Amendments to Parts A and C of the "Rules for the Classification of Ships" (REP.1 and REP.3): new additional class notation Optimized Shaft Alignment (OSA) or Optimized Shaft Alignment and procedure (OSA-PR)

Effective from 15 February 2024

Reason: introduction of the new additional class notation Optimized Shaft Alignment (OSA) or Optimized Shaft Alignment and procedure (OSA-PR)

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).

2 Main class symbol

2.1 Main class symbol

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

2.1.2 *(1/1/2009)*

The main class symbol C is assigned to ships 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 ship is maximum 5 years; see Ch 2, Sec 2, [4].

Except for special cases, class is assigned to a ship 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.

Note 2: The symbol **C** may be followed by the additional construction feature **light ship** in case of ships or other units having restricted navigation notations and generally having length not greater than 50 m as well as speed greater than 15 knots, whose hull scantlings and outfitting comply with the applicable requirements of Chapters 3 and 6 of the "Rules for the Classification of High Speed Craft", issued separately by the Society.

3 Construction marks

3.1 General

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

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The service notation of units operating permanently anchored or moored in a fixed location is competed by the additional class notation "**MOORING**".

The service notation of units provided with at least one crane, fitted with a grab or a bucket, is completed by the additional class notation "**CARGO HANDLING**".

4.12 Miscellaneous units

4.12.1 The service notation **special service** is assigned to ships which, due to the peculiar characteristics of their activity, are not covered by any of the notations mentioned above. The classification requirements of such units are considered by the Society on a case by case basis.

This service notation may apply, for instance, to ships engaged in research, expeditions and survey, ships for training of marine personnel, whale and fish factory ships not engaged in catching, ships processing other living resources of the sea, and other ships with design features and modes of operation which may be referred to the same group of ships.

An additional service feature may be specified after the notation (e.g. **special service - training, special service - ship lift, special service - fish factory**) to identify the particular service in which the ship is intended to trade. The scope and criteria of classification of such units are indicated in an annex to the Certificate of Classification.

5 Navigation and operating area notations

5.1 Navigation notations

5.1.1 Every classed ship is to be assigned one navigation notation as listed in [5.2].

5.1.2 The assignment of a navigation notation, including the reduction of scantlings or specific arrangements for restricted navigation notations, is subject to compliance with the requirements laid down in Part B, Part C, Part D and Part E of the Rules.

5.1.3 The assignment of a navigation notation does not absolve the Interested Party from compliance with any international and national regulations established by the Administrations for a ship operating in national waters, or a specific area, or a navigation zone. Neither does it waive the requirements in Sec 1, [3.3.1].

5.2 List of navigation notations

5.2.1 The navigation notation **unrestricted navigation** is assigned to a ship intended to operate in any area and any period of the year.

5.2.2 The navigation notation **summer zone** is assigned to ships intended to operate only within the geographical limits as defined in ILLC 1966 for the Summer zones.

5.2.3 The navigation notation **tropical zone** is assigned to ships intended to operate only within the geographical limits as defined in ILLC 1966 for the Tropical zones.

5.2.4 The navigation notation **coastal area** is assigned to ships intended to operate only within 20 nautical miles from the shore and with a maximum sailing time of six hours from a port of refuge or safe sheltered anchorage.

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.

6.14.69 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.

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 *(15/2/2024)*

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	

(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]).

Additional class notation	Reference for definition	Reference	Remarks
LNG FUELLED (Aux) or **CNG FUELLED (Aux)**	[6.14.23] c)	Pt C, Ch 1, App 7 and Pt E, Ch 9, Sec 16	
LNG READY (X1, X2, X3…) or **CNG READY (X1, X2, X3…)**	[6.14.37]	Pt F, Ch 13, Sec 24	
LOADINT-HUG, LOADINT-ST1, LOADINT-ST2, LOADINT-ST3, LOADINT-ST4, LOADINT-HUG-ST1, LOADINT-HUG-ST2, LOADINT-HUG-ST3, LOADINT-HUG-ST4	[6.14.67]	Pt B, Ch 11, Sec 2	
LOADINT-LAS	[6.14.67]	Pt F, Ch 13, Sec 5, [3.5]	
LPG FUELLED	[6.14.51]	Pt C, Ch 1, App 13	
MAN OVERBOARD DETECTION SYSTEM (MOB)	[6.14.43]	Pt F, Ch 13, Sec 27	
MANOVR	[6.14.10]	Pt F, Ch 13, Sec 10	
MASS-ADS **MASS-RCM** **MASS-RCU** **MASS-FAS**	[6.14.55]	Pt F, Ch 13, Sec 37	
METHYL/ETHYL ALCOHOL FUELLED	[6.14.58]	Pt C, Ch 1, App 15	
METHYL/ETHYL ALCOHOL FUELLED READY (X1, X2, X3)	[6.14.59]	Pt F, Ch 13, Sec 39	
MLCDESIGN	[6.14.16]	Pt F, Ch 13, Sec 13	
MON-HULL	[6.6.2]	Pt F, Ch 5, Sec 1	
MON-SHAFT	[6.6.3]	Pt F, Ch 5, Sec 2	
MOORING	[6.14.29]	Pt F, Ch 13, Sec 21	
NH3 FUELLED	[6.14.52]	Pt C, Ch 1, App 13	
NH3 FUELLED READY (X1, X2, X3)	[6.14.53]	Pt F, Ch 13, Sec 35	
NOx-Tier II-x%	[6.8.6]	Pt F, Ch 7, Sec 7	
NOx-Tier III	[6.8.7]	NA	
NOISE-PORT-OUT(X) **NOISE-PORT-IN(X)**	[6.5.7]	Pt F, Ch 6, Sec 4	
OSA **OSA-PR**	[6.14.70]	Pt C, Ch 1, Sec 7 Tasneef Guide for Optimized Shaft Alignment	
PERSONNEL LIFTING, **PERSONNEL LIFTING ADV**, **PERSONNEL LIFTING ADV PLUS**	[6.14.30]	Tasneef Rules for loading and unloading arrangements and for other lifting appliances on board ships	
PERSONS WITH REDUCED MOBILITY (PMR-ITA)	[6.14.48]	Pt F, Ch 13, Sec 32	

(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]).

SECTION 7 MAIN PROPULSION SHAFTING

1 General

1.1 Application

1.1.1 This Section applies to shafts, couplings, clutches and other shafting components transmitting power for main propulsion.

For shafting components in engines, turbines, gears and thrusters, see Sec 2, Sec 4, Sec 5, Sec 6 and Sec 12, respectively; for propellers, see Sec 8.

For vibrations, see Sec 9.

Additional requirements for navigation in ice are given in Pt F, Ch 9, Sec 3.

1.2 Documentation to be submitted

1.2.1 The Manufacturer is to submit to the Society the documents listed in Tab 1 for approval.

Plans of power transmitting parts and shaft liners listed in Tab 1 are to include the relevant material specifications.

2 Design and construction

2.1 Materials

2.1.1 General

The use of other materials or steels having values of tensile strength exceeding the limits given in [2.1.2], [2.1.3] and [2.1.4] will be considered by the Society in each case.

2.1.2 Shaft materials *(1/7/2006)*

In general, shafts are to be of forged steel having tensile strength, R_m, between 400 and 800 N/mm^2.

Where shafts may experience vibratory stresses close (i.e. higher than 80%) to the permissible stresses for transient operation, the materials are to have a specified minimum ultimate tensile strength (R_m) of 500 N/mm^2. Otherwise, materials having a specified minimum ultimate tensile strength (R_m) of 400 N/mm^2 may be used.

Table 1 : Documentation to be submitted

No.	Document (drawings, calculations, etc.)
1	Shafting arrangement **(1)**
2	Thrust shaft
3	Intermediate shafts
4	Propeller shaft
5	Shaft liners, relevant manufacture and welding procedures, if any
6	Couplings and coupling bolts
7	Flexible couplings **(2)**
8	Sterntube
9	Details of sterntube glands
10	Oil piping diagram for oil lubricated propeller shaft bearings
11	Shaft alignment calculation, see also [3.3]

(1) This drawing is to show the entire shafting, from the main engine coupling flange to the propeller. The location of the thrust block, and the location and number of shafting bearings (type of material and length) are also to be shown.

(2) The Manufacturer of the elastic coupling is also to submit the following data:

- allowable mean transmitted torque (static) for continuous operation
- maximum allowable shock torque
- maximum allowable speed of rotation
- maximum allowable values for radial, axial and angular misalignment

In addition, when the torsional vibration calculation of main propulsion system is required (see Sec 9), the following data are also to be submitted:

- allowable alternating torque amplitude and power loss for continuous operation, as a function of frequency and/or mean transmitted torque
- static and dynamic stiffness, as a function of frequency and/or mean transmitted torque
- moments of inertia of the primary and secondary halves of the coupling
- damping coefficient or damping capability
- properties of rubber components
- for steel springs of couplings: chemical composition and mechanical properties of steel employed.

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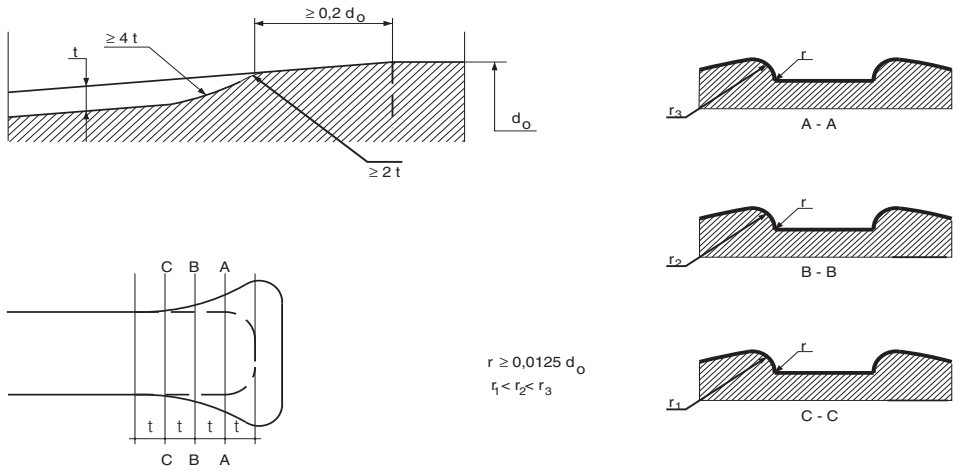
Figure 1 : Details of forward end of propeller shaft keyway



3 Arrangement and installation

3.1 General

3.1.1 The installation is to be carried out according to the instructions of the component Manufacturer or approved documents, when required.

3.1.2 The installation of sterntubes and/or associated non-shrunk bearings is subject to approval of procedures and materials used.

3.1.3 The joints between liner parts are not to be located in way of supports and sealing glands.

Metal liners are to be shrunk on to the shafts by pre-heating or forced on by hydraulic pressure with adequate interference; dowels, screws or other means of securing the liners to the shafts are not acceptable.

3.2 Protection of propeller shaft against corrosion

3.2.1 The propeller shaft surface between the propeller and the sterntube, and in way of propeller nut, is to be suitably protected in order to prevent any entry of sea water, unless the shaft is made of austenitic stainless steel.

3.3 Shaft alignment

3.3.1 **Definitions** *(15/2/2024)*

a) **Shaft alignment**

Shaft alignment is the configuration of the shafts and bearings relative to the centerlines of the bearings from the theoretical straight-line condition, so that an acceptable bearing load distribution is achieved and satisfy the limits for: the bearing loading conditions, the shaft-bearing misalignment angles, the bending moments and shear force in the shafts, the stresses in the shaft, and other parameters imposed by designer, such as displacement of shafts in way of gears.

b) **Shaft alignment optimization**

Alignment optimization is a method to identify a condition (such as a set of bearing offsets) which, when applied in the dry dock or at the light ship draft condition produces the most favorable bearing load distribution for more than one alignment condition and will satisfy the bearing loading conditions, the limits prescribed by the Manufacturers of shaft line components including machineries and the limits stated in the Rules, in all service drafts of the vessel (e.g., from ballast to fully-laden).

For new vessels under construction to which shaft alignment optimization is foreseen by designers, the assignment of the additional class notation "Optimized Shaft Alignment" **OSA** or **OSA-PR** may be required.

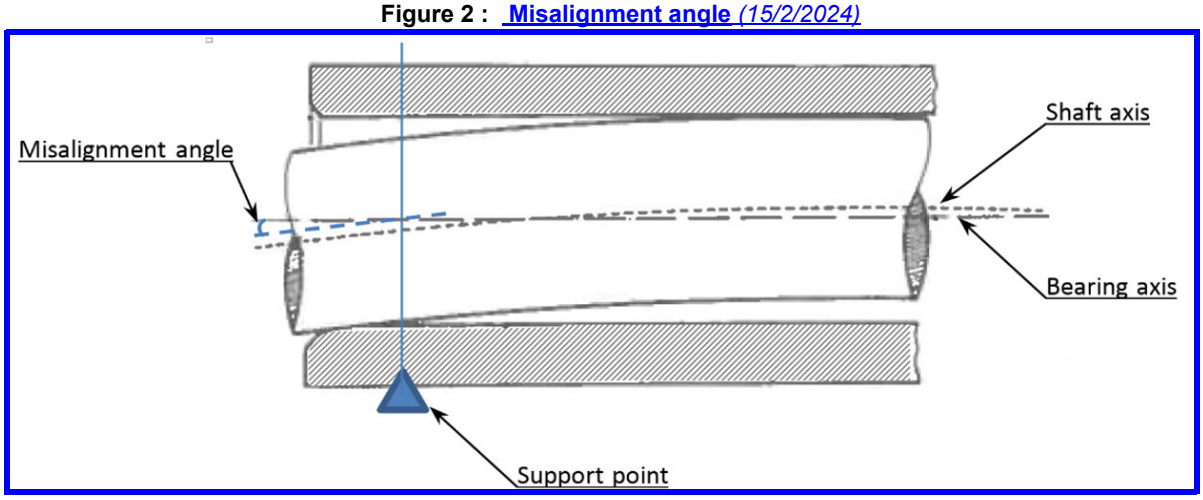
c) **Misalignment Angle (for bearing modeled as single point of support)**

Misalignment angle is defined as the angle between the bearing axis and the tangent line to the shaft at the equivalent point of support. (See Fig. 2)

d) **Mean shaft misalignment (for bearing modeled as multiple point of support)**

The Mean shaft misalignment angle (in radians) is defined as the difference between the displacement of the shaft centerline relative to the bearing centerline calculated at the aftmost point of support and the forwardmost point of support of the considered bearing divided by the bearing effective length.

Figure 2 : Misalignment angle *(15/2/2024)*



3.3.2 Shaft alignment *(15/2/2024)*

~~In the case of propulsion shafting with turbines, direct coupled engines or bearings with offsets from a reference line, t~~The ~~relevant~~ shaft alignment calculation is to be submitted for approval for all ships having propulsion shafting with turbines, direct coupled engines, or bearings with offsets from a reference line.

The Society may also require the above calculation and/or impose additional requirements in the case of non-conventional propulsion systems or~~special~~ arrangements which are considered critical (e.g. Propulsion shafting with no forward stern tube bearing).

~~The alignment of the propulsion machinery and shafting and the spacing and location of the bearings are to be such as to ensure that the loads are compatible with the material used and the limits prescribed by the Manufacturer.~~

The calculation is to ~~take into account~~consider thermal, static and dynamic effects (e.g. external loads) and buoyancy effects in water on propeller and on shaft sections operating in water or oil; the results are to include the reaction forces of bearings, bending moments, shear stresses and other parameters (such as gap and sag of each flanged coupling or jacking loads) and instructions for the alignment procedure.

Bearings are to be modelled as follow:

a) For aftmost bearing:

   1) In case where only one support point is used, the axial position of the single point of support may vary and it is to be evaluated by the designer for each shaft alignment condition presented.

   2) In case where two support points are used, their locations are to be at each end of such bearings.

   3) In case of more than two support points are used, their locations are to be defined by designer, but one point of support is to be at each end of such bearings.

b) For other bearings, the location of the support point is to be at the mid-length of bearing.

The alignment of the propulsion machinery and shafting and the spacing and location of the bearings are to be such as to ensure that the loads are compatible with the material used and the limits prescribed by the Manufacturer.

Bearing reactions are to be always positive (i.e. pushing the shafts upward). If any shaftline bearing load is lower than 5% of manufacturer's maximum limits, whirling behavior are to be investigated in that condition.

Aftmost bearings with no-slope or single slope boring:

- if a single point of support is utilized for the bearing model, the misalignment angle between the propeller shaft and the aftmost bearing bush, (stern tube or strut), should not exceed 0.3mm/m or 0.3 mrad under all analyzed static conditions. The axial position of the single point of support may vary and it is to be appropriately evaluated for each shaft alignment condition presented. In case that the 0.3 mrad misalignment angle criterion cannot be met under a single-point-of-support bearing modelling then a multi-point of support bearing modelling and criteria are to be used.
- If the bearing is modelled as multi-point of support, the mean shaft misalignment is to be considered. For aftmost bearings modelled as multi-point of support, the mean shaft misalignment is not to exceed the minimum value between 0.3mm/m and the ratio of radial clearance divided by the bearing effective length.

Failing the above provisions, one of the following ways to reduce the shaft misalignment is to be adopted: bearing inclination or bearing having single-slope boring or bearing having multiple slope boring.

The slope boring angle calculation (for bearing having single or multiple slope boring) is to be based on a static afloat condition with a hot engine and fully immersed propeller.

Aft stern tube bearing with multiple slope boring is to have the aftmost transition point between two slopes located in between D/3 and L/4 distance from the aft bearing edge, where D is the actual shaft diameter and L is the actual length of aft stern tube bearing.

The slope design angles are to be such to result in heaviest reaction load at the point of the slope transition, and as close to zero load as possible at the aft and forward edge of the bearing.

In case aftmost sterntube bearings with multi-slope boring will be fitted, requirements related to calculation

acceptance conditions and acceptance of the proposed alignment procedure will be stipulated on a case-by-case basis.

The alignment is to be checked on board by a suitable measurement method.

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

Where one of the "Optimized Shaft Alignment" additional notations **OSA** or **OSA-PR** is requested, the requirements in Tasneef "Guide for Optimized Shaft Alignment" are to be complied with, as applicable, in lieu of the above requirements.

4 Material tests, workshop inspection and testing, certification

4.1 Material and non-destructive tests, workshop inspections and testing

4.1.1 Material tests *(1/7/2006)*

Shafting components are to be tested in accordance with Tab 4 and in compliance with the requirements of Part D.

Magnetic particle or liquid penetrant tests are required for the parts listed in Tab 4 and are to be effected in positions mutually agreed upon by the Manufacturer and the Surveyor, where experience shows defects are most likely to occur.

Table 3 : Shafting of propulsion machinery *(1/7/2005)*

Symbol convention H = High, HH = High high, G = group alarm L = Low, LL = Low low, I = individual alarm X = function is required, R = remote	Monitoring		Automatic control				
			Main Engine			Auxiliary	
Identification of system parameter	Alarm	Indica-tion	Slow-down	Shut-down	Control	Stand by Start	Stop
Temperature of each shaft thrust bearing (non applicable for ball or roller bearings)	H		X				
Stern tube bush oil gravity tank level	L						

4.1.2 Hydrostatic tests

Parts of hydraulic couplings, clutches of hydraulic reverse gears and control units, hubs and hydraulic cylinders of controllable pitch propellers, including piping systems and associated fittings, are to be hydrostatically tested to1,5 times the maximum working pressure.

Sterntubes, when machine-finished, and propeller shaft liners, when machine-finished on the inside and with an overthickness not exceeding 3 mm on the outside, are to be hydrostatically tested to 0,2 MPa.

4.2 Certification

4.2.1 Testing certification

Society's certificates (C) (see Pt D, Ch 1, Sec 1, [4.2.1]) are required for material tests of components in items 1 to 5 of Tab 4.

Works' certificates (W) (see Pt D, Ch 1, Sec 1, [4.2.3]) are required for hydrostatic tests of components indicated in [4.1.2] and for material and non-destructive tests of components in items of Tab 4 other than those for which Society's certificates (C) are required.

Table 4 : Material and non-destructive tests

Shafting component	Material tests (Mechanical properties and chemical composition)	Non-destructive tests	
		Magnetic particle or liquid penetrant	Ultrasonic
1) Coupling (separate from shafts)	all	if diameter ≥ 250 mm	if diameter ≥ 250 mm
2) Propeller shafts	all	if diameter ≥ 250 mm	if diameter ≥ 250 mm
3) Intermediate shafts	all	if diameter ≥ 250 mm	if diameter ≥ 250 mm
4) Thrust shafts	all	if diameter ≥ 250 mm	if diameter ≥ 250 mm
5) Cardan shafts (flanges, crosses, shafts, yokes)	all	if diameter ≥ 250 mm	if diameter ≥ 250 mm
6) Sterntubes	all	-	-
7) Sterntube bushes and other shaft bearings	all	-	-
8) Propeller shaft liners	all	-	-
9) Coupling bolts or studs	all	-	-
10) Flexible couplings (metallic parts only)	all	-	-
11) Thrust sliding-blocks (frame only)	all	-	-