.
 - All sections (except Sec.3): Addition of guidance notes, comments or clarification of existing requirements within the standard.
- Sec.3 Structural technical requirements
 - Sec.3 has been restructured to present requirements in a more user friendly format.

Editorial corrections

In addition to the above stated main changes, editorial corrections may have been made.

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SECTION 1 INTRODUCTION

This standard for certification has been issued in order to collect into one document a suitable collection of requirements with relevant appropriate references to various international codes and standards which are applicable to the design and installation of offshore service modules.

Offshore service modules are designed to perform temporary services on offshore installations and may be placed on different offshore installations and units in different national waters.

This standard for certification applies basic requirements from other DNV GL rules and standards to offshore service modules and has been based primarily on recognised practices for the offshore industry. It is intended that the standard will be suitable for global usage. It should, however, be noted that some shelf or flag states may have stricter or other requirements than those given in this standard.

Modules designed and manufactured in compliance with DNV 2.7-2 are intended to meet the basic requirements of SOLAS, MODU code and DNV Offshore Standards relevant to the functions of the equipment and as applicable at date this standard was issued. All subject to adequate installation of the equipment when located on the offshore installation (which is out with the scope of this standard).

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1.1 Relationship with other standards, codes and regulations

1.1.1 The International Maritime Organization (IMO)

The requirements in the SOLAS Code apply for Offshore Service Modules utilised on ships and certain floating offshore installations. The requirements in the MODU Code apply for offshore service modules utilised on floating offshore drilling units, including jack-up installations. This applies irrespective of the time such modules are installed and used.

DNV 2.7-2 is intended to meet the basic safety requirements of SOLAS and MODU code with regard to escape provision, fire detection and fire protection.

1.1.2 DNV Rules for Classification of Ships / DNV Offshore Standards.

Offshore service modules that are installed on a DNV GL classed offshore Installation may be subject to classification requirements, either in main class or other class notations. DNV 2.7-2 includes the basic requirements of these documents, for main class items, when applied to temporary installations. DNV 2.7-2 is not intended to replace certification to the DNV Rules for Classification of Ships/DNV Offshore Standards for permanently installed equipment or conversions. Equipment needing type approval or product certification or type approval certificate (as defined in DNV Rules for Ships or Offshore Standards) shall be certified in accordance with the relevant rules/ standard prior to commissioning and use in a DNV 2.7-2 module.

When equipment is located on a DNV GL classed offshore installation it is required to be assessed by DNV GL to ensure any aspects which interface with a class systems have been correctly installed and to ensure that general safety principles have been adhered. This considers the location/integration of the equipment and confirms that relevant installation and hook-up requirements specified in the DNV GL product certificate have been satisfied. It is not the intention of this standard to address the requirements for commissioning on a DNV GL class unit, these remain the responsibility of the vessel/offshore unit owner/manager.

1.1.3 Relationship to previous revisions of this standard

This revision has been published to provide additional information and clarifications on a limited number of existing requirements, as presented in the May 2013 edition, with the intention of simplifying the implementation of these requirements. Minor typing errors have also been corrected in this revision.

Design assessment and certification to the previous revision of this standard shall not be conducted six months following release of this revision.

SECTION 2 GENERAL

2.1 Objective

The objective of this standard for certification is to set requirements for offshore service modules focussed on the safety impact to the offshore installation upon which the equipment is installed.

When installed and used on floating offshore installations, service containers are subject to the regulations applicable to an offshore installation (i.e., IMO MODU/SOLAS, Class, flag state and national regulations). When offshore service containers are installed and used on fixed offshore installations, national regulations will apply.

It has been recognised that individual interpretations of all the various codes and standards may sometimes lead to conflicting requirements. This standard for certification intends to prescribe solutions which will provide an equivalent level of safety as the codes and standards referred to throughout this document.

Certification by DNV GL provides a document which may be presented to users of the module to document its technical standard and safety performance. The certificate also defines conditions for transportation to, and installation on, an offshore installation.

2.2 Definitions

Accommodation space

Those used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, pantries containing no cooking appliances and similar spaces. Public spaces are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

Guidance note:

The term "cabins" relates to sleeping areas. "Offices" are considered as spaces for paperwork/administrative tasks only. Facilities for office work incorporated into the same space as low voltage control/monitoring equipment or laboratories, without an internal source of release, would not be considered an office/accommodation space.

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Category A machinery space:

All spaces which contain internal combustion-type machinery used either for main propulsion or for other purposes where such machinery has in the aggregate a total power of not less than 375 kW or which contain any oil-fired boiler or oil fuel unit; and trunks to such spaces.

Certified safe equipment:

Certified safe equipment is equipment certified by an independent national test institution or competent body to be in accordance with a recognised standard for electrical apparatus in hazardous areas.

Essential/safety system:

Module integrated systems including required utilities, which are provided to prevent, detect or warn of an accidental event and/or mitigate its effect. This may include;

- fire and gas detection systems
- shutdown systems
- PA/GA systems
- supplies from emergency power or UPS sources
- fire protection and extinguishing system.

Extreme location:

Areas which are out with the range of locations defined for Mid-point location.

Gas tight:

Doors, walls or dampers which will maintain a pressure differential between adjacent areas, the allowable leakage rate will not exceed 0.5 m³/ m²h at +50Pa.

Important services:

Services provided by the module to the offshore installation which are critical to the safety of the offshore installation or modules that prevent, protect or mitigate from the effects of an accidental event. Examples may include accommodation units, emergency generator units, well intervention equipment.

Low flame spread:

A surface, which in accordance with the IMO Fire Test Procedures (FTP) Code, will adequately restrict the spread of flame.

Manned:

Manned for more than 2-hours in a 24-hour period. If manning is provided and located externally requirements for emergency lighting and ventilation are not considered mandatory.

Maximum operational weight

Maximum weight of the module during operation on deck, including materials, fluids (e.g. diesel, water or hydraulic fluid) or process materials (e.g. mud, cuttings) contained in the unit during operation (this may be different to the Maximum Rating defined for the purposes of transportation and lifting).

Mid-point location:

Area between 0.2 and 0.7 times the offshore installation/vessel length, measured from the aft.

Non-combustible material:

Material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750°C, this being determined in accordance with the IMO Fire Test Procedures (FTP) Code.

Offshore container:

A portable container with a maximum gross mass not exceeding 25,000 kg, for repeated use in the transport of goods or equipment, handled in open seas, to, from or between fixed and/or floating offshore installations and ships. See DNV 2.7-1 for a more detailed definition.

Offshore installation:

This is used as a short term and may be a fixed offshore installation, a mobile offshore unit or a ship on which the module may be located.

Offshore service module:

A unit built and equipped for a special service task, mainly for temporary installation, on offshore installations.

This applies equally to offshore frames with equipment but for ease of reference we will refer throughout the standard to offshore service modules.

Portable offshore unit:

A "POU" (portable offshore unit) is a package or unit intended for repeated or single offshore transportation and installation/lifting. POU's may also be designed for subsea lifting. See DNV 2.7-3 for more detailed definition.

Primary deck covering:

Deck covering which will not readily ignite in accordance with the IMO Fire Test Procedures (FTP) Code.

Short circuit proof

Installation following one of the following methods:

- bare conductors mounted on isolating supports
- single core cables (i.e. conductors with both insulation and overall jacket) without metallic screen or armour or braid, or with the braid fully insulated by heat shrink sleeves in both ends
- insulated conductors (wires) from different phases kept separated from each other and from earth by supports of insulating materials, or by the use of outer extra sleeves

- double insulated wires or conductors.

Source of release

Point or location from which a flammable substance may be released into the room or building such that an explosive gas atmosphere could be formed.

Standard fire test:

A test in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature in accordance with the test method specified in the IMO Fire Test Procedures (FTP) code.

Unmanned:

Areas not 'manned' in accordance with the definition in this standard.

2.3 Referenced class rules, regulations and standards

The following standards include provisions which, through reference in the text, constitute provisions of this standard. The latest issue of the references will be used unless otherwise agreed. Where the referenced DNV standard in this document has been superseded by a DNV GL version, the DNV GL version shall be considered as the latest issue. Other recognised standards may be used provided it can be demonstrated that these meet or exceed the requirements of the standards referenced below:

- IMO requirements:
 - CSC, IMO Convention for Safe Containers
 - IMO FSS, International Code for Fire Safety Systems
 - IMO FTP, International Code for Application of Fire Test Procedures
 - MSC.1/Circ. 1275 – Unified Interpretation of SOLAS Chapter II-2 on the number and arrangement of portable fire extinguishers on board ships
 - MODU, IMO Code Mobile Offshore Drilling Units
 - SOLAS, IMO Convention Safety of Life at Sea.
- DNV Classification Note No. 8 Conversion Of Ships
- DNV Offshore Standards:
 - DNV-OS-A101- Safety Principles and Arrangements
 - DNV-OS-D101- Marine and Machinery Systems and Equipment
 - DNV-OS-D201- Electrical Installations
 - DNV-OS-D301- Fire Protection
 - DNV-OS-E101- Drilling Plant
 - DNV-OS-E201- Oil and Gas Processing Systems
 - DNV-OS-E402- Offshore Standard for Diving Systems.
- DNV Rules for Ships Pt.3, Ch.1 - Hull Structural Design
- DNV Service Specification DNV-DSS-105- Rules for Classification of Diving Systems
- DNV Standard DNV-DS-E403- Standard for Surface Diving Systems
- DNV Standard for Certification:
 - DNV STC 1.2 Type Approval
 - DNV STC 2.22 Lifting Appliances
 - DNV STC 2.4 Environmental Test Specification for Instrumentation and Automation Equipment
 - DNV STC 2.7-1 Offshore Containers
 - DNV STC 2.7-3 Portable Offshore Units.

- IEC publications:
 - IEC 60079 Series - Explosive atmospheres
 - IEC 60092 Series - Electrical installations in Ships
 - IEC 61892 Series - Mobile and fixed offshore units – Electrical installations.
- NORSOK publications:
 - Norsok E-001 – Electrical Systems
 - Norsok Z-015 – Temporary Equipment.

2.4 Abbreviations

Table 2-1 Abbreviation

<i>Abbreviation</i>	<i>Description</i>
CCR	central control room
DNV	DNV GL
DNV 2.7-1	Offshore Containers
DNV 2.7-2	Offshore Service Modules
DNV 2.7-3	Portable Offshore Units
EMC	electro magnetic compatibility
EN	European Normative Standard
ESD	emergency shutdown
EU/EEA	European Union / European Economic Area
F&G	fire and gas
FSS	fire safety systems
FTP	fire test procedure
IEC	International Electro-technical Commission
IMDG	The International Maritime Dangerous Goods Code
IMO	International Maritime Organisation
IP	ingress protection
LEL	lower explosive limit
MODU	IMO Code Mobile Offshore Drilling Units
MOU	mobile offshore unit
P & ID	piping and instrumentation diagram
PA/GA	public address / general alarm
PFP	passive fire protection
PLC	programmable logic controller
POU	portable offshore unit
SOLAS	IMO Convention Safety of Life at Sea
STC	DNV standard for certification
UPS	uninterruptable power supply

SECTION 3 STRUCTURAL TECHNICAL REQUIREMENTS

3.1 General

Offshore service modules will be subject to various static or dynamic loads during transportation, handling and operation on offshore installations. In addition to principal loads such as the unit weight and the effects of lifting, miscellaneous loads associated with a units' proposed location and mode of operation should also be defined and considered where applicable.

In addition to relevant lifting and transportation related loads (see [3.2]), offshore service modules for use on floating offshore installations will be subject to additional forces during operation. Applicable loads based upon offshore installation type are specified in sections [3.3] and [3.4]. Figure 3-1 summarises the main structural criteria to be defined by the designer and satisfied where relevant, depending on operational requirements.

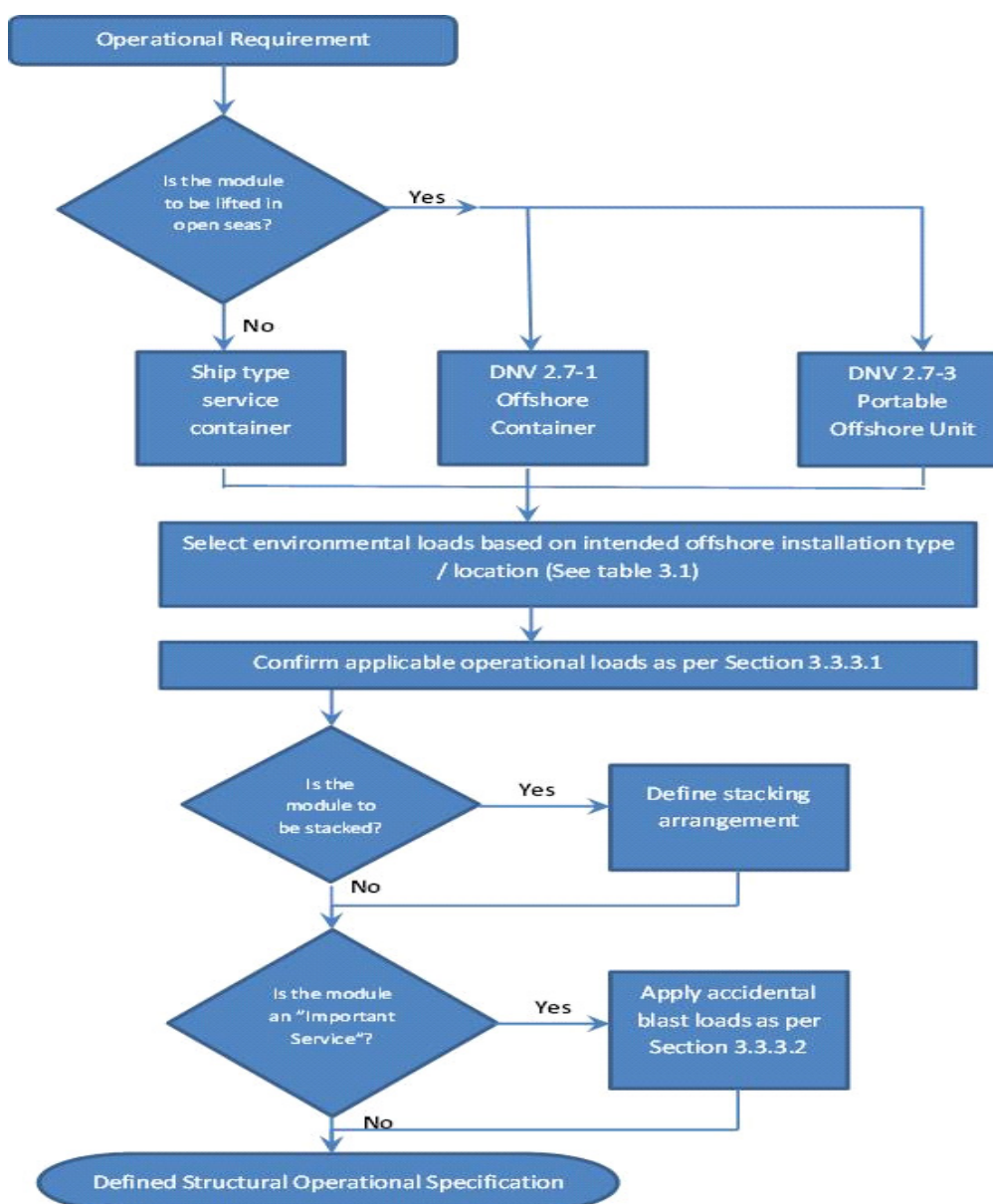


Figure 3-1
Operational specification - structural assessment

3.2 Lifting

Units certified to DNV 2.7-2 shall also be approved and certified by DNV GL using one of the three following schemes:

- Standard for Certification No. DNV 2.7-1, (including IMO/MSC/Circ.860) Offshore Containers
- Standard for Certification No. DNV 2.7-3, Portable Offshore Units
- Ship type service containers – These will not be used for lifting between vessels and/or offshore installations at sea.

Guidance note 1:

Offshore containers and portable offshore units certified by another organisation shall be considered on a case by case basis following verification of the design and surveillance of the container/unit.

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Guidance note 2:

Units should be certified as ISO/CSC containers if sea-transportation as a freight container is required.

Building units as ISO/CSC containers will facilitate international transport by sea, since such units can be carried as standardized cargo units on container carriers and other dry cargo ships. Modules that are not ISO/CSC containers will normally be transported as special cargo.

Modules built according to ISO freight container standards, ISO 1496 must be certified to IMO's Convention for Safe containers, CSC. The structural requirements in ISO 1496 and CSC are related to transport and handling, and are not generally relevant for units when installed on ships or offshore installations and as such will be subject to the additional requirements outlined in this Section.

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Guidance note 3:

Modules which are based on ship type service containers may not require certification of the primary frame with respect to lifting; these modules are not subject to lifting in open seas. The requirements for certification will be dictated by the end user and/or local regulations prevalent in the country in which it is lifted. Unless explicitly requested, lifting aspects will not be addressed during the certification process for ship type service containers.

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3.2.1 Additional fittings for lifting

In addition to the pad eyes and slings used for offshore handling, some Offshore Containers and Portable Offshore Units are built with extra sets of fittings for lifting and handling. These may include pad eyes, tugger points, etc used for handling the module on an offshore installation only. Such equipment, including the supporting structure, must be dimensioned according to DNV 2.7-1, DNV 2.7-3 or DNV Standard for Certification No. 2.22, Lifting Appliances.

These additional fittings must not be used to lift a module unit to or from a supply vessel. This will be stated in the certificate and shall be clearly marked on the module.

3.3 Offshore installation induced loads

3.3.1 General

Installation induced and other miscellaneous loads should be defined and documented by the Designer and/or Customer – realistic values may be specified for generic operational conditions. Additional loads shall be considered applicable for "important service" modules (see section [3.3.3.2]). Operational limitations used as the basis for approval will be specified in the DNV GL product certificate.

It is recommended that the thickness of the module outer walls be a minimum of 4 mm however shall be demonstrated as sufficient to withstand the loads specified in this section. Special attention should be paid to buckling control of thin-plated structures subject to compressive stresses.

Allowable bending and shear stresses shall be taken as $160f_1$ and $90f_1$ N/mm² respectively where f_1 is the relevant material factor (reference DNV Rules for Classification of Ships, Pt.3 Ch.1).

Guidance note:

The plate flanges of corrugated/stiffened-plates should be checked for buckling in accordance with DNV Rules for Ships Pt.3 Ch.1 Sec. 13. The compression stress σ_b in the plate flange, induced by lateral pressure and local bending of the plate profile, should not exceed the critical buckling stress times utilisation factor for normal load level $\sigma_c \times \eta$. For loads applied on normal load level $\eta = 0.80$.

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3.3.2 External / environmental loads

For floating offshore installations and ships, vessel motions will be applicable as might direct sea pressure, the nature and severity of which will depend on the nature of the offshore installation and the proposed location of the offshore service module on deck. [Table 3-1](#) below defines minimum loads which shall be considered.

Table 3-1 Environmental parameters

			Acceleration					
	Sea pressure		Mid-point location		Extreme location		Other applicable loads *2	
Vessel type	Mid-point location (kPa)	Extreme location (kPa)	Horizontal	Vertical	Horizontal	Vertical	Wind (kPa)	Securing *3
FPSO, well intervention, drill ship *1	See figure 3.2	See figure 3.3	0.75 g	0.6 g	0.75 g	1.0 g	See figures 3.2 or 3.3	Yes
Service / supply vessel, self-elevated unit (in transit)			0.5 g	0.3 g	0.5 g	0.5 g		
Column stabilised unit			0.35 g	0.3 g	0.35 g	0.3 g		
Self-elevated unit (while jacked), fixed offshore installation	N/A		N/A				Yes	No

Height above sea level (h_0) specified in [Figure 3-2](#) and [Figure 3-3](#) are based upon the minimum freeboard as specified in Load Line Convention and is detailed in [Table 3-2](#). Where the actual freeboard is in excess of this value the difference between minimum and actual freeboard values shall be subtracted from the deck height above sea level (h_0).

h is considered to be the height to the bottom of the lowest OSM.

Horizontal acceleration shall be considered to act in any direction, unless clearly specified in project documentation.

Vertical acceleration shall be considered to act in a positive or negative direction in addition to normal gravity.

Offshore installations / vessels in excess of 300 m in length shall utilise the values for 300 m

Where sea pressures are below the boundary line for 30 kPa a special case assessment should be provided following the requirements of DNV Rules for ships Pt.3 Ch.1.

Guidance note:

Reference Classification Note No. 8, Conversion of Ships, Section 3.7 for additional guidance.

Sea pressure should be applied to external surfaces of the module as a linear triangular distribution, with zero pressure at the top of the module and maximum sea pressure at the base, with average sea pressure at the half height. The same distribution is considered applicable for up to two modules stacked, with zero pressure at the top of the highest unit. When stacking more than 2 modules in height sea pressure need only be considered on the lower two modules.

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Additional Notes

*1 Grouping includes any type of vessel which will be required to stay on station during all weather conditions.

*2 Applicable loads defined for reference however all applicable loads, including those specified in [\[3.3.3.1\]](#) and [\[3.3.3.2\]](#) shall be considered and applied as relevant to module/application.

*3 Where securing may not be considered applicable, stacking shall still be assessed if modules are required to be stacked.

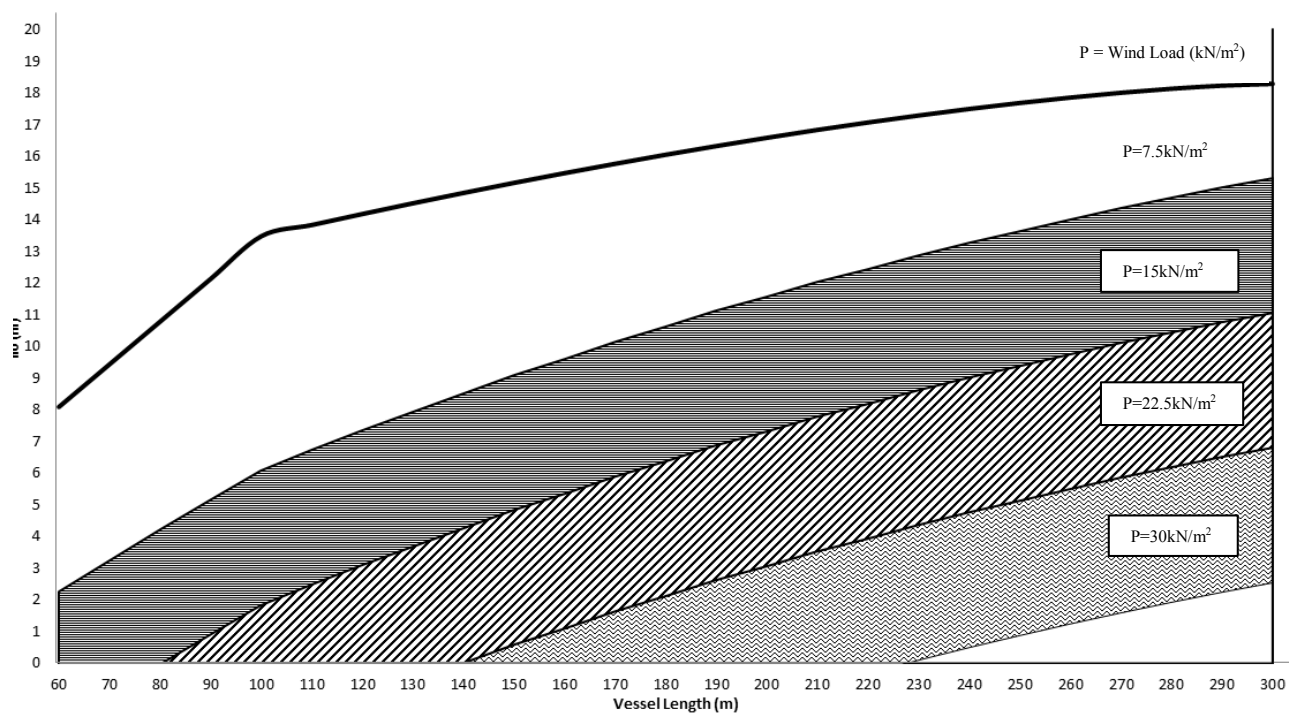


Figure 3-2 Sea pressure (mid-point location)

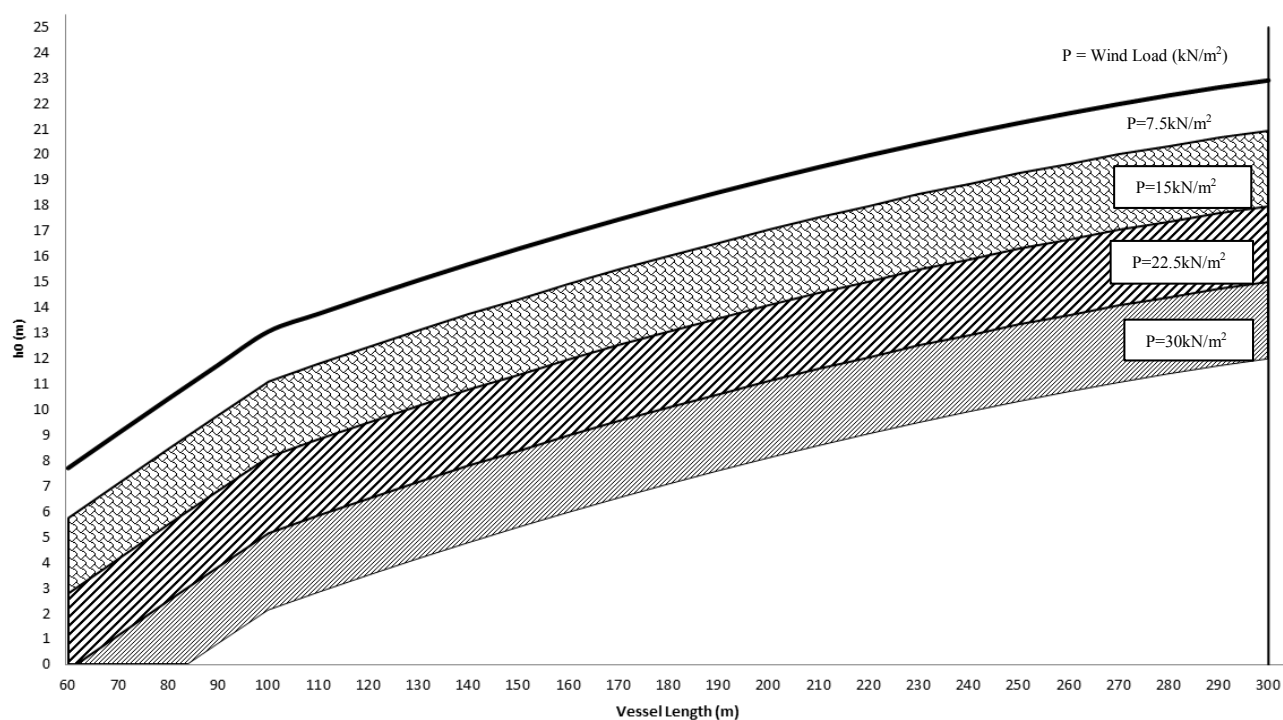


Figure 3-3 Sea pressure (extreme location)

Table 3-2 Vessel length and relative minimum freeboard

Length (m)	60	80	100	120	140	160	180	200	220	240	260	280	300
Freeboard (m)	0.57	0.89	1.27	1.69	2.11	2.52	2.92	3.26	3.59	3.88	4.15	4.39	4.63