Amendments to Parts A and F of the "Rules for the Classification of Ships" (REP.1 and REP.6): new additional class notation VIB-MAC

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www.tasneefmaritime.ae
+971 2 6922333 +971 2 4454333 info@tasneef.ae 111155, Abu Dhabi, UAE

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 ship 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 navigation of the ship 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, navigation 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 ship are indicated on the Certificate of Classification, as well as in the Register of Ships published by the Society.

1.1.3 *(1/7/2008)*

Ships and units, other than those covered in Parts B, C, D, E and F, are to comply with specific Rules published by the Society, which also stipulate the relevant classification notations.

1.1.4 The classification notations applicable to existing ships conform to the Rules of the Society in force at the date of assignment of class, as indicated in Ch 2, Sec 1. However, the classification notations of existing ships may be updated according to the current Rules, as far as applicable.

1.2 Types of notations assigned

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

a) main class symbol

b) construction marks

c) service notations with additional service features, as applicable

d) navigation notations

e) operating area notations (optional)

f) 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 As an example, the classification notations assigned to a ship 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 ✠ HULL ✠ MACH

(main class symbol, construction marks)

oil tanker-chemical tanker-ESP-Flash point > 60°C

(service notation and additional service features)

Unrestricted navigation

(navigation notation)

✠SYS - NEQ

(additional class notation).

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5.2.5 The navigation notation **sheltered area** is assigned to ships intended to operate in sheltered waters , i.e. harbours, estuaries, roadsteads, bays, lagoons and generally calm stretches of water and when the wind force does not exceed 6 Beaufort scale.

5.2.6 *(1/7/2009)*
The navigation notations defined in these items [5.2.1] to [5.2.5] are those considered as "normal". Where particular cases of navigation are to be assigned which are not included among those so defined, the navigation notation **special** is assigned, followed by specified restrictions (such as the designation of the geographical area, distance from the shore and/or the most unfavourable sea conditions considered).

5.2.7 *(1/7/2009)*
The Society may assign navigation notations provided by the regulations of the flag Administration, which may be different from those defined in [5.2.1] to [5.2.6].

5.3 Operating area notations

5.3.1 The operating area notation expresses the specified area where some service units are likely to operate at sea within specific restrictions which are different from normal navigation conditions.

The operating area notation is, in principle, solely granted to working units, such as dredgers and crane pontoons.

This operating area notation is indicated after the navigation notation.

Example: **unrestricted navigation - “operating area notation”**

5.3.2 The following operating area notations may be assigned:

a) notation **specified operating area**, where the specific operating conditions which have been considered by the Society are described in an annex to the Certificate of Classification (i.e. distance from shore or from port of refuge, weather or sea conditions)

b) 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 of the Rules.

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 ship are listed in [6.2] to [6.14], according to the category to which they belong. These additional class notations are also listed in alphabetical order in Tab 3.

6.2 System of Trace and Analysis of Records (STAR)

6.2.1 General *(1/7/2008)*
STAR is a System of Trace and Analysis of Records integrating rational analysis with data and records from ship-in-service concerning planned inspection and ship maintenance.

The requirements for the assignment of these notations are given in Part F, Chapter 1.

6.2.2 STAR-HULL *(1/10/2000)*
The additional class notation **STAR-HULL** is assigned to ships on which an Inspection and Maintenance Plan (IMP) for the hull is implemented.

The notation may be completed by the suffix **NB** when a structural tridimensional analysis has been performed for the hull structures, as defined in Pt B, Ch 7, App 1 or Pt B, Ch 7, App 2 or Pt B, Ch 7, App 3, as applicable, at the new building stage. The suffix **NB** is removed when the ship enters the **STAR-HULL** survey programme through the implementation of the Inspection and Maintenance Plan (IMP).

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6.14 Other additional class notations

6.14.1 Strengthened bottom - Not always afloat but safe aground (NAABSA) *(15/10/2019)*

The additional class notation **STRENGTHBOTTOM-NAABSA** may be assigned to ships built with specially strengthened bottom structures so as to be able to be loaded and/or unloaded when properly stranded.

The requirements for the assignment of this notation are given in Pt F, Ch 13, Sec 1.

6.14.2 Loading by grabs *(1/4/2006)*

a) The additional class notation **GRABLOADING** may be assigned to ships with hold tank tops specially reinforced for loading/unloading cargoes by means of grabs or buckets.

The requirements for the assignment of this notation are given in Pt F, Ch 13, Sec 2.

However, this does not preclude ships not assigned with this notation from being loaded/unloaded with grabs.

b) The additional class notation **GRAB [X]** may be assigned to ships with hold tank tops designed for loading/unloading cargoes by means of grabs having a maximum mass of [X] tonnes.

The requirements for the assignment of this notation are given in Pt F, Ch 13, Sec 2 (see also Note 2).

Note 1: These additional class notations may only be assigned to ships with the service notation **general cargo ship** (intended to carry dry bulk cargoes), **bulk carrier**, **ore carrier**, **combination carrier/OBO** or **combination carrier/OOC**.

Note 2: The specific requirements for the assignment of the notation **GRAB [X]** to bulk carriers with the service feature **CSR** are given in the Common Structural Rules (Ch 1, Sec 1, [3]).

6.14.3 In-water survey

The additional class notation **INWATERSURVEY** may be assigned to ships provided with suitable arrangements to facilitate the in-water surveys as provided in Ch 2, Sec 2, [7.1.4].

The requirements for the assignment of this notation are given in Pt F, Ch 13, Sec 3.

6.14.4 Single point mooring

The additional class notation **SPM** (Single Point Mooring) may be assigned to ships fitted with a specific mooring installation.

The requirements for the assignment of this notation are given in Pt F, Ch 13, Sec 4.

These requirements reproduce the provisions of “Recommendations for Equipment Employed in the Mooring of Ships at Single Point Mooring” (3rd edition 1993), issued by OCIMF (Oil Companies International Marine Forum).

6.14.5 Container lashing equipment *(1/7/2017)*

The additional class notation **LASHING** is assigned to ships initially fitted with mobile container lashing equipment that is documented, tested and checked.

The notation **ROUTE DEPENDENT LASHING (start date - end date)** is assigned to ships initially fitted with mobile container lashing equipment that is documented, tested and checked for specific routes and for the period of year defined by the specification start date - end date.

These notation are assigned only to ships having the service notation **container ship** or the additional service feature **equipped for carriage of containers**.

The requirements for the assignment of the notations are given in Pt F, Ch 13, Sec 5.

This equipment, however, will not be verified any longer at the periodical class surveys to which the ship is submitted.

6.14.6 Dynamic positioning *(1/1/2021)*

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

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

The additional class notation **DYNAPOS** is assigned, in accordance with [6.1.3], to ships fitted with dynamic positioning installations complying with the requirements of this Section, as follows:

- **DYNAPOS-SAM**
- **DYNAPOS-DP1**
- **DYNAPOS-DP2**
- **DYNAPOS-DP3**

DYNAPOS-SAM (semi-automatic control): the control system of installation is to be achieved by automatic conversion of the instructions issued by the operator in thruster commands: the operator's manual intervention is necessary for position keeping.

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f) **LOADINT-HUG-ST1**, **LOADINT-HUG-ST2**, **LOADINT-HUG-ST3**, **LOADINT-HUG-ST4**, when the loading instrument performs hull girder calculations and stability calculations, as applicable.

The requirements for the assignment of these notation are given in Pt B, Ch 11, Sec 2, as specified in items a) to e) above.

g) **LOADINT-LAS** when the loading instrument performs lashing calculations.

The requirements for the assignment of these notation are given in Pt F, Ch 13, Sec 5, [3.5].

6.14.68 Ultra low emission vessel (ULEV) *(1/7/2023)*

The additional class notation **ULEV** may be assigned to ships with installed internal combustion engines with a very low level of emissions (both gaseous pollutants and particulate) tested at the time of assignment of the notation. The list of tested engines and their fuel(s) is to be recorded at the assignment of the **ULEV** additional class notation.

The requirements for the assignment of this notation are given Pt F, Ch 13, Sec 46.

6.14.69 BIOFUEL *(1/7/2023)*

The additional class notation **BIOFUEL** is assigned to ships operating with biofuel as fuel for their internal combustion engines, boilers, fuel cell or other consumers complying with the requirements of Pt C, Ch 1, App 16. Depending on the type of fuel (e.g. diesel, methanol, ammonia, hydrogen etc..), the notation **BIOFUEL** may be completed with the following features:

- BIODIESEL (FAME)
- BIODIESEL (BTL)
- BIODIESEL (HVO/HDRD)
- BIODIESEL (SVO/PPO)
- BIOMETHANOL
- BIOETHANOL
- BIOLNG
- BIOAMMONIA
- BIOHYDROGEN

For biofuels considered as low flashpoints fuels - i.e those based on LNG, LPG, NH3, methyl/ethyl alcohol and hydrogen - the ship is to additionally comply with the following requirements, as applicable:

- Pt C, Ch 1, App 7 (LNG or CNG Fuelled Ships)
- Pt C, Ch 1, App 13 (LPG or NH3 Fuelled Ships)
- Pt C, Ch 1, App 14 (Hydrogen Fuelled Ships)
- Pt C, Ch 1, App 15 (Methyl/Ethyl Alcohol Fuelled Ships).

The biofuels based on biodiesel considered as low flash point fuel are subject to acceptance by the Society on case-by-case basis.

6.14.70 Optimized Shaft Alignment *(15/2/2024)*

The additional class notations **Optimized Shaft Alignment (OSA)** or **Optimized Shaft Alignment and procedure (OSA-PR)** are assigned to new ships when the Shaft Alignment (configuration of the shafts and bearings relative to the centerlines of the bearings from the theoretical straight-line condition) is designed, installed, verified, and surveyed in accordance with Tasneef "Guide for Optimized Shaft Alignment".

The requirements in the Guide are in lieu of the applicable requirements of Pt C, Ch 1, Sec 7.

The additional class notations **OSA** and **OSA-PR** are not applicable to ships equipped with azimuth thrusters or non-conventional shaft lines intended for main propulsion, or as otherwise deemed not appropriate by the Society.

6.14.71 Cyber Resilience Ready *(1/6/2024)*

The additional class notation **CS-Ready** may be assigned to ships contracted for construction before 1 July 2024 in a shipyard complying with the requirements of Tasneef "Guide for Shipyards to assign new buildings with **CS-Ready** additional class notation".

6.14.72 VIB-MAC *(1/6/2025)*

The additional class notation **VIB-MAC** is assigned to ships whose machinery and onboard equipment comply with the vibration requirements defined in Pt F, Ch 13, Sec 47, specifying levels of vibration (to be confirmed by a measurement campaign) which suggest good working conditions for machinery in operation and sound mounting, balancing and alignment for new installations.

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 3 : List of additional class notations *(1/6/2025)*

Additional class notation	Reference for definition	Reference	Remarks
ADVANCED WASTEWATER TREATMENT PLANT (AWTP)	[6.8.12]	NA	
AIR LUBRICATION SYSTEM (AIR LUB)	[6.14.47]	Pt F, Ch 13, Sec 31	
AIR-MON	[6.14.33]	Pt F, Ch 13, Sec 22	
AUT-CCS	[6.4.3]	Pt F, Ch 3, Sec 2	**(1)**
AUT-PORT	[6.4.4]	Pt F, Ch 3, Sec 3	**(1)**
AUT-UMS	[6.4.2]	Pt F, Ch 3, Sec 1	**(1)**
AVM-APS or AVM-APS-NS	[6.3.2]	Pt F, Ch 2, Sec 1	**(1)**
AVM-IAPS	[6.3.3]	Pt F, Ch 2, Sec 2	**(1)**
AVM-DPS or AVM-DPS-NS	[6.3.4]	Pt F, Ch 2, Sec 3	**(1)**
AVM-IPS	[6.3.5]	Pt F, Ch 2, Sec 4	**(1)**
BATTERY POWERED SHIPS	[6.14.42]	Pt C, Ch 2, App 2	
BIOFUEL	[6.14.69]	Pt C, Ch 1, App 16	
BIOSAFE SHIP	[6.14.49]	Pt F, Ch 13, Sec 33	
BWM-E	[6.14.15]	Pt C, Ch 1, Sec 10, [7]	**(5)**
BWM-T	[6.14.15]	Pt C, Ch 1, App 8	
CARGOCONTROL	[6.14.9]	Pt F, Ch 13, Sec 9	
CARGO HANDLING (H), **CARGO HANDLING (O)**, **CARGO HANDLING (T)**, **CARGO HANDLING (S)**, **CARGO HANDLING (SW)**	[6.14.30]	Tasneef Rules for loading and unloading arrangements and for other lifting appliances on board ships	
CARGO PIPING PROTECTED (CPP)	[6.14.63]	Pt F, Ch 13, Sec 41	
CLEAN-AIR	[6.8.3]	Pt F, Ch 7, Sec 3	**(4)**
CLEAN-SEA	[6.8.2]	Pt F, Ch 7, Sec 4	**(4)**
COAT-WBT	[6.14.12]	Pt F, Ch 13, Sec 12	
COATING PERFORMANCE STANDARD IN CARGO OIL TANKS (CPS-COT)	[6.14.64]	Pt F, Ch 13, Sec 42	
COMF-AIR	[6.7.4]	Pt F, Ch 6, Sec 3	
COMF-NOISE, **COMF-NOISE (DP)** and **COMF-NOISE (MM)**	[6.7.2]	Pt F, Ch 6, Sec 1	
COMF-NOISE-PLUS	[6.7.2]	Pt F, Ch 6, Sec 5	
COMF-VIB, **COMF-VIB (DP)** and **COMF-VIB (MM)**	[6.7.3]	Pt F, Ch 6, Sec 2	
COVENT	[6.14.8]	Pt F, Ch 13, Sec 8	
CS-Ready	[6.14.71]	Tasneef Guide for Shipyards to assign new buildings with CS-Ready additional class notation	

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

(2) This notation may be completed by the specific notations **-PRECOOLING**, **-QUICKFREEZE** and/or **-AIRCONT** (see [6.9.5]).

(3) This notation may be completed by the specific notations **-MIDSHIP** and **-TRANSFER** (see [6.14.7]).

(4) When ships are assigned the notations **CLEAN-SEA** and **CLEAN-AIR**, the two separate notations are superseded by the cumulative additional class notation **GREEN STAR 3 DESIGN** (see [6.8.4]).

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

(6) This notation may be completed by the specific notation **-HULL** (see [6.10.4]).

(7) This notation may be completed by the specific notation **Icebreaker** (see [6.11.1]).

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Additional class notation	Reference for definition	Reference	Remarks
STRENGTHBOTTOM-NAABSA	[6.14.1]	Pt F, Ch 13, Sec 1	
SUSTAINABLE SHIP	[6.14.54]	Pt F, Ch 13, Sec 36	
SYS-COM	[6.5.4]	Pt F, Ch 4, Sec 3	
SYS-IBS	[6.5.3]	Pt F, Ch 4, Sec 2	**(1)**
SYS-NEQ **SYS-NEQ-1**	[6.5.2]	Pt F, Ch 4, Sec 1	**(1)**
TAS	[6.14.27]	NA	
TEMPORARY REFUGE (RISKS)	[6.14.38]	NA	
ULTRA LOW EMISSION VESSEL (ULEV)	[6.14.68]	Pt F, Ch 13, Sec 46	
VCS	[6.14.7]	Pt F, Ch 13, Sec 7	**(3)**
VIB-MAC	[6.14.72]	Pt F, Ch 13, Sec 47	
WIND ASSISTED PROPULSION SYSTEM (WAPS)	[6.14.66]	Pt F, Ch 13, Sec 45	
WINTERIZATION (temp)	[6.12.1]	Part F, Chapter 11	

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

(2) This notation may be completed by the specific notations **-PRECOOLING**, **-QUICKFREEZE** and/or **-AIRCONT** (see [6.9.5]).

(3) This notation may be completed by the specific notations **-MIDSHIP** and **-TRANSFER** (see [6.14.7]).

(4) When ships are assigned the notations **CLEAN-SEA** and **CLEAN-AIR**, the two separate notations are superseded by the cumulative additional class notation **GREEN STAR 3 DESIGN** (see [6.8.4]).

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

(6) This notation may be completed by the specific notation **-HULL** (see [6.10.4]).

(7) This notation may be completed by the specific notation **Icebreaker** (see [6.11.1]).

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SECTION 47 VIB-MAC

1 General

1.1 Application

1.1.1 *(1/6/2025)*

The additional class notation **VIB-MAC** is assigned, in accordance with Pt A, Ch 1, Sec 2, [6.14.72], to ships classed by the Society whose machinery and onboard equipment comply with the vibration requirements of this Section.

In the event that the ship undergoes modifications, refitting or repairs as specified in [3.2.1], the maintenance of the notation is subject to the results of new measurements as deemed appropriate by the Society [3.2.2].

The notation is completed by a letter **A**, **B** or **C** which represents the level of vibration measured on components under test, such as machinery, equipment and structures, when the ship is in normal seagoing conditions. Letter **A** corresponds to the lowest level of vibration of the component.

The notation **VIB-MAC** is assigned if at least level **C** is reached on all components under test. For each component under test, the level of vibration measured **A**, **B** or **C**, is to be noted in the report.

1.1.2 *(1/6/2025)*

Ships not classed by the Society complying with the requirements of this Section may be provided, upon request, with a Certificate of Conformity to the requirements of this Section. The Certificate is valid for a period of 5 years and may be extended, upon request, for an additional 5-year period based on a limited set of measurements covering at least 5% of those made when the Certificate was first issued.

1.1.3 *(1/6/2025)*

The requirements of this Section apply to components under test as specified in [2.2], as far as practicable.

1.2 Basic principles

1.2.1 *(1/6/2025)*

The scope of this notation is to define the level of vibration of components under test through a measurement campaign. Vibration levels of components under test will be indicators of sound mounting, balancing and alignment for new installations as well as indicators of good working condition for machinery in operation.

1.2.2 *(1/6/2025)*

Assignation of levels (**A**, **B** or **C**) is based on the measurement of vibration on components under test. This assessment is to be carried out by or under the surveillance of a Society's surveyor.

2 Applicability

2.1 Vibration

2.1.1 *(1/6/2025)*

Vibration is the time variation of the value of a physical quantity described by either the motion or the position of a mechanical system when this value is alternatively greater or smaller than a mean reference value.

As far as these Rules are concerned, the reference physical quantity is the structural velocity in the frequency range from 4 to 5000 Hz, measured in mm/s.

2.2 Machinery and components

2.2.1 *(1/6/2025)*

This notation is to be applied to all major components that satisfy the requirements listed below:

- Diesel engines (internal combustion) with a power > 200 kW
- Thrusters with a power > 100 kW
- Shafting with a diameter > 50 mm

- Shaft line bearings with a diameter > 50 mm
- Turbines with a power > 1 MW
- Diesel generators with a power > 100 kW
- Turbochargers with a power > 1 MW
- Gears with a transmitted power > 200 kW
- Pumps with a power > 10 kW
- Compressors with a power > 10 kW
- Fans with a power > 25 kW
- Boilers with a power > 500 kW

2.3 Operational power in the Continuous Service Rate (CSR) condition

2.3.1 *(1/6/2025)*

Operational power is the amount of energy transferred or converted per unit time (measured in kW) at which the ship or the machine is normally operated.

2.3.2 *(1/6/2025)*

The ship's operational power to be considered for the purpose of these Rules is 85% of the Maximum Continuous Rate (MCR) defined in the following as the Continuous Service Rate (CSR) condition.

2.3.3 *(1/6/2025)*

The machine's operational power to be considered for the purpose of this Rule is the steady-state operating power at which the component was designed to function continuously by the manufacturer.

2.3.4 *(1/6/2025)*

Subject to the acceptance of the Society and to the agreement of both Owner and Shipyard, CSR may be other than a propulsion power of 85% MCR, if such condition corresponds to the normal seagoing conditions. The notation assigned to the ship will reflect such modified test condition (e.g.: VIB-MAC-75 for CSR corresponding to 75% of MCR).

Similarly, other operational powers from those prescribed can be used for each machine under assessment. If agreed, the different values will have to be clearly stated in the report in [7].

3 Design of systems in respect of vibrations

3.1 Principle

3.1.1 General *(1/6/2025)*

Vibrations on a vessel may impair the proper functioning of essential machinery and equipment. Fatigue damage to important structural elements of the vessel is to be avoided by giving special consideration to the design, construction and installation of machinery systems so that any mode of their vibrations is not to cause undue stresses in the normal operating ranges.

3.1.2 Vibration levels *(1/6/2025)*

Systems' vibrations (torsional, bending and axial) are to be acceptable to the Manufacturers, and in accordance with the requirements of this Section, in both continuous and transient running. Where vibration levels of a component are found to exceed the limits corresponding to vibration level **C** as defined in [6.2.1], it is advised to contact the Manufacturer to identify possible causes and remedial actions.

3.2 Modifications of existing plants

3.2.1 *(1/6/2025)*

When substantial modifications to existing plants take place, the Society is to be duly notified. The notation is automatically suspended until a new measurement campaign confirms compliance. Examples of alterations include:

- significant change of the running speed, power or layout (e.g: cylinders number) of the main engine
- replacement or addition of major components (such as propeller, compressor, flexible coupling or damper).

3.2.2 *(1/6/2025)*

The new measurement campaign is to be performed when substantial modifications of existing plants take place (see [3.2.1]). Depending on the extent of the modification (amount and type of components involved), the scope of the

measurement campaign may be adjusted accordingly. The proposed set of measurements is to be submitted for evaluation to the Society.

4 General Requirements

4.1 Design requirements

4.1.1 Submission of documentation *(1/6/2025)*

Being the vibration behavior of the ship's systems under assessment, relevant characteristics of components (such as dimensions, nominal outputs, rotational speeds, etc.) are to be submitted to the Society for information.

Subject to Society's discretion, additional information may be requested if further investigations are needed.

4.2 Constructional Requirements

4.2.1 Vibration measurement plan *(1/6/2025)*

A plan describing the proposed vibration measurement campaign, in compliance with [5.2], is to be developed. The plan is to include the ship machinery and the proposed minimum number of measurements to be taken on each machinery. The aim is to obtain a rational distribution of measurement points throughout the machineries of the ship.

4.2.2 Vibration measurement report *(1/6/2025)*

A detailed report is to be submitted as shown in item [7]. The report is to contain:

- characteristics of instruments and signal processing
- characteristics of propulsion machinery and main auxiliaries
- position of measurement points on machineries
- measured vibration levels (RMS)
- resulting merit level
- ship characteristics (loading condition, length, etc.)
- environmental conditions (wind and waves)
- water depth.

Additionally, for each measuring point that has been further investigated, the following data are to be included in the report:

- spectrum of the structural velocity in the frequency range of investigation
- indication of the frequency and value of the main peaks.

5 Measurement of vibration levels

5.1 Testing conditions

5.1.1 General *(1/6/2025)*

Vibration levels are to be measured in the conditions defined in the following paragraphs of this Section. However, different conditions may be accepted at the discretion of the Society with agreement of involved parties.

5.1.2 Equipment operational conditions during tests *(1/6/2025)*

During measurements, all auxiliary systems, forced ventilation and air conditioning systems (HVAC systems) and hotel service systems are to be operating in normal service conditions. However, different conditions - to be clearly mentioned in the report - may be accepted by the Society with agreement of involved parties.

5.1.3 Ship conditions *(1/6/2025)*

As far as practicable the ship's loading conditions are to be as close as possible to normal operating conditions and, as far as possible, the ship is to proceed on a straight course.

Subject to the acceptance of the Society with agreement of involved parties, any equipment is to be operative during measurements if it is necessary for the ship to proceed in normal seagoing conditions and in the environmental conditions specified in [5.1.4] (e.g. stabilizing fins etc.).

5.1.4 Environmental conditions *(1/6/2025)*

Water depth is to be sufficiently deep and at least 5 times the medium ship draught.

In general, meteorological conditions are to be within the following limits:

- wind: not stronger than Beaufort 3 - strong breeze (speed 7 to 10 knots),
- waves: not stronger than force 3 - rough (significant wave height 0,5 to 1,25 m).

5.1.5 **Operational power** *(1/6/2025)*

a) Measurements on machines are to be taken when the machine has reached its steady-state operating conditions (e.g. normal operating temperature or operational power).

b) Measurements are to be carried out with the ship working at the operational power in the CSR condition as defined in [2.3].

5.1.6 **Machineries to be measured** *(1/6/2025)*

The list of components to be tested is to be provided to the Society and have to include all components in [2.2] as a minimum, if installed on board. If such plan is not provided, components under test will be those in [2.2].

5.2 Measurement positions

5.2.1 **General** *(1/6/2025)*

Measurements are to be carried out on the machinery defined in [5.1.6] according to the general principles of ISO 4867-1984 and ISO 4868-1984. At the discretion of the Society, additional measurements are to be carried out where evidence of local vibration occurs.

5.2.2 *(1/6/2025)*

Machineries mentioned in [2.2] might vary greatly in shape and size. Thus, for uniformity of measurement and comparison to the limits specified in [6] (Tab 1), the following notes are to be followed:

- Diesel engines < 200 rpm: to be measured at the top of the A-frame at engine ends
- Diesel engines > 200 rpm: to be measured on the engine block top and bottom
- Shaft line bearings: to be measured horizontally or vertically with the shaft center
- Turbines: to be measured in any direction on the bearings
- Diesel generators: to be measured in any direction on the bearings
- Turbochargers: to be measured at the top of compressor casing
- Gears: to be measured in any direction on the foundation and on the input shaft bearing
- Pumps: to be measured in any direction on the bearings
- Compressors: to be measured in any direction on the bearings
- Fans: to be measured in any direction on the bearings
- Boilers: to be measured on stiff parts, e.g. lugs, flanges, etc.

Records of measured results are to include essential data of the machine and of the measuring system used.

5.3 Instrumentation

5.3.1 *(1/6/2025)*

Vibration levels (V_mis) are to be recorded by means of instrumentation that is to comply with the requirements of ISO 8041. This compliance is to be verified at least every two years by an organization recognized by the Society.

The date of last verification and confirmation of compliance with relevant standards is to be recorded and calibration sheets provided.

5.4 Instrumentation settings

5.4.1 *(1/6/2025)*

Vibration level measurements are to be carried out by recording the Root Mean Square (RMS) values of structural vibration. Specifically, the quantity to be measured is the structural velocity, in mm/s, over the frequency range from [1-5000] Hz, by means of an instrument as defined in [5.3.1].

The vibration levels of the spectra line are to be averaged over a length of time of at least 30 s. If significant evidence of modulation appears in the vibration levels, the spectrum will be averaged over a length of time of 60 s.

In the vibration level assessment, only the maximum amplitude of vibration among the vertical, transversal or longitudinal components will be considered for each measured position, unless otherwise agreed by the involved parties (e.g. the Society with Owner, Makers, Shipyard, etc).

5.4.2 *(1/6/2025)*

If further optional investigation is carried out on any point (clearly mentioned in the report), the fast Fourier transform (FFT) analyzer settings to obtain the vibration spectrum are to be the following:

- frequency range 1-5000 Hz
- time window type Hanning with overlap equal to 2/3 or 3/4 (66.7% or 75%)
- a number of at least 400 spectral lines
- linear or exponential averaged spectra.

Different instrumentation settings will be considered by the Society on a case-by-case basis.

6 Acceptance criteria

6.1 Vibration levels

6.1.1 *(1/6/2025)*

For each type of machinery, limit values (V_lim) depending on the vibration level are given in Tab 1. Values of vibration levels are to be measured in mm/s in the frequency range $4 \leq f \leq 5000$ Hz.

6.2 VIB-MAC level assignation

6.2.1 *(1/6/2025)*

Each component is rated on the basis of the actual rating reached by vibration level V_mis, provided that a level of at least C is reached. The merit level of the component is assigned as follows:

a) Merit level is A if:
   - at any condition $V\_mis \leq VA$

b) Merit level is B if:
   - at any condition $VA < V\_mis \leq VB$

c) Merit level is C if:
   - at any condition $VB < V\_mis \leq VC$

The global merit level for the ship will be **VIB-MAC** if the ship was tested at CSR condition as per [2.3.2], otherwise a suffix indicating the percentage of MCR at which the ship was tested will be added as per [2.3.4].

Table 1 : Vibration level limits *(1/6/2025)*

Components	A (1)	B (1)	C (1)
	4 ≤ f ≤ 5000 Hz Velocity [mm/s]	4 ≤ f ≤ 5000 Hz Velocity [mm/s]	4 ≤ f ≤ 5000 Hz Velocity [mm/s]
	V_lim	V_lim	V_lim
Diesel engine < 200 rpm (vertical, longitudinal)	7	8.5	10
Diesel engine < 200 rpm (transversal)	17	21.0	25.0
Diesel engine > 200 rpm (hard mounted)	10.0	12.5	15.0
Diesel engine > 200 rpm (resiliently mounted)	17.0	21.0	25.0
Thruster	12.0	15.0	18.0
Shafting	4.0	4.5	5.0
Shaft line bearing	4.0	4.5	5.0
Turbine	5.0	6.0	7.0
Diesel generator	12.0	15.0	18.0
Turbocharger (below 5 MW) (2)	35.0	40.0	45.0
Turbocharger (5-10 MW) (2)	40.0	45.0	50.0

(1) all limits in the table are root mean square values (RMS).
(2) indicated power is the total combined power serving one turbocharger from cylinder group.

Turbocharger (above 10 MW) (2)	45.0	50.0	55.0
Gear	5.0	6.0	7.0
Compressor (elastically mounted)	7.0	8.5	10.0
Compressor (fixed mounted)	5.0	6.0	7.0
Fan	8.0	10.0	12.0
Boiler	35.0	40.0	45.0

(1) all limits in the table are root mean square values (RMS).
(2) indicated power is the total combined power serving one turbocharger from cylinder group.

7 Report

7.1 Minumum information to be included in the report

7.1.1 *(1/6/2025)*

The report for machineries vibration measurements is to contain at least the information in the following Tables 2 to 7.

Table 2 : Characteristics of the ship *(1/6/2025)*

Name of the ship		
Register number RI		
IMO identification number		
Name of the shipyard		
Type of ship		
Length	m	
Breadth	m	

Table 3 : Characteristics of the propulsion *(1/6/2025)*

Engine		
Manufacturer		
Model		
Number of cylinders		
Number of units		
Maximum continuous power	kW	
Maximum rated speed	rpm	
Gear box		
Manufacturer		
Model		
Reduction ratio		
Gearing arrangement (1)		
Propeller		
Manufacturer		
Number of blades		
Propeller diameter	m	

(1) this column refers to the number of teeth of each gear and other relevant characteristics

Table 4 : Characteristics of the other machinery *(1/6/2025)*

Type			
Manufacturer			
Model			
Operational power during test	kW		
Operational power during test	rpm		
Notes			

Table 5 : Characteristic of instruments and signal processing *(1/6/2025)*

Manufacturer			
Analyzer name			
Identification number			
Calibration date			
Transducer (X)			
Transducer (Y)			
Transducer (Z)			
Overall parameter			
FFT Averaging			
Time window			
Overlap	%		
Frequency resolution	Hz		

Table 6 : Measurement conditions *(1/6/2025)*

General Data					
Date					
Starting - Ending time					
Route / Location					
Displacement	t				
Draft (Aft, Fore)	m		m		
Velocity	kts				
Propulsion power	kW				
Percentage of MCR	%				
Meteorological conditions					
Wind force					
Wind direction					
Sea State Douglas scale					
Wave height					
Water depth					

Table 7 : Measurement results *(1/6/2025)*

Type of machinery				
Position				
Serial number				
Results				
Transducer #	Position	Direction	V_mis [mm/s]	V_lim [mm/s]
1				
....				
All results in the table are root mean square values (RMS).				