Amendments to the "Rules for the Classification of Floating Offshore Units at Fixed Locations and Mobile Offshore Drilling Units"

Effective from 1/1/2026

List of the amendments:

Part/Chapter/Section/Paragraph amended	Reason
Pt A, Ch 1, Sec 2, [6.10.7], [6.10.17](new) and Tab 3 Pt B, Ch 1, Sec 3, Tab 3 Pt B, Ch 7, Sec 2, [2.1.5] Pt F, Ch 6, Sec 9(new), Sec 10(new)	to introduce the following new additional class notations: • FATIGUELIFE (Y, Spectral Fatigue Analysis), when the spectral fatigue analysis is requested • FATIGUELIFE (Y, Mooring), to complement the existing notation FATIGUELIFE (Y) when the mooring system has a design fatigue life value different from the one for the structural elements • Direct Wave Loading (DWL and DWL (SITE yyy)), for units for which the behaviour of hull structures has also been assessed for hydrodynamic loads applied directly to a complete FEM model, in addition to compliance with all other requirements of the Rules. (Prop.305)

SECTION 2 CLASSIFICATION NOTATIONS

1 General

1.1 Purpose of the classification notations

1.1.1 The classification notations give the scope according to which the class of the unit has been based and refer to the specific rule requirements which are to be complied with for their assignment. In particular, the classification notations are assigned according to the type, service and operation of the unit and other criteria which have been provided by the Interested Party, when applying for classification.

The Society may change the classification notations at any time, when the information available shows that the requested or already assigned notations are not suitable for the intended service, operation and any other criteria taken into account for classification.

Note 1: Reference should be made to Sec 1, [1.3] on the limits of classification and its meaning.

1.1.2 The classification notations assigned to a unit are indicated on the Certificate of Classification, as well as in the Register of Ships published by the Society.

1.2 Types of notations assigned

1.2.1 The types of classification notations assigned to a unit are the following:

a) main class symbol

b) construction marks

c) service notations with additional service features, as applicable

d) operating area notations (optional)

e) additional class notations (optional)

The different classification notations and their conditions of assignment are listed in [2] to [6] below, according to their types.

1.2.2 *(1/7/2011)*

As an example, the classification notations assigned to a unit may be as follows (the kind of notation shown in brackets does not form part of the classification notation indicated in the Register of Ships and on the Certificate of Classification):

C ✠

(main class symbol, construction marks)

FPSO-CSR

(service notation and additional service features)

✠AUT-UMS

(additional class notation).

1.3 Modes of operation

1.3.1 A mode of operation is a condition or manner in which a unit may operate or function while on location or in transit. From the classification aspects the modes of operation of all units are to include the following:

a) Operating condition

A condition when a unit is on location, for the purpose of carrying out its primary design operations and the combined environmental and operational loadings are within the appropriate design limits established for such operations.

b) Survival condition

A severe storm condition during which a unit may be subjected to the most severe environmental loadings for which the unit is designed. Production, drilling or similar operations may have been discontinued due to the severity of the environmental loadings.

c) Transit condition

All units movements from one geographical location to another.

2 Main class symbol

2.1 Main class symbol

2.1.1 The main class symbol expresses the degree of compliance of the unit with the rule requirements as regards its construction and maintenance. There is one main class symbol, which is compulsory for every classed unit.

2.1.2 The main class symbol **C** is assigned to units built in accordance with the requirements of the Rules or other rules recognised as equivalent, and maintained in a condition considered satisfactory by the Society. The period of class (or interval between class renewal surveys) assigned to a unit is maximum 5 years; see Ch 2, Sec 2, [4].

Except for special cases, class is assigned to a unit only when the hull, propulsion and auxiliary machinery installations, and equipment providing essential services have all been reviewed in relation to the requirements of the Rules.

Note 1: The symbol **C** with the 5 year class period is to be understood as being the highest class granted by the Society.

3 Construction marks

3.1 General

3.1.1 The construction mark identifies the procedure under which the unit and its main equipment or arrangements have been surveyed for initial assignment of

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5.4.2 The following operating area notations may be assigned:

a) notation **specified operating site**, where the specific operating location is identified (offshore field name, latitude and longitude)

b) notation **specified operating area**, where the specific operating conditions which have been considered by the Society are described in the Certificate of Classification (i.e. a certain site in a specific sea, weather or sea conditions)

c) notation **operation service within 'x' miles from shore**, where the operating service is limited to a certain distance from the shore.

6 Additional class notations

6.1 General

6.1.1 An additional class notation expresses the classification of additional equipment or specific arrangement, which has been requested by the Interested Party.

6.1.2 The assignment of such an additional class notation is subject to the compliance with additional rule requirements, which are detailed in Part F.

6.1.3 Some additional class notations, due to the importance of relevant equipment or arrangements, are assigned a construction mark, according to the principles given in [3.1.2]. This is indicated in the definition of the relevant additional class notations.

6.1.4 The different additional class notations which may be assigned to a unit are listed in [6.2] to [6.10], according to the category to which they belong. These additional class notations are also listed in alphabetical order in Tab 2.

6.1.5 If the Interested Party requests the assignment of additional class notations which are not included in these Rules, but are provided in the Rules for the Classification of Ships, they may be assigned based on the latter Rules, if and as considered appropriate by the Society.

6.2 Automated machinery systems (AUT)

6.2.1 General

The notations dealt with under this heading are relevant to automated machinery systems installed on board units.

In compliance with [6.1.3], these notations are assigned a construction mark, as defined in [3].

The requirements for the assignment of these notations are given in Part F, Chapter 2.

6.2.2 Unattended machinery space (AUT-UMS)

The additional class notation **AUT-UMS** is assigned to units which are fitted with automated installations enabling machinery spaces to remain periodically unattended in all sailing conditions including manoeuvring.

6.2.3 Centralised control station (AUT-CCS)

The additional class notation **AUT-CCS** is assigned to units which are fitted with machinery installations operated and monitored from a centralised control station.

6.3 Monitoring equipment (MON)

6.3.1 General

The notations dealt with under this heading are relevant to hull monitoring equipment installed on board units.

The requirements for the assignment of these notations are given in Part F, Chapter 3.

6.3.2 Hull stress monitoring (MON-HULL)

The additional class notation **MON-HULL** is assigned to units which are fitted with equipment continuously monitoring unit's dynamic loads through measurements of motions in waves and stresses/deformations in the hull structure.

6.4 Comfort on board units (COMF)

6.4.1 General

The additional class notations indicated in Part A, Ch 1, Sec 2 of the Rules for Classification of Ships may be assigned on the basis, as far as applicable, of the requirements given in Part F, Chapter 6 of the Rules for Classification of Ships.

6.5 Pollution prevention

6.5.1 General

The notation dealt with under this heading is assigned to units fitted with equipment and arrangements enabling them to reduce the pollution of the sea and/or air caused by release of solid waste and liquid and/or gaseous effluents.

The requirements for the assignment of these notations are given in Part F, Chapter 3.

6.5.2 Sea and air pollution prevention (GREEN PLUS)

The additional class notation **GREEN PLUS** is assigned to units designed and provided with systems, components and procedural means to control and prevent the emission of polluting substances into the sea and the air, in accordance with the requirements in Pt F, Ch 4, Sec 1.

6.6 Navigation in ice (ICE CLASS)

6.6.1 The additional class notations indicated in Part A, Ch 1, Sec 2 of the Rules for Classification of Ships may be assigned on the basis, as far as applicable, of the requirements given in Part F, Chapter 9 of the Rules for Classification of Ships.

6.7 Navigation in ice (POLAR CLASS)

6.7.1 The additional class notations indicated in Part A, Ch 1, Sec 2 of the Rules for Classification of Ships may be assigned on the basis, as far as applicable, of the requirements given in Part F, Chapter 10 of the Rules for Classification of Ships.

6.8 WINTERIZATION (temp)

6.8.1 The additional class notation **WINTERIZATION (temp)** indicated in Part A, Ch 1, Sec 2 of the Rules for Classification of Ships may be assigned on the basis, as far as applicable, of the requirements given in Part F, Chapter 11 of the Rules for Classification of Ships.

6.9 Planned maintenance scheme and condition based maintenance (PMS/CBM)

6.9.1 General

The notations dealt with under this item [6.9] are assigned to units where a Planned Maintenance Scheme (hereinafter denominated PMS) has been implemented according to the requirements given in Pt F, Ch 6, Sec 5.

6.9.2 PMS

Where a Planned Maintenance Scheme approved by the Society is implemented, the additional class notation **PMS** is assigned.

The requirements for the assignment of this notation are given in Pt F, Ch 1, Sec 1.

6.10 Other additional class notations

6.10.1 In-water survey

The additional class notation **INWATERSURVEY** may be assigned to units provided with suitable arrangements to facilitate the in-water surveys as provided in Ch 2, Sec 2, [5.4.4].

The requirements for the assignment of this notation are given in Pt F, Ch 6, Sec 1.

6.10.2 Dynamic positioning

The additional class notation **DYNAPOS** may be assigned to units equipped with a dynamic positioning system.

In compliance with [6.1.3], this notation is assigned a construction mark, as defined in [3].

The scope of the notation, including the additional keys for the description of capability of the installation and the requirements for assignment, are given in Pt F, Ch 6, Sec 2.

6.10.3 Vapour control system

The additional class notation **VCS** (Vapour Control System) may be assigned to units equipped with cargo vapour control systems both in way of midship cargo crossovers and in way of stern cargo manifolds. The notation **-MIDSHIP** is added to the notation where the unit is equipped with cargo vapour control systems only in way of cargo midship crossovers.

This notation is assigned only to units having the service notation **FPSO** or **FSO**.

The requirements for the assignment of this notation are given in Pt F, Ch 6, Sec 3.

6.10.4 Centralised cargo control

The additional class notation **CARGOCONTROL** may be assigned to units equipped with a centralised system for handling cargo and ballast liquids.

In principle, this notation is assigned only to units having the service notation **FPSO**, **FSO** or **FSRU**.

The requirements for the assignment of this notation are given in Pt F, Ch 6, Sec 4.

6.10.5 Damage stability

The additional class notation **DMS** may be assigned to **FSO**, **FPSO** and **FSRU** complying with the damage stability requirements given in Pt F, Ch 6, Sec 5.

6.10.6 Protective coatings in water ballast tanks

The additional class notation **COAT-WBT** may be assigned to units surveyed during construction by the Society, whose water ballast tanks have been provided with protective coatings complying with the requirements for the assignment of this notation given in Pt F, Ch 6, Sec 6.

The notation may be assigned to units having any service notation.

6.10.7 Fatigue Life *(1/1/2026)*

The additional class notation **FATIGUELIFE (Y)** is assigned to units designed for a fatigue life greater than Y years. In general, Y is to be not less~~greater~~ than 20 years; for units having the additional service feature **CSR, Y** is to be ~~greater~~not less than 25 years.

The fatigue life is to be calculated in accordance with the requirements in Pt B, Ch 7, Sec 2; for units having the additional service feature **CSR** the fatigue life is to be calculated in accordance with the requirements in the "Common Structural Rules for Bulk Carriers and Oil Tankers".

When the spectral fatigue analysis is requested, the additional class notation **FATIGUELIFE (Y, Spectral Fatigue Analysis)** is assigned, complying with the requirements in Pt F, Ch 6, Sec 9.

For **Y** greater than 30 years, the strength calculation and construction criteria are to be defined by the Society on a case-by-case basis.

Where the mooring system has a design fatigue life value different from the one for the structural elements, the notation **FATIGUELIFE (Y)** is complemented by the notation **FATIGUELIFE (Y, Mooring)**, where (**Y**) is the mooring system's design fatigue life.

Mooring components connected to the hull are covered by the **FATIGUELIFE (Y)** notation, while all the other mooring components are covered by the notation **FATIGUELIFE (Y, Mooring)**.

The fatigue life of mooring system is to be calculated in accordance with the requirements in Pt B, Ch 5, App 3 and Pt B, Ch 9, Sec 3, [2.5].

6.10.8 Residual Fatigue Life *(1/7/2023)*

The additional class notation **RESIDUALFATIGUELIFE (Y)** is assigned to floating units converted from an existing ship, where **Y** represents the expected minimum remaining fatigue life, in years, in the site of installation, calculated in accordance with the requirements in Pt B, Ch 7, Sec 2. The notation is followed by the year of maturation of fatigue life and the specific site of installation. For example, **RESIDUALFATIGUELIFE (14), 2023 in Adriatic Sea** indicates that the expected remaining fatigue life is 14

years, which will be matured in the year 2023 for conditions anticipated in the Adriatic Sea.

6.10.9 Permanent means of access

The additional class notation **PMA** is assigned to cargo units that are provided with permanent means of access complying with SOLAS Regulation II-1/3-6, as amended by Resolution MSC 151(78), with the associated "Technical provisions for means of access for inspections" in IMO Resolution MSC 158(78) and the relevant interpretations in IACS UI SC191.

6.10.10 Ballast water management

The additional class notation **BWM-E** is assigned to units complying with the "International Convention for the Control and Management of Ship's Ballast Water and Sediments" as adopted by IMO on 13 February 2004, by means of a Ballast Water Exchange system.

The notation is to be completed by one of the following features, as applicable:

- **sequential** when the Ballast Water Exchange system is of sequential type
- **flow-through** when the Ballast Water Exchange system is of flow-through type
- **dilution** when the Ballast Water Exchange system is of dilution type.

Note 1: according to the above Convention, Ballast Water Exchange will be phased out as an acceptable method, depending on the ballast water capacity and date of delivery of the vessel. After phasing out, the only acceptable method will be Ballast Water Treatment. Therefore the class notation BWM-E will be withdrawn when the Ballast Water Exchange is phased out.

The additional class notation **BWM-T** is assigned to units complying with the "International Convention for the Control and Management of Ship's Ballast Water and Sediments" as adopted by IMO on 13 February 2004, by means of a Ballast Water Treatment system.

6.10.11 Crew Accommodation and Recreational Facilities according to the Marine Labour Convention, 2006 (MLCDESIGN)

The additional class notation **MLCDESIGN** is assigned to units having crew accommodation and recreational facilities complying with the requirements of Pt F, Ch 6, Sec 7.

6.10.12 Helideck

The additional class notation **HELIDECK-H** is assigned to units fitted with helicopter facilities in accordance with the requirements of Part F, Chapter 5.

The additional class notation **HELIDECK** is assigned to units where the use of helicopter facilities is only occasional. Units covered by this notation are not provided with hangar, refueling or maintenance facilities, in accordance with requirements of Part F, Chapter 5 with the exception of requirements of Part F, Chapter 5, Section 3 and Section 4, items [1.2] and [2.2].

6.10.13 Drilling system (for MODU's) *(1/1/2011)*

The additional class notation **DRILLING** is assigned to MODU's which have their drilling systems complying with the “Rules for the Design and Construction of Drilling Systems”.

6.10.14 Technical Advisor Service (TAS) *(1/7/2013)*

The additional class notation **TAS** is assigned to units whose approved geometry and structural data are stored in a database in order to allow the Society to provide, through dedicated computer programs, the necessary assistance in the event of damage.

6.10.15 Disconnectable *(1/1/2016)*

The additional class notation **disconnectable** is assigned to units, different from MODU, who can be temporarily disconnected from their fixed location.

6.10.16 Alternative Regime Survey (ARS) *(1/1/2023)*

The additional class notation **ARS** is assigned to Floating Offshore Units operating at a fixed location, having type B cargo tanks and that comply with the requirements given in Pt F, Ch 6, Sec 8 to allow an extended period between two consecutive internal inspections of each cargo tank.

The **ARS** notation may also be assigned to units having cargo tanks of types other than type B based on the Society's evaluation on a case-by-case basis.

6.10.17 Direct Wave Loading (DWL and DWL (SITE yyy)) *(1/1/2026)*

The additional class notation **DWL** is assigned to units for which the behaviour of hull structures has been evaluated also for hydrodynamic loads directly applied to a FEM complete model, in addition to the compliance with all the other requirements of the Rules.

The additional notation **DWL** (without specifications) is assigned when the hydrodynamic loads have been determined using the wave environment as if the unit has a 20-year (for units not having the additional service feature CSR) or 25-year (for units having the additional service feature CSR) service life in unrestricted navigation (see sailing ship case in Pt B, Ch 5, App 2, [1] and environmental coefficients in Pt B, Ch 5, Sec 1, [2.7.1]).

If the wave environmental conditions of the intended site are used for the analysis, the additional class notation **DWL (SITE yyy)** is assigned, where yyy is the design return period at the specific site, e.g. **DWL (SITE 100)** if a 100-year return period is used for the specific site.

Wave loads deriving from transit condition to the intended site are also to be considered/evaluated for the assignment of the **DWL (SITE yyy)** notation.

The requirements for the assignment of the additional class notations **DWL** and **DWL (SITE yyy)** are given in Pt F, Ch 6, Sec 10.

7 Other notations

7.1

7.1.1 The Society may also define other notations by means of provisional requirements and guidelines, which may then be published in the form of tentative rules.

Table 2 : List of additional class notations *(1/1/2026)*

Additional class notation	Reference for definition	Reference in Part F	Remarks
ARS	[6.10.16]	Pt F, Ch 6, Sec 8	
AUT-CCS	[6.2.3]	Part F, Chapter 2	**(1)**
AUT-UMS	[6.2.2]	Part F, Chapter 2	**(1)**
BWM-E	[6.10.10]	NA	**(3)**
BWM-T	[6.10.10]	NA	
CARGOCONTROL	[6.10.4]	Pt F, Ch 6, Sec 4	
COAT-WBT	[6.10.6]	Pt F, Ch 6, Sec 6	
COMF-AIR	See Remarks	See Remarks	Refer to Part F, Ch 6 of the Rules for Classification of Ships
COMF-NOISE	See Remarks	See Remarks	Refer to Part F, Ch 6 of the Rules for Classification of Ships
COMF-VIB	See Remarks	See Remarks	Refer to Part F, Ch 6 of the Rules for Classification of Ships
DISCONNECTABLE	[6.10.15]		
DMS	[6.10.5]	Pt F, Ch 6, Sec 5	
DRILLING	[6.10.13]	NA	Refer to "Rules for the Design and Construction of Drilling Systems"
DWL, DWL (SITE yyy)	[6.10.17]	Pt F, Ch 6, Sec 10	
DYNAPOS	[6.10.2]	Pt F, Ch 6, Sec 2	**(1)**
FATIGUELIFE (Y)	[6.10.7]	NA	
FATIGUELIFE (Y, Mooring)	[6.10.7]	NA	
FATIGUELIFE (Y, Spectral Fatigue Analysis)	[6.10.7]	Pt F, Ch 6, Sec 9	
GREEN PLUS	[6.5.2]	Part F, Chapter 4	
HELIDECK-H	[6.10.12]	Part F, Chapter 5	
HELIDECK	[6.10.12]	Part F, Chapter 5	
ICE	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
ICE CLASS IA	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
ICE CLASS IA SUPER	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
ICE CLASS IB	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
ICE CLASS IC	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
ICE CLASS ID	See Remarks	See Remarks	Refer to Part F, Ch 9 of the Rules for Classification of Ships
INWATERSURVEY	[6.10.1]	Pt F, Ch 6, Sec 1	
MLCDESIGN	[6.10.11]	Pt F, Ch 6, Sec 7	
MON-HULL	[6.3.2]	Part F, Chapter 3	
PMA	[6.10.9]	NA	
PMS	[6.9.2]	Part F, Chapter 1	
POLAR CLASS	See Remarks	See Remarks	Refer to Part F, Ch 10 of the Rules for Classification of Ships
RESIDUALFATIGUE (Y)	[6.10.8]	NA	
VCS	[6.10.3]	Pt F, Ch 6, Sec 3	**(2)**
TAS	[6.10.14]	NA	
WINTERIZATION (temp)	See Remarks	See Remarks	Refer to Part F, Ch 11 of the Rules for Classification of Ships

(1) A construction mark is added to this notation.

(2) This notation may be completed by the specific notations **-MIDSHIP** and **-TRANSFER** (see [6.10.3]).

(3) This notation may be completed by the specific features: **sequential, flow-through, dilution**.

SECTION 3 DOCUMENTATION TO BE SUBMITTED

1 Documentation to be submitted for all units

1.1 Units built under the Society's supervision

1.1.1 Plans and documents to be submitted for approval

The plans and documents to be submitted to the Society for approval are listed in Tab 1. This list is intended as guidance for the complete set of information to be submitted, rather than an actual list of titles.

The above plans and documents are to be supplemented by further documentation which depends on the service notation and, possibly, the additional class notation (see Pt A, Ch 1, Sec 2) assigned to the unit, as specified in [2].

Structural plans are to show details of connections of the various parts and, in general, are to specify the materials used, including their manufacturing processes, welded procedures and heat treatments. See also Ch 13, Sec 1, [1.6].

1.1.2 Plans and documents to be submitted for information

In addition to those in [1.1.1], the following plans and documents are to be submitted to the Society for information:

- general arrangement
- capacity plan, indicating the volume and position of the centre of gravity of all compartments and tanks
- lines plan
- hydrostatic curves
- lightweight distribution
- towing and mooring arrangement plan.

In addition, when direct calculation analyses are carried out by the Designer according to the rule requirements, they are to be submitted to the Society.

1.1.3 Number of copies

The number of copies to be submitted for each plan or document is to be agreed with the Society on a case by case basis depending on the specific conditions under which plan approval and supervision during construction are organised. However, it is generally equal to:

- 3 for plans and documents submitted for approval
- 2 for plans and documents submitted for information.

2 Further documentation to be submitted for units with certain service notations or additional class notations

2.1 General

2.1.1 Depending on the service notation and, possibly, the additional class notation (see Pt A, Ch 1, Sec 2) assigned to the unit, other plans or documents may be required to be submitted to the Society, in addition to those in [1.1]. They are listed in [2.2] and [2.3] for the service notations and additional class notations which require this additional documentation.

However, the additional documentation relevant to a service notation or an additional class notation may be required also for units to which it is not assigned, when this is deemed necessary by the Society on the basis, inter alia, of the unit service, the structural arrangements, the type of cargo carried and its containment.

2.2 Service notations

2.2.1 The plans or documents to be submitted to the Society are listed in Tab 2.

2.3 Additional class notations

2.3.1 The plans or documents to be submitted to the Society are listed in Tab 3.

Table 1 : Plans and documents to be submitted for approval for all units *(1/7/2022)*

Plan or document	Containing also information on
Midship section Transverse sections Shell expansion Decks and profiles Double bottom Pillar arrangements Framing plan Deep tank and ballast tank bulkheads, wash bulkheads	Class characteristics Main dimensions Minimum ballast draught Frame spacing Density of cargoes Design loads on decks and double bottom Steel grades Location and height of air vent outlets of various compartments Corrosion protection Openings in decks and shell and relevant compensations Boundaries of flat areas in bottom and sides Details of structural reinforcements and/or discontinuities Bilge keel with details of connections to hull structures
Loading manual and loading instruments	See Pt B, Ch 11, Sec 2 of the Rules for the Classification of Ships
Watertight subdivision bulkheads Watertight tunnels	Openings and their closing appliances, if any
Fore part structure	Location and height of air vent outlets of various compartments
Transverse thruster, if any, general arrangement, tunnel structure, connections of thruster with tunnel and hull structures	
Aft part structure	Location and height of air vent outlets of various compartments
Machinery space structures Foundations of propulsion machinery and boilers, where fitted	Type, power and r.p.m. of propulsion machinery Mass and centre of gravity of machinery and boilers
Superstructures and deckhouses Machinery space casing	Extension and mechanical properties of the aluminium alloy used (where applicable)
Inner doors, if any, side doors and other openings in the side shell	Closing appliances Electrical diagrams of power control and position indication circuits for bow doors, stern doors, side doors, inner doors, television system and alarm systems for ingress of water
Windows and side scuttles, arrangements and details	
Scuppers and sanitary discharges	
Bulwarks and freeing ports	Arrangement and dimensions of bulwarks and freeing ports on the freeboard deck and superstructure deck
Derricks and cargo gear Cargo lift structures	Design loads (forces and moments) Connections to the hull structures
Sea chests, other recesses	
Hawse pipes	
Plan of outer doors and hatchways	
Plan of manholes	
Plan of access to and escape from spaces	
Plan of ventilation	Use of spaces

Plan or document	Containing also information on
Plan of tank testing	Testing procedures for the various compartments Height of pipes for testing
Plan of watertight doors and scheme of relevant manoeuvring devices	Manoeuvring devices Electrical diagrams of power control and position indication circuits
Freeboard calculations	
Stability documentation	See Ch 3, Sec 1, [2.1]
Calculations relevant to intact stability	
Equipment for towing and equipment for ship-to-unit mooring	List of equipment Construction and breaking load of steel wires Material, construction, breaking load and relevant elongation of synthetic ropes
Site-specific and transit	See Ch 5, Sec 1, [1.8]
Seakeeping calculations	See Ch 5, App 2, [1.2]
Mooring Loads	See Ch 5, App 3, [2]
Ship-to-unit mooring analysis	See Ch 8, App 1, [2]
Plans of position mooring system	Anchors, anchor lines and equipments Winches, windlasses Buoys, if any Mechanical details Hull interface
Sea bed foundations	See Ch 10, Sec 1, [1.1]

Table 2 : Plans and documents to be submitted depending on service notations

Service notations	Plans or documents
FSO, FPSO	Arrangement of pressure/vacuum valves in cargo tanks Cargo temperatures
FSRU	Arrangement of pressure/vacuum valves in cargo tanks Heat transfer analysis Distribution of steel qualities For units with independent tanks: • cargo tank structure • connection of the cargo tanks to the hull structure • anti-floating and anti-collision arrangements
FPSO, FSO, FSRU	Topside structures for process and off-loading facilities and hull interface
MODU	See Pt E, Ch 4, Sec 2 [1.2]

Table 3 : Plans and documents to be submitted depending on additional class notations *(1/1/2026)*

Additional class notation	Plans or documents
DMS	See Pt F, Ch 6, Sec 5, [1.2]
DWL, DWL (SITE yyy)	See Pt F, Ch 6, Sec 10
FATIGUELIFE (Y, Spectral Fatigue Analysis)	See Pt F, Ch 6, Sec 9
ICE CLASS IA SUPER **ICE CLASS IA** **ICE CLASS IB** **ICE CLASS IC** **ICE CLASS ID**	Refer to Part F, Ch 9 of the Rules for Classification of Ships

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SECTION 2 FATIGUE CHECK OF STRUCTURAL DETAILS

Symbols

For symbols not defined in this Section, refer to the list at the beginning of this Chapter.

p_W : Wave pressure, in kN/m^2, see [2.2]

s : Spacing, in m, of ordinary stiffeners

ℓ : Span, in m, of ordinary stiffeners, measured between the supporting members, see Pt B, Ch 4, Sec 3, [3.2] of the Rules for the Classification of Ships

w : Net section modulus, in cm^3, of the stiffener, with an attached plating of width b_p , to be calculated as specified in Pt B, Ch 4, Sec 3, [3.4] of the Rules for the Classification of Ships

K_h, $K\ell$: Stress concentration factors, defined in Ch 13, Sec 2 for the special structural details there specified

K_F : Fatigue notch factor, defined in [3.3.1]

K_m : Stress concentration factor, taking account of misalignment, defined in [3.3.1]

$\Delta\sigma_{P0}$: Allowable stress range, defined in [4].

1 General

1.1 Net scantlings

1.1.1 As specified in Ch 4, Sec 2, [1], all scantlings referred to in this Section are net, i.e. they do not include any margin for corrosion.

The gross scantlings are obtained as specified in Ch 4, Sec 2.

1.2 Application

1.2.1 Structural details to be checked

The requirements of this Section apply for the fatigue check of special structural details, according to Ch 13, Sec 2.

The Society may require other details to be checked, when deemed necessary on the basis of the detail geometry and stress level.

1.2.2 Categorisation of details

With respect to the method to be adopted to calculate the stresses acting on structural members, the details for which the fatigue check is to be carried out may be grouped as follows:

- details where the stresses are to be calculated through a three dimensional structural model (e.g. connections between primary supporting members)
- details located at ends of ordinary stiffeners, for which an isolated structural model can be adopted.

1.2.3 Details where the stresses are to be calculated through a three dimensional structural model *(1/1/2022)*

The requirements of Pt B, Ch 7, App 1, [6] of the Rules for the Classification of Ships apply, in addition of those of [1] to [5] of this Section.

1.2.4 Details located at ends of ordinary stiffeners

The requirements of [1] to [6] of this Section apply.

1.2.5 Other details

In general, for details other than those in [1.2.2], the stresses are to be calculated through a method agreed by the Society on a case by case basis, using the load model defined in [2].

The checking criterion in [5] is generally to be applied.

1.3 Definitions

1.3.1 Hot spots

Hot spots are the locations where fatigue cracking may occur. They are indicated in the relevant figures of special structural details in Ch 13, Sec 2.

1.3.2 Nominal stress

Nominal stress is the stress in a structural component taking into account macro-geometric effects but disregarding the stress concentration due to structural discontinuities and to the presence of welds (see Fig 1).

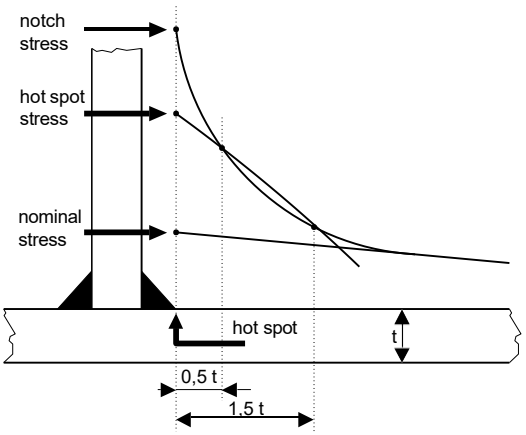
1.3.3 Hot spot stress

Hot spot stress is a local stress at the hot spot taking into account the influence of structural discontinuities due to the geometry of the detail, but excluding the effects of welds (see Fig 1).

1.3.4 Notch stress

Notch stress is a peak stress in a notch such as the root of a weld or the edge of a cut-out. This peak stress takes into account the stress concentrations due to the presence of notches (see Fig 1).

Figure 1 : Nominal, hot spot and notch stresses



1.3.5 Elementary stress range

Elementary stress range is the stress range determined for one of the load cases “a”, “b”, “c” or “d” (see Ch 5, Sec 4, [2]) and for either of the loading conditions (see Ch 5, Sec 1, [2.5] and Ch 5, Sec 1, [2.6]).

1.3.6 Equivalent stress range

Equivalent stress range is a stress range obtained from a combination of elementary stress ranges, as indicated in [3.3.2] for notch stress and [6.2.1] for hull girder nominal stress.

1.4 Partial safety factors

1.4.1 The partial safety factors to be considered for the fatigue check of structural details are specified in Tab 1.

Table 1 : Fatigue check - Partial safety factors

Partial safety factors covering uncertainties regarding:	Symbol	Value	
		General	Details at ends of ordinary stiffeners
Still water hull girder loads	γ_{S1}	1,00	1,00
Wave hull girder loads	γ_{W1}	1,05	1,15
Still water pressure	γ_{S2}	1,00	1,00
Wave pressure	γ_{W2}	1,10	1,20
Resistance	γ_{R}	1,02	1,10

2 Load model

2.1 General

2.1.1 Load point *(1/1/2022)*

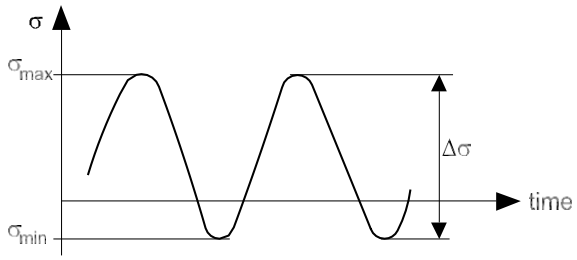
Unless otherwise specified, design loads are to be determined at points defined in:

- Pt B, Ch 7, Sec 2, [1.3] of the Rules for the Classification of Ships for ordinary stiffeners
- Pt B, Ch 7, Sec 3, [1] of the Rules for the Classification of Ships for primary supporting members.

2.1.2 Local and hull girder loads

The fatigue check is based on the stress range induced at the hot spot by the time variation of local and hull girder loads in each load case “a”, “b”, “c” and “d” defined in [2.2] for the loading conditions defined in [2.1.4] and [2.1.3] (see Fig 2).

Figure 2 : Stress range



2.1.3 Loading conditions for details where the stresses are to be calculated through a three dimensional structural model

The most severe full load and ballast conditions for the detail concerned are to be considered in accordance with Ch 5, Sec 1, [2.6].

2.1.4 Loading conditions for details located at ends of ordinary stiffeners

The cargo and ballast distribution is to be considered in accordance with Ch 5, Sec 1, [2.5].

2.1.5 Spectral fatigue analysis *(1/1/2026)*

For units with non-conventional shapes or with restricted navigation, the Society may require a spectral fatigue analysis to be carried out. The additional class notation **FATIGUELIFE (Y, Spectral Fatigue Analysis)** is assigned, complying with the additional requirements defined in Pt F, Ch 6, Sec 9.

In this analysis, the loads and stresses are to be evaluated through long-term stochastic analysis taking into account the characteristics of the unit and the site-specific environmental conditions.

The load calculations and fatigue analysis are to be submitted to the Society for approval.

2.2 Lateral pressure

2.2.1 General

Lateral pressure is constituted by the wave pressure.

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SECTION 9 SPECTRAL FATIGUE ANALYSIS (FATIGUE (Y, SPECTRAL FATIGUE ANALYSIS))

1 General

1.1 Applications

1.1.1 *(1/1/2026)*

The additional class notation **FATIGUELIFE (Y, Spectral Fatigue Analysis)** is assigned, in accordance with Pt A, Ch 1, Sec 2, [6.10.7], to units for which a spectral fatigue analysis is performed in compliance with the requirements of this section.

1.2 Documentation to be submitted

1.2.1 *(1/1/2026)*

The documents listed below are to be sent to the Society for information:

- Technical report about the calculation of hydrodynamic loads, including a clear and complete description of assumptions, input data and results according to the relevant requirements in [2].
- Technical report about the calculation of FEM results, including a clear and complete description of assumptions, input data and results.
- Technical report containing statistical post processing for damage evaluation and relevant acceptance criteria.

2 Spectral Fatigue Analysis Procedure

2.1 General

2.1.1 *(1/1/2026)*

The spectral fatigue analysis comprises the following three main parts:

- **Hydrodynamic analysis**: calculation of external loads induced by waves and resulting motions.
- **Structural analysis**: application of loads on the unit's structural model to obtain the Response Amplitude Operators (RAOs) for stresses at locations of interest.
- **Fatigue damage calculation**: statistical evaluation of stress ranges distribution and related damage.

2.2 Minimum requirements

2.2.1 *(1/1/2026)*

The spectral fatigue analysis is to account for at least the following, unless adequately justified otherwise:

- Three internal loading conditions, including minimum and maximum draughts.
- Wave directions covering a 360° range (discretized in steps not greater than 30°)
- Wave frequencies from 0,2 to 1,80 rad/s, with steps of 0,05 rad/s.

2.3 Intermittent wetting effect

2.3.1 *(1/1/2026)*

The intermittent wetting effect near the free surface is not included in the linear model of the spectral analysis and is to be specially considered by the designer with a proper correction of the hydrodynamic pressures in the areas affected. The correction procedure is to be approved in advance by the Society.

2.4 Structural model requirements

2.4.1 *(1/1/2026)*

The fatigue life is to be calculated in accordance with the requirements in Pt B, Ch 7, Sec 2.

For units having the additional service feature CSR, the fatigue life is to be calculated in accordance with the requirements in the "Common Structural Rules for Bulk Carriers and Oil Tankers".

2.5 Mass and inertia load distribution

2.5.1 *(1/1/2026)*

The total solid mass is distributed across plate and beam elements applying adjusted material densities. Topsides modules weights are included based on the lightship weight distribution, modeled using non-stiff beam elements. Inertia loads are derived from this mass model in combination with the unit accelerations. Internal fluid pressures in cargo and ballast tanks are calculated quasi-statically, using accelerations at the tank's center of gravity.

2.6 Distribution of hot-spot stress ranges

2.6.1 *(1/1/2026)*

For a given sea state, the short-term distribution of hot-spot stress ranges is derived from spectral analysis of the hot-spot stress-range transfer function, combined with Rayleigh statistics.

The long-term distribution over a defined period is calculated by summing the short-term distributions based on the probabilities in the scatter diagram for the operational site.

2.7 Fatigue damage

2.7.1 **General** *(1/1/2026)*

Fatigue damage is assessed from the distribution of stress ranges using the Miner's rule (linear cumulative damage summation).

2.7.2 Short-term fatigue damage *(1/1/2026)*

By means of the spectral approach, short-term statistics can be obtained for various hydrodynamic and hydro-structure model outputs, including but not limited to stress.

Using stress response statistics together with the fatigue S-N curve for the detail under consideration, short-term fatigue damage can be calculated.

2.7.3 Long-term fatigue damage *(1/1/2026)*

The long-term fatigue damage is the cumulative damage from all short-term sea state conditions and can be evaluated either:

- by deriving the long-term stress-range distribution from short-term statistics, or
- by summing the individual short-term damage contributions weighted by their probability of occurrence.

The recommended approach for spectral analysis is to sum the short-term fatigue damages.

SECTION 10 DIRECT WAVE LOADING (DWL AND DWL (SITE YYY))

1 General

1.1 Application

1.1.1 *(1/1/2026)*

The additional class notations **DWL** and **DWL (SITE yyy)** are assigned, in accordance with Pt A, Ch 1, Sec 2, [6.10.17], to units for which a direct wave loading FEM complete ship model analysis is performed in compliance with the requirements of this section.

1.2 Documents to be submitted

1.2.1 *(1/1/2026)*

The documents listed below are to be sent to the Society for information:

- Technical report about the calculation of hydrodynamic loads, including a clear and complete description of assumptions, input data and results according to the relevant requirements in [2] and [3].
- Technical report about the calculation of FEM results, including a clear and complete description of assumptions, input data, results and acceptance criteria for yielding and buckling checks (see [2.10] and [2.11]).

2 Analysis Procedure

2.1 General description

2.1.1 *(1/1/2026)*

The direct wave loading analysis is based on the conceptual steps here contained. Reference is also made to Pt B, Ch 7, App 3 of the Rules for Classification of Ships, containing the same calculation procedure applicable to ships.

2.2 Hydrostatic calculations

2.2.1 *(1/1/2026)*

Compute the displacement, trim, drafts (at FP and AP), longitudinal center of gravity, longitudinal distribution of still-water vertical shear force and bending moment for all the selected loading conditions.

2.3 Hydrodynamics, response amplitude operator (RAO) analysis

2.3.1 *(1/1/2026)*

Calculate the linear response amplitude operators (RAO) for each of the load parameters to be maximized and for each of the selected loading conditions.

2.4 Hydrodynamics, Extreme values analysis

2.4.1 *(1/1/2026)*

Evaluate the appropriate wave environment for the intended unit service to determine the extreme values for each of the different load parameters to be maximized and for each of the selected loading conditions.

2.5 Hydrodynamics, Equivalent Design Wave (EDW)

2.5.1 *(1/1/2026)*

Determine an Equivalent Design Wave (EDW) for each load parameter to be maximized and for each operating loading condition.

2.5.2 *(1/1/2026)*

The unit is considered to encounter an EDW that is a regular sinusoidal wave simulating the magnitude and location of the extreme value for the load parameter to be maximized.

2.5.3 *(1/1/2026)*

Based on the RAO evaluation in [2.3], each EDW is defined by:

- wave length or period T
- heading angle
- wave height (double amplitude)
- wave phase.

2.6 Hydrodynamics, external hydrodynamic pressure calculation

2.6.1 *(1/1/2026)*

The external hydrodynamic pressures on the wetted hull surface are to be calculated and applied to the FEM model, for each EDW.

2.7 Hydrodynamics, internal liquids tank pressure calculation

2.7.1 *(1/1/2026)*

The liquid pressures acting on the internal surfaces of liquid cargo and ballast tanks are to be calculated and applied to the structural FEM model, considering the unit hydrodynamic motions and accelerations calculated for each EDW.

2.8 Hydrodynamics, Loads on Lightship Structure and Equipment calculation

2.8.1 *(1/1/2026)*

The loads of the lightship structure and equipment are to be calculated and applied to the structural FE model,

considering the unit hydrodynamic motions and accelerations calculated for each EDW.

2.9 Complete FEM Models structural analysis

2.9.1 *(1/1/2026)*

The FEM models and their boundary conditions to be used in the complete unit structural analysis are described in Pt B, Ch 7, App 3, [2] of the Rules for Classification of Ships, where all the loads described in [2.1.1], [2.1.5], [2.1.6] and [2.1.7] are applied on a FEM complete model of the unit. The output is the displacements and stresses in the structural model.

2.10 Yielding and Buckling evaluation on Complete FEM models

2.10.1 *(1/1/2026)*

For yielding checking criteria the requirement in Pt B, Ch 7, Sec 3 of the Rules for Classification of Ships are to be applied according to the global mesh size.

2.10.2 *(1/1/2026)*

For buckling checking criteria, the requirements Pt B, Ch 7, App 1, [6] and Pt B, Ch 7, Sec 1, [5.4] of the Rules for Classification of Ships are to be applied.

2.11 Local FEM models structural analysis

2.11.1 *(1/1/2026)*

More detailed local stresses are to be determined by finer mesh FEM analysis of local structures, based on the results of the global 3-D analysis from which the obtained nodal displacements or forces are then applied as boundary conditions.

2.11.2 *(1/1/2026)*

For yielding checking criteria the requirement in Pt B, Ch 7, Sec 3 of the Rules for Classification of Ships are to be applied according to the local mesh size.

3 Alternative procedures

3.1 General description

3.1.1 *(1/1/2026)*

Procedures that are based on the same concept described in [2] but differ in some of the detailed steps will be evaluated by the Society on a case by-case basis based on the description provided in the calculation reports.

4 Minimum requirements for the calculation procedure

4.1 Operational loading conditions

4.1.1 *(1/1/2026)*

As a minimum, the following operational loading conditions, including minimum and maximum draughts, are to be used:

- ballast or minimum draft condition after offloading (all cargo tanks empty)
- intermediate loading (33% filled)
- intermediate loading (tanks 50% filled)
- intermediate loading (67% filled)
- full-load condition at scantling draft or before offloading (tanks full)
- transit condition(s).

4.1.2 *(1/1/2026)*

All the operational loading conditions except the transit condition are to be calculated with the site wave environment while the transit condition is to be calculated with the wave environment for specific transit(s) foreseen.

4.2 Hydrostatic calculation

4.2.1 *(1/1/2026)*

The convergence of the displacement, trim and still water vertical bending moment is deemed satisfactory if within the following tolerances:

- 2% of the displacement
- 0,1 degrees of the trim angle
- 10% of the still water bending moment.

4.3 Load Parameters to be maximized

4.3.1 *(1/1/2026)*

The following load parameters are, as a minimum, to be maximized following the Equivalent Design Wave (EDW) approach:

- vertical wave bending moment in hogging condition at midship section
- vertical wave bending moment in sagging condition at midship section
- vertical wave shear force positive, at the location where maximum positive still water shear force occurs.
- vertical wave shear force negative, at the location where maximum negative still water shear force occurs.
- horizontal wave bending moment at midship section
- transverse acceleration at deck at sides at midship section
- vertical acceleration at forward perpendicular and at midship section, centerline and waterline level.
- roll angle at center of gravity.

4.4 Hydrodynamics, response amplitude operator (RAO) analysis

4.4.1 *(1/1/2026)*

The Response Amplitude Operators (RAO's) and associated phase characteristics are to be computed for wave periods between 3.5 and 30 seconds in increments of maximum 1 second, using a linear seakeeping program, for all the load parameters.

4.4.2 *(1/1/2026)*

The RAOs are to be calculated for wave headings, in increments of no more than 15 degrees from head seas to following seas.

4.5 Hydrodynamics, Extreme values analysis

4.5.1 *(1/1/2026)*

For some of the load parameters to be maximized such as vertical wave bending moment and vertical wave shear force at least the nonlinear hydrostatic restoring and Froude-Krylov forces are to be considered when evaluating the target extreme values.