Subject

Change in Inspection Method Due to Amendment of Rules for Propeller Shaft Surveys

ClassNK
Technical Information

No. TEC-1277
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To whom it may concern

Due to the amendment of requirements regarding propeller shaft surveys (scheduled to take into effect on 1 October 2022 (hereinafter, referred to as "effective date")), partial surveys or simplified partial surveys may now be performed consecutively instead of the propeller shaft ordinary surveys required every five years since the last propeller shaft ordinary survey after the effective date. Thus, if the results of such partial surveys are favorable, the maximum interval between propeller shaft withdrawal will be now 15 years. (However, seawater lubricated systems are excluded, and ships affixed with PSCM notation remain as before.)

Furthermore, in addition to 3-month and 1-year extensions, 2.5-year extensions may now be requested for survey due dates (except for seawater lubricated systems).

PSCM･A, which is affixed to the class notation as a preventive maintenance management system for propeller shafts will be integrated with PSCM, and the only class notation for propeller shafts survey will now be PSCM, which is a preventive maintenance management system for propeller shafts. (Re-approval of PSCM and PSCM･A management manuals is not required.)

For vessels currently affixed with PSCM･A, a new classification certificate will be issued with the class notation changed to PSCM; therefore, it is not necessary to apply again.

For vessels affixed with PSCM notation, in addition to the existing requirement of lubricating oil analysis every 6 months, it will be required to analyse (visual confirmation) the water content of the lubricating oil on board at least once a month after the effective date. Therefore, please check the water content in the lubricating oil every month and keep a record of the results on board.

(To be continued)

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1. Rules/Guidance for the Survey and Construction of Steel Ships Part B, Rule No.45 / Notice No.31 (excerpt)

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part B Class Surveys

2022 AMENDMENT NO.1

Rule No.45 30 June 2022

Resolved by Technical Committee on 26 January 2022

Amendment 1-4

Chapter 1 GENERAL

1.1 Surveys

1.1.3 Intervals of Class Maintenance Surveys*

Sub-paragraph -1(6) has been amended as follows.

1 Periodical Surveys are to be carried out in accordance with the requirements specified in **(1)** through **(6)** below.
((1) to (5) are omitted.)
(6) Propeller Shaft and Stern Tube Shaft Surveys

~~(a) Surveys of propeller shafts and stern tube shafts are to be carried out as specified in the following **i)** to **iii)** corresponding to the kind of shaft, etc., unless alternative means are provided to assure the condition of the propeller shaft assembly.~~

~~i) Ordinary Surveys of propeller shafts Kind 1 or stern tube shafts Kind 1 (hereinafter referred to as "shafts Kind 1" in this Part) are to be carried out within 5 *years* from the date of completion (i.e. the survey due date) of the Classification Survey or the previous Ordinary Survey.~~

~~ii) Ordinary Surveys of propeller shafts Kind 2 and stern tube shafts Kind 2 (hereinafter referred to as "shafts Kind 2" in this chapter) are to be carried out as prescribed in **1)** and **2)**.~~

~~1) Concurrently with Special Surveys; and~~

~~2) Within 36 *months* from the date of completion (i.e. the survey due date) of the Classification Survey or the previous Ordinary Surveys~~

~~iii) For keyless connection shafts lubricated with water lubricated bearings, the maximum interval between two consecutive dismantling and verifications of the shaft cone by means of non-destructive examination (*NDE*) is not to exceed 15 *years*.~~

~~(b) For oil lubricated or freshwater lubricated shafts Kind 1, the Partial Surveys specified in **8.1.2** can be carried out instead of the Ordinary Surveys specified in **8.1.1**. The survey interval of the Ordinary Surveys specified in **8.1.1** is, however, not to exceed the limits specified separately by the Society.~~

~~(c) For the surveys referred to in **i)** and **ii)** of **(a)** as well as in **(b)** above completed within 3 *months* before the survey due date, the next period will start from the survey due date.~~

~~(d) Surveys of the propeller shafts and stern tube shafts of ships affixed with the notation "*PSCM*" or "*PSCM・A*" are to be carried out as specified in **8.1.3**.~~

~~(e) Regardless of **(a)** to **(d)** above, surveys of the propeller shafts and stern tube shafts of ships affixed with the notation "*APSS・O*" or "*APSS・W*" are to be carried out as specified separately by the Society.~~

Propeller shaft and stern tube shaft surveys are to be carried out as specified in **Chapter 8**.

1.3 Definitions

Paragraph 1.3.1 has been amended as follows.

1.3.1 Terms*

The ~~definitions of~~ terms which appear in this ~~P~~part are ~~as specified in the following~~ defined as

follows. Terms not defined here are as defined in other parts of the Rules.
((1) to (24) are omitted.)
(25) The terminology used in the application of propeller shaft and stern tube shaft surveys is as specified in ~~the following **(a) to (p):**~~ **Chapter 8**.

~~(a) "Shafts" mean propeller shafts as specified in the following **(b)** and stern tube shafts as specified in the following **(c)**, but exclude the intermediate shaft(s) which is(are) considered part of the propulsion shafting inside the vessel.~~

~~(b) "Propeller shaft" is the part of the propulsion shaft to which the propeller is fitted.~~

~~(c) "Stern tube shaft" is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.~~

~~(d) "Stern tube" is a tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), through which passes the stern tube shaft or aftermost section of the propeller shaft. "Stern tube" is the housing of the shaft bearings that sustain the shaft and also accommodates the shaft sealing arrangement.~~

~~(e) "Stern tube sealing system" means the equipment installed on the inboard extremity and, for oil or freshwater lubricated bearings, at outboard extremity of the stern tube. An "inboard seal" is the device fitted on the fore part of the stern tube that achieves the sealing against the possible leakage of the lubricant media into the ship internal. An "outboard seal" is the device fitted on the aft part of the stern tube that achieves the sealing against the possible sea water ingress and the leakage of the lubricant media.~~

~~(f) "Oil lubricated" means closed loop oil lubricating systems which use oil to lubricate the bearings and are sealed against the environment by adequate sealing or gland devices.~~

~~(g) "Freshwater lubricated" means closed loop water lubricating systems which use fresh water to lubricate the bearings and are sealed against the environment by adequate sealing or gland devices.~~

~~(h) "Water lubricated" means open water lubricating systems where bearings are cooled and lubricated by water (salt or fresh) which are exposed to the environment.~~

~~(i) "Service records" are regularly recorded data showing in-service conditions of the shaft(s) and include, as applicable: lubricating oil temperature, bearing temperature and oil consumption records (for oil lubricated bearings) or water flow, water temperature, salinity, pH, make-up water and water pressure (for closed loop fresh water lubricated bearings depending on design).~~

~~(j) "Oil sample examination" is a visual examination of the stern tube lubricating oil taken in the presence of the Surveyor with a focus on water contamination.~~

~~(k) "Lubricating oil analysis" is the analysis to be carried out as specified in the following **i) to iii):**~~

~~i) The lubricating oil analysis is to be carried out at regular intervals not exceeding 6 *months*.~~

~~ii) The documentation on lubricating oil analysis is to be available on board.~~

~~iii) Oil samples to be submitted for the analysis are, in principle, to be taken under service conditions.~~

~~(l) "Fresh water sample test" is the test to be carried out in accordance with the following **i) to iv):**~~

~~i) The fresh water sample test is, in principle, to be carried out at regular intervals not exceeding 6 *months*.~~

~~ii) Fresh water samples are to be taken in accordance with the following **1) to 4):**~~

~~1) The sample is to be taken under service conditions (i.e. with a rotating shaft and the system at service temperature) and are to be representative of the water circulating within the stern tube.~~

~~2) The sample is to be taken from the same agreed position in the system, before the filters, if any fitted in the freshwater lubrication system, which is to be positively identified.~~

~~3) At time of survey the sample for the test is to be taken in the presence of the Surveyor.~~

~~4) The sample, unless supervised by the Surveyor, is to be collected under the direct supervision of the Chief Engineer.~~

~~iii) Analysis results are to be retained on board and made available to the Surveyor.~~

~~iv) The fresh water sample test is to include the following **1)** to **3)** parameters:~~

~~1) chlorides content;~~

~~2) pH value; and~~

~~3) presence of bearing particles or other particles (only for laboratory analysis, and not required for tests carried out in the presence of the Surveyor).~~

~~(m) "Keyless connection" is the forced coupling methodology between the shaft and the propeller without a key achieved through the interference fit of the propeller boss on the shaft tapered end.~~

~~(n) "Keyed connection" is the forced coupling methodology between the shaft and the propeller with a key and keyway achieved through the interference fit of the propeller boss on the shaft tapered end.~~

~~(o) "Flanged connection" is the coupling methodology, between the shaft and the propeller, achieved by a flange, built in at the shaft aft end, bolted to the propeller boss.~~

~~(p) "Alternative means" means shafting arrangements such as, but not limited to, an approved condition monitoring scheme and/or other reliable approved means for assessing and monitoring the condition of the tail shaft, bearings, sealing devices and the stern tube lubricant system capable to assure the condition of the propeller shaft assembly with an equivalent level of safety as obtained by survey methods specified in this Part; this, however, excludes propeller shafts adopting the preventive maintenance system specified in **8.1.3**.~~

((26) to (28) are omitted.)

Chapter 3 ANNUAL SURVEYS

3.3 Annual Surveys for Machinery

3.3.1 General Examinations*

Sub-paragraph -1(3) has been amended as follows.

1 At Annual Surveys for Machinery, a general examination of all the machinery in the engine room as well as the following **(1)** to **(4)** inspections are to be carried out:
((1) and (2) are omitted.)
(3) For ships affixed with the notation "*PSCM*" ~~or "*PSCM • A*"~~, the records of the parameters monitored are to be reviewed, in addition to a general examination, so as to ascertain that the relevant installations are well maintained.
(4) (Omitted)

3.3.4 Surveys of Water Jet Propulsion Systems, etc.

Sub-paragraph -2 has been amended as follows.

2 Surveys ~~F~~for ships fitted with azimuth thrusters~~, the surveys~~ are to be carried out in accordance with the following **(1)** ~~and~~to **(~~2~~3)**:
((1) and (2) are omitted.)
(3) Ships where vibration measurement systems or Fe-density measurement systems are used instead of the temperature sensors and temperature recorders, in the case of azimuth thrusters which use roller bearings as the bearings for propeller shafts Kind 1*C*, are to comply with the requirements specified in the following **(a)** and **(b)**.
  (a) (Omitted)
  (b) It is to be confirmed that the lubricating oil sampling and analysis specified in **~~8.1.3(1)(a) to~~ (1)(a)**, Item **5**, **Table B8.1** is being carried out regularly.

Chapter 6 DOCKING SURVEYS

6.1 Docking Surveys

Sub-paragraphs -1 and -3 have been amended as follows.

6.1.3 Other Surveys*

1 For ships affixed with the notation "*PSCM*" ~~or "*PSCM • A*"~~, the records of the parameters monitored are to be reviewed, in addition to a general examination, so as to ascertain that relevant installations are well maintained.

2 (Omitted)

3 Ships in which where vibration measurement systems or Fe-density measurement systems are used instead of temperature sensors and temperature recorders, in the case of azimuth thrusters which use roller bearings as the bearings of propeller shaft Kind 1*C*, are to comply with the requirements specified in the following **(1)** and **(2)**.

(1) (Omitted)

(2) It is to be confirmed that the lubricating oil sampling and analysis specified in ~~**8.1.3(1)(a) to (1)(a)**~~, Item **5**, **Table B8.1** is be carried out regularly.

Chapter 8 has been amended as follows.

Chapter 8 PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS

~~**8.1 Propeller Shaft and Stern Tube Shaft Surveys**~~

~~**8.1.1 Ordinary Surveys***~~

~~Ordinary Surveys of propeller and stern tube shafts are to be carried out in accordance with **Table B8.1**.~~

~~**8.1.2 Partial Surveys**~~

~~**1** Partial Surveys for propeller shafts Kind 1 with oil lubricated or freshwater lubricated stern tube bearings are to be carried out in accordance with the following **(1)** and **(2)**:~~

~~(1) Examinations are to be carried out in accordance with the following **(a)** to **(i)** after confirming that the results of the examinations specified in the following **(2)** are satisfactory. In cases where the results of the examinations specified in the following **(2)** or the examinations specified in the following **(a)** to **(i)** are not satisfactory, the Ordinary Survey specified in **8.1.1** is to be carried out.~~

~~(a) In the case of keyed connections, the examinations specified in item 2 of **Table B8.1** are to be carried out.~~

~~(b) Checking and recording the bearing weardown measurements are to be carried out.~~

~~(c) A visual inspection of all accessible parts of the shafting system is to be carried out.~~

~~(d) The examinations specified in item 6 of **Table B8.1** are to be carried out.~~

~~(e) Confirmation that the seal liner is found to be or placed in a satisfactory condition is to be carried out.~~

~~(f) Verification of satisfactory conditions of inboard and outboard seals, and of the satisfactory installation of the propeller is to be carried out.~~

~~(g) In the case of keyed connections, the examinations specified in item 9 of **Table B8.1** are to be carried out.~~

~~(h) The examinations specified in items 12 and 13 of **Table B8.1** are to be carried out.~~

~~(i) Verification that the main engines have not been operated within the barred speed range for torsional vibration is to be carried out.~~

~~(2) The examinations required by **(1)** above are to be carried out in accordance with the following **(a)** to **(d)**:~~

~~(a) Review of service records is to be carried out. Confirmation of bearing temperature may, however, be omitted in cases where the installation of devices to measure temperature is not required.~~

~~(b) The review specified in the following **i)** and **ii)** is to be carried out.~~

~~i) For oil lubricated shafts, review of test records of the lubricating oil analysis is to be carried out to confirm that the reference standards deemed appropriate by the Society are complied with.~~

~~ii) For freshwater lubricated shafts, review of test records of the fresh water sample test is to be carried out to confirm that the reference standards deemed appropriate by the Society are complied with.~~

~~(c) An oil sample examination (for oil lubricated shafts) or fresh water sample test (for closed system fresh water lubricated shafts) is to be carried out.~~

~~(d) Verification of no reported repairs by grinding or welding of shafts and/or propellers is to be carried out.~~

~~**2** In the case of propeller shafts Kind 1*C*, the "Record for Monitoring System of Stern Tube~~

Bearing and Oil Sealing Devices" is to be examined in addition to the examinations specified in **-1**.

8.1.3 Preventive Maintenance System*

Notwithstanding the requirements in **8.1.1** above, where the ship is equipped with oil lubricated stern tube bearings and appropriate stern tube oil sealing devices as approved by the Society, the survey items of 1, 3, 4, 5 and 7 in **Table B8.1** may be replaced with a general examination of the shafting system and, for the weardown measuring and recording specified in item 8 in **Table B8.1**, they may be carried out while the propeller is installed in lieu of the timing after re-installation; this, however, is provided that all condition monitoring data taken according to the approved preventive maintenance system is found to be within permissible limits. Furthermore, omission of the survey items of 2, 9 and 10 in **Table B8.1** may be allowed except in the case of keyed connections.

(1) Based upon Society approved preventive maintenance systems, at least the following **(a)** to **(d)** are to be properly monitored and recorded for diagnosing lubricating conditions of shafting systems and performing preventive system maintenance. Moreover, the notation "*Propeller Shaft Condition Monitoring System*" (abbreviated as "*PSCM*") is to be affixed to the classification characters of ships whose preventive maintenance systems are approved by the Society.

(a) Lubricating oil sampling and analysis is to be carried out regularly at intervals not exceeding 6 *months*, with at least the following **i)** to **iv)** being analysed each time:

i) water content;

ii) salinity (sodium);

iii) content of shaft metal and bearing metal particles; and

iv) oxidation of oil.

(b) Lubricating oil consumption rate

(c) Bearing temperature. In the case of azimuth thrusters which use roller bearings as the bearings for propeller shafts, however, vibrations of the power transmission systems in the propulsion systems or the Fe-density of the lubricating oil in the azimuth thruster casings may be acceptable.

(d) Weardown of the propeller shaft at the stern tube bearing

(2) Based upon Society approved preventive maintenance systems, at least the following **(a)** to **(e)** are to be properly monitored and recorded for diagnosing lubricating conditions of shafting systems and performing preventive system maintenance. Moreover, the notation "*Propeller Shaft Condition Monitoring System • A*" (abbreviated as "*PSCM • A*") is to be affixed to the classification characters of ships whose preventive maintenance systems are approved by the Society.

(a) Lubricating oil sampling and analysis is to be carried out regularly at intervals not exceeding 6 *months*, with at least the following **i)** to **iv)** being analyzed each time:

i) water content;

ii) salinity (sodium);

iii) content of shaft metal and bearing metal particles; and

iv) oxidation of oil.

(b) The monthly onboard checking of lubricating oil water content. Such checking, however, may be omitted when the oil sampling and analysis specified in **(a)** above is carried out regularly at intervals not exceeding 3 *months*.

(c) Lubricating oil consumption rate

(d) Bearing temperature. In the cases of azimuth thrusters which use roller bearings as the bearings for propeller shafts, however, the vibrations of the power transmission systems in the propulsion systems or the Fe-density of the lubricating oil in the azimuth thruster casings may be acceptable.

(e) Weardown of the propeller shaft at the stern tube bearing

~~**8.1.4 Propeller Shaft and Stern Tube Shaft Surveys of Ships Affixed with Notation "*APSS • O*" or "*APSS • W*" ***~~

~~Notwithstanding the requirements in **8.1.1** to **8.1.3** above, propeller shaft and stern tube shaft surveys of ships affixed with the notation "*APSS • O*" or "*APSS • W*" are to be carried out as specified separately by the Society.~~

~~Table B8.1 Ordinary Surveys of Propeller Shaft and Stern Tube Shaft~~

~~Items~~	~~Examinations~~
~~1 Drawing out of the propeller shaft and the stern tube shaft~~	
~~-1) for oil or freshwater lubricated bearings~~	~~Drawing the propeller shaft and the stern tube shaft and examining the entire shafts, seals system and bearings~~
~~-2) for water lubricated bearings~~	~~Drawing the propeller shaft and the stern tube shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings~~
~~2 Propeller connections~~	
~~-1 Keyed connections~~	~~Removing the propeller to expose the forward end of the taper, and performing a non-destructive examination (*NDE*) by an approved surface crack detection method deemed appropriate by the Surveyor all around the shaft in way of the forward portion of the taper section, including the keyway. For shafts provided with liners, the *NDE* is to be extended to the after edge of the liner.~~
~~-2 Keyless connections~~	~~Removing the propeller to expose the forward end of the taper, and performing a non-destructive examination (*NDE*) by an approved surface crack detection method deemed appropriate by the Surveyor all around the shaft in way of the forward portion of the taper section. For shafts provided with liners, the *NDE* is to be extended to the after edge of the liner.[4] When the propeller is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in **7.3.1-1, Part D**.~~
~~-3 Flanged connections~~	~~Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by the Surveyor, the coupling bolts and flange radius are to be examined by means of an approved surface crack detection method deemed appropriate by the Surveyor.~~
~~3 Propeller shaft, stern tube shaft, and coupling bolts~~	~~Examination of the sleeves, the fillet of the coupling flange to the intermediate shaft or to the stern tube shaft and the coupling bolts with the shaft drawn from the stern tube bearings. However, coupling bolts are to be examined by an efficient crack detection method in cases where the Surveyor, based on the results of external examinations, deems such addition testing to be necessary. In addition, anti-corrosion covers are to be removed for shafts Kind 2.~~
~~4 Stern tube bearing[1]~~	~~Examination of the stern tube bearings~~
~~5 Clearances between bush of the stern tube bearing[2] and either the propeller shaft or the stern tube shaft~~	~~Checking and recording the bearing clearances between the bush and the shaft~~
~~6 Propellers~~	~~Verification that the propeller is free of damages which may cause the propeller to be out of balance~~
~~7 Sealing device for stern tube[3]~~	~~Verification of the satisfactory conditions of inboard and outboard seals during the re-installation of the shaft and propeller~~
~~8 For oil lubricated or freshwater lubricated stern tube bearings, weardown of the propeller shaft or the stern tube shaft at the stern tube bearing~~	~~Measuring and recording the bearing weardown (after re-installation)~~
~~9 Propeller boss surfaces in contact with the propeller shaft taper~~	~~Examination of the propeller boss surface~~
~~10 Controllable pitch propeller connections~~	~~Examination of the pitch control gear and working parts as well as, by an efficient crack detection method, the propeller blade fixing bolts~~

~~Table B8.1 Ordinary Surveys of Propeller Shaft and Stern Tube Shaft (Continued)~~

~~Items~~	~~Examinations~~
~~11 Water lubrication lines~~	~~Where water lubricated stern tube bearings are adopted, the water piping for lubrication is to be examined.~~
~~12 Low oil level alarms of the lubricating oil or lubricating freshwater tanks, lubricating oil or lubricating freshwater temperature measuring devices, oil or freshwater lubrication lines as well as lubricating oil or lubricating freshwater circulation pumps, etc.~~	~~Where oil or freshwater lubricated stern tube bearings are adopted, examination of the systems for verifying whether stern tube bearings are being maintained in good working condition~~
~~13 Lubricating oil or lubricating freshwater~~	~~Examination of the lubricating oil or lubricating freshwater record book~~

~~(Notes)~~

~~1 This includes shaft bracket bearings. The same applies hereinafter in this Chapter.~~

~~2 This includes bush of shaft bracket bearings. The same applies hereinafter in this Chapter.~~

~~3 This includes sealing devices for shaft bracket bearings. The same applies hereinafter in this Chapter.~~

~~4 For shafts with water lubricated bearings, it is recommended that the survey specified in **1.1.3-1(6)(a)iii)** also be carried out in cases where the date 15 *years* after the date of completion of the previous survey specified in **1.1.3-1(6)(a)iii)** is earlier than the next survey due date.~~

8.1 Definitions

8.1.1 Terms

The terms which appear in this chapter are defined as follows.

(1) "Shafts" mean propeller shafts and stern tube shafts as specified in the following **(2)** and **(3)** but does not include intermediate shafts which are considered to be part of the propulsion shafting inside the ships.

(2) "Propeller shaft" is the part of the propulsion shaft to which the propeller is fitted.

(3) "Stern tube shaft" is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.

(4) "Shaft Kind 1" is a propeller shaft which is effectively protected against corrosion by sea water, outboard fresh water and inboard fresh water with a means approved by the Society or which is made of corrosion resistant materials approved by the Society.

(5) "Shaft Kind 1*A*" is "Shaft Kind 1" with water lubricated stern tube bearing.

(6) "Shaft Kind 1*B*" is "Shaft Kind 1" with oil lubricated stern tube bearing.

(7) "Shaft Kind 1*C*" is "Shaft Kind 1*B*" satisfying the requirements in **6.2.11, Part D**.

(8) "Shaft Kind 1*W*" is "Shaft Kind 1" with fresh water lubricated stern tube bearing.

(9) "Shaft Kind 2" is a propeller shaft other than "Shaft Kind 1".

(10) "Stern tube shaft" is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water.

(11) "Stern tube" is a tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), through which passes the stern tube shaft or aftermost section of the propeller shaft.

(12) "Stern tube sealing system" means the sealing system installed for the following **(a)** or **(b)**, depending on the kind of shaft. The sealing system for the inboard extremity of the stern tube prevents any the possible leakage of the lubricant media into the ship internal. The sealing system for the outboard extremity of stern tube prevents any possible sea water ingress or the leakage of the lubricant media.

(a) "Shaft Kind 1*A*" or "Shaft Kind 2" : Inboard extremity of stern tube

(b) "Shaft Kind 1*B*", "Shaft Kind 1*C*" or "Shaft Kind 1*W*" : Inboard and outboard extremity of stern tube

(13) "Oil lubricated" means closed loop oil lubricating systems which use oil to lubricate the bearings and are sealed against the environment by adequate sealing devices.

(14) "Water lubricated" means open water lubricating systems where bearings are lubricated by water (sea water or outboard fresh water) and cooled.

(15) "Fresh water lubricated" means closed loop water lubricating systems which use fresh water to lubricate the bearings and are sealed against the environment by adequate sealing devices.

(16) "Service records" are regularly recorded data showing in-service conditions of the shafts and stern tube include the following (as applicable): service conditions of lubricating water pumps (for "Shaft Kind 1*A*" or "Shaft Kind 2"), lubricating oil temperature, bearing temperature and oil consumption records (for "Shaft Kind 1*B*" or "Shaft Kind 1*C*") or water flow, water temperature, salinity, pH, make-up water and pressure of lubricating fresh water pumps (for "Shaft Kind 1*W*").

(17) "Oil sample examination" is a visual examination of the stern tube lubricating oil taken in the presence of a surveyor with a focus on water contamination.

(18) "Lubricating oil analysis" is the analysis to be carried out in accordance with the following **(a)** to **(c)**:

(a) The lubricating oil analysis is to be carried out at regular intervals not exceeding 6 *months*.

(b) The documentation on lubricating oil analysis is to be available on board.

(c) Oil samples to be submitted for the analysis are to be taken in accordance with following **i)** to **ii)**:

i) The sample is to be taken from the same identified position in the system under service conditions.

ii) The sample, unless supervised by a surveyor, is to be collected under the direct supervision of the Chief Engineer and to be identified.

(19) "Fresh water sample test" is the test to be carried out in accordance with the following **(a)** to **(d)**:

(a) The fresh water sample test is to be carried out at regular intervals not exceeding 6 *months*.

(b) Fresh water samples are to be taken in accordance with the following **i)** to **iv)**:

i) The sample is to be taken under service conditions (i.e. with a rotating shaft and the system at service temperature) and are to be representative of the water circulating within the stern tube.

ii) The sample is to be taken from the same agreed position in the system, before the filters, if any fitted in the fresh water lubrication system, which is to be positively identified.

iii) At time of survey the sample for the test is to be taken in the presence of a surveyor.

iv) The sample, unless supervised by a surveyor, is to be collected under the direct supervision of the chief engineer.

(c) Analysis results are to be retained on board and made available to the surveyor.

(d) The fresh water sample test is to include the following **i)** to **iii)** parameters:

i) chlorides content;

ii) pH value; and

iii) presence of bearing particles or other particles (only for laboratory analysis, and not required for tests carried out in the presence of at surveyor).

(20) "Keyless connection" is the forced coupling methodology between the shaft and the propeller without a key achieved through the interference fit of the propeller boss on the shaft tapered end.

(21) "Keyed connection" is the forced coupling methodology between the shaft and the propeller with a key and keyway achieved through the interference fit of the propeller boss on the shaft tapered end.

(22) "Flanged connection" is the coupling methodology, between the shaft and the propeller, achieved by a flange, built in at the shaft aft end, bolted to the propeller boss

(23) "*Propeller Shaft Condition Monitoring System*" (abbreviated as *PSCM*) is notation affixed to the classification characters of ships whose preventive maintenance systems are approved in accordance with the requirements of **8.1.2**.

(24) "Alternative means" means shafting arrangements such as an approved condition monitoring scheme or other reliable approved means for assessing and monitoring the condition of the shafts, sealing devices and the stern tube lubricant system capable to assure the condition of the propeller shaft assembly with an equivalent level of safety as obtained by survey methods specified in this part.

8.1.2 Preventive Maintenance System of Shafts

The notation *PSCM* is affixed to the classification characters of ships equipped with following **(1)** to **(3)** and whose preventive maintenance system are approved in accordance with the procedures specified in **Table B8.1**.

(1) Oil lubricated stern tube bearing

(2) Stern tube sealing devices can be repaired or replaced without drawing out the shafts

(3) One or more temperature sensors embedded into the metal at the aft end bottoms of stern tube

Table B8.1 Approval Procedure of Preventive Maintenance System for Oil Lubricated Propeller Shafts

Item	Procedures
1 General	(1) These procedures apply to ships intended for the preventative maintenance of propeller shafts. This system permits shipowners to maintain the shafts using preventive measures such as by regularly carrying out lubricating oil analysis and diagnosing the lubricating condition of the shaft based on the results.
2 Application	(1) The executive management (hereinafter referred to as "management") responsible for adopting the preventive maintenance system according to the procedures is to submit to the Society three copies of the maintenance manual specifying at least the following **(a)** to **(f)**. (a) Management's policy for implementing the preventive maintenance system (b) Procedures and personnel responsible for sampling oil, monitoring parameters such as oil analysis results and recording the necessary data (c) Procedures and personnel responsible for selecting and controlling the analytical testing machines (or testing laboratory) and the measuring devices for monitoring parameters (d) Procedures and personnel responsible for review of each parameter monitored and diagnosing the lubricating condition thereby (e) Procedures and personnel responsible for handling any abnormalities found (including those for reporting to the Society) (f) Procedures and personnel responsible for ensuring that proper maintenance is carried out according to the maintenance manual (2) The Society returns two copies of the documents to the applicant after review and approval. Management is to keep one copy of the approved documents on board the ship and the other copy of the approved documents either on hand or at the shipowner's office. (3) The application is to be submitted within 6 *months* from the date of completion of the Classification Survey or the previous Ordinary Survey of the propeller shaft. However, this 6 *months* period may be waived in cases where supplementary documentation confirming the soundness of the propeller shafting system is submitted.
3 Approval and Notation	(1) The Society examines the documents submitted and bases its approval on items such as the management system, the maintenance procedures and the criteria for parameters (including the criteria for alarm and abnormal conditions) of oil analysis results. The Society assigns approved ships with the notation (*PSCM*) as classification characters.

Table B8.1 Approval Procedure of Preventive Maintenance System for Oil Lubricated Propeller Shafts (Continued)

<table>
<tr><th>Item</th><th>Procedures</th></tr>
<tr><td>4 Approval Conditions</td><td>
(1) Management system
(a) Management is to state clearly that it will take responsibility for proper implementation of the preventive maintenance of the related parts according to the manual and familiarize the crew concerned with the procedures.
(b) Management is to verify that parameters such as oil analysis results are all within their limits and to take suitable measures as necessary. The management is to report to the Society immediately where any abnormality is found.
(c) Management is to verify that suitable maintenance is carried out according to the manual.
(d) The items monitored or reviewed according to the manual are to be recorded.
(2) Maintenance procedures
(a) Oil sampling for analytical testing is to be carried out regularly at the intervals of at least 6 months and the procedures are in accordance with the following.
i) Sampling is to be carried out at sea as much as possible. The sampling oil quantity is about 200 ml and it is to be always from a fixed place after fully draining. For example, the air purge pipe at the pump exit or oil sample cock; places where the sampled oil can be representative of the system.
ii) Where the sampling can only be conducted at port, the sampling is to be carried out after sufficient circulation of the oil with an oil pump if one is available, and according to the method in i) above. Otherwise, the oil is to be sampled from a few points at different levels and all the samples are mixed together as the testing sample.
(b) Monitoring and recording of each parameter is to be properly carried out and the following data is to be recorded at each sampling.
i) Temperature of the circulation oil
ii) Temperature of the aft stern tube bearing
iii) Sampling date, service oil name, service hours, total oil quantity and oil consumption rate (l/day)
(c) The testing machines and measuring devices for monitoring the parameters are to have their accuracy
(3) Criteria for parameters
Management is to determine the criteria for each parameter for the ship based on the reference standards below and by taking into account its experience and knowledge.
(a) Analytical items and methods:
i) Analytical items and methods: Refer to Table 1 as a standard. However, alternative analytical items and methods can be adopted instead when deemed appropriate by the Society.
ii) Standard criteria: To be within the max. values specified in Table 1 counting from the values of the new oil
iii) Alarm values: To be less than double the standard criteria (where any parameter exceeds the alarm value, the testing oil is to be re-sampled and re-analysis for all the items is to be carried out immediately)
(b) Lubricating oil consumption rate: 2 l/day or less
(c) Temperature at aft. stern tube bearing: 55°C or less
(d) Wear down for oil lubricated bearing: 0.3 mm or less

Standard criteria (Reference)
<table>
<tr><th>analytical items</th><th>max. values</th><th>analytical methods</th></tr>
<tr><td>Fe (ppm)</td><td>50</td><td>ICP (SOAP)</td></tr>
<tr><td>Sn (ppm)</td><td>20</td><td>ICP (SOAP)</td></tr>
<tr><td>Pb (ppm)</td><td>20</td><td>ICP (SOAP)</td></tr>
<tr><td>Na (ppm)</td><td>80</td><td>ICP (SOAP)</td></tr>
<tr><td>IR Oxidation @ 5.85 μm (Abs. unit/cm)</td><td>10</td><td>FT-IR</td></tr>
<tr><td>Separated Water (%)</td><td>1.0</td><td>Visual (24 settling hours)</td></tr>
</table>
</td></tr>
</table>

Table B8.1 Approval Procedure of Preventive Maintenance System for Oil Lubricated Propeller Shafts (Continued)

Item	Procedures
5 General	(1) The parameters at least following **(a)** to **(e)** are to be monitored and recorded onboard the ship in accordance with the approved manual, and the lubricating condition of the propeller shafts is to be diagnosed thereby. (a) Lubricating oil sampling and analysis is to be carried out regularly at intervals not exceeding 6 *months*, with at least the following **i)** to **iv)** being analyzed each time: i) water content; ii) salinity (sodium); iii) content of shaft metal and bearing metal particles; and iv) oxidation of oil. (b) The monthly onboard checking of lubricating oil water content. (c) Lubricating oil consumption rate (d) Bearing temperature*1 (e) Weardown of the propeller shaft at the stern tube bearing (2) Where any abnormality is found, management is to report it to the Society as soon as possible and withdraw the shaft for a thorough examination or carry out maintenance to the shaft as necessary. (3) Management is to maintain onboard records of the analysis data in **4.(2)(b)** above after every analysis of the sample oil. In the documents, management's opinion, such as on the necessity for withdrawing the shaft, is to be included. (4) The Society will carry out general examinations on the related shafting parts and review each record of parameters monitored at the ship's periodical surveys to verify that appropriate maintenance is carried out in compliance with the approved manual, and notify the ship's management of any necessary maintenance. Where any abnormality or improper maintenance is found out through the examination, management is required to apply for an Ordinary Survey of the shaft.
6 Cancellation of Approval	(1) Where the following **(a)** to **(c)** are applicable, the Society may cancel the ship's approval to adopt the preventive maintenance system for propeller shafts. In such cases, the Society is to notify the ship's management of the cancellation, and the ship is to carry out an Ordinary Survey immediately in accordance with **Table B8.3**. (a) Where any improper conduct is found regarding entries in the records such as those for oil analysis results. (b) Where it is regarded by the Society that proper maintenance is not carried out according to the approved manual. (c) Where the shipowner or ship management company has changed, or cancellation of the approval to adopt the preventive maintenance system has been requested by the ship's management.

Notes

*1 : In the cases of azimuth thrusters which use roller bearings as the bearings for propeller shafts, however, the vibrations of the power transmission systems in the propulsion systems or the Fe-density of the lubricating oil in the azimuth thruster casings may be acceptable. In such cases, the instruments specified in **(1)** or **(2)** are used, the data and the result of the analysis are to be evaluated prior to the survey and are to be retained on board at all times. However, the following requirements specified in **(3)** are to be satisfied.

(1) A vibration measurement system to measure vibration of power transmission system in the azimuth thrusters complying with the following **(a)** to **(c)**. Where the system is fixed type, the environmental tests specified in **18.7.1(1), Part D** are to be carried out.

(a) The measurement is to be carried out regularly at intervals not exceeding 3 *months*.

(b) Measurement points and the relevant data are to be in accordance with those described in the guidance for measurement in the management manual concerning the vibration measurement system.

(c) A trend display and frequency analysis of the measurement data is to be provided.

(2) A Fe-density measurement system of lubricating oil in the azimuth thrusters casings complying with the following **(a)** to **(c)**. Where the system is fixed type, the environmental tests specified in **18.7.1(1), Part D** are to be carried out.

(a) Sampling is to be carried out regularly at intervals not exceeding 3 *months*.

(b) The measurement data is to be the amount of Fe per hour, considering the change of new lubricating oil. A trend display of the data is to be provided.

(c) Sampling is to be carried out when the azimuth thrusters are operating at sea as far as possible. When the sampling can only be conducted at port, the sampling is to be carried out within 30 *minutes* after said thrusters stop.

(3) Measurement data

(a) The executive management (hereinafter referred to as "management") is to determine the criteria for each parameter (including the criteria for alarm and abnormal conditions) for the ship taking into account its experience and knowledge.

(b) Management is to submit the analysis records with the data after every analysis of the sample oil. In this document, the management's opinion, such as on the necessity for withdrawing the azimuth thrusters, is to be included.

8.2 Surveys of Water Lubricated Shafts

8.2.1 Surveys of Shafts Kind 1*A*

1 Surveys for shafts Kind 1*A* are to be the Ordinary Surveys specified in **Table B8.2** and are to be carried out within 5 *years* from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 In addition to **-1** above, surveys for shafts Kind 1*A* which are used corrosion resistant materials specified in **6.2.7-1(3), Part D** are to be the Partial Surveys specified in **Table B8.2** and are to be carried out within 36 *months* from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey specified in **-1** above. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.2** is to be carried out.

3 For the surveys referred to **-1** and **-2** above completed within 3 *months* prior to the survey due date, the next period is to start from the survey due date.

4 The survey due date may be extended in cases where a survey is carried out in accordance with following **(1)** to **(4)** and the shafts condition is confirmed to be satisfactory. The interval of the Ordinary Survey specified in **Table B8.2** is not to exceed 6 *years*.

(1) The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.2** is carried out. No further extension survey may be carried out.

(2) The survey due date may be extended for up to 3 *months* in cases where the 3Month Extension Survey specified in **Table B8.2** is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.2** is carried out.

(3) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 *month* prior to the survey due date.

(4) The period of extension counts from the date on which the extension survey in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.

8.2.2 Surveys of Shafts Kind 2

1 Surveys of shafts Kind 2 are to be the Ordinary Surveys specified in **Table B8.2** and are to be carried out in accordance the following **(1)** and **(2)** periods (survey due dates).

(1) Concurrently with Special Surveys, ; and

(2) Within 36 *months* from the date of completion of the Classification Survey or the previous Ordinary Survey.

2 For the surveys referred to **-1** above that are completed within 3 *months* prior to the survey due date, the next period is to start from the survey due date.

Table B8.2 Surveys of Water Lubricated Shafts – Shafts Kind 1*A* and Kind 2

Items	Examinations	Ordinary Survey	Partial Survey	Extension Survey	
				1Year	3Month
1 Drawing out of the shafts -1 Entirely drawing out	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings.	○			
-2 Partially drawing out	(1) Drawing the propeller shaft to confirm the contacting parts to stern tube bearing. The propeller shaft may be withdrawn with the condition fitting propeller to propeller shaft.		○		
2 Propeller connections -1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts provided with liners, the *NDE* is to be extended to the after edge of the liner.)	○			
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. For shafts provided with liners, the *NDE* is to be extended to the after edge of the liner. (3) Notwithstanding **(2)** above, with the interval not to exceed 15 *years*, performing a non-destructive examination (*NDE*) to whole corn parts of shaft including the forward portion of the taper section with the method deemed appropriate by a surveyor.	○			
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination (*NDE*) to the coupling bolts and flange radius with the method deemed appropriate by the surveyor.	○			
3 Clearance between bush of the stern tube bearing and propeller shaft	(1) Checking and recording the clearance between bush of the stern tube and propeller shaft. (2) Confirm the clearance does not exceed following value. (a) Shaft diameter no more than 230*mm*: 6 *mm* (b) Shaft diameter more than 230*mm* but no more than 305*mm*: 8 *mm* (c) Shaft diameter more than 305*mm*: 9.5 *mm*	○	○	○	

Table B8.2 Surveys of Water Lubricated Shafts – Shafts Kind 1*A* and Kind 2 (Continued)

Items	Examinations	Ordinary Surveys	Partial Survey	Extension Survey	
				1Year	3Month
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (For extension survey, the information is confirmed by the record etc.) (2) For ordinary surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in **7.3.1-1, Part D**.	○	○	○	○
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard seals during the re-installation of the shaft and propeller. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.)	○	○	○	○
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For extension survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination (*NDE*) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary. In addition, anti-corrosion covers are to be removed for shafts Kind 2.	○		○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○			
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○			
9 Controllable pitch propeller connections (Only applies to shafts with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination (*NDE*) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	○			
10 Water lubrication lines	(1) Examination of water lubrication lines.	○	○	○	○
11 Review of records etc.	(1) Review of following **(a)** to **(d)**. (a) Previous clearance recording (b) Service records (c) No report to repairs by grinding or welding of shafts or propellers (d) The information of the shafting arrangement is in good working condition by the chief engineer			○	○

8.3 Surveys of Oil Lubricated Shafts

8.3.1 Surveys of Shaft Kind 1*B* and Kind 1*C*

1 Surveys of shafts Kind 1*B* and shaft Kind 1*C* are to be the Ordinary Surveys specified in **Table B8.3** and are to be carried out within 5 years from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 Notwithstanding **-1** above, for shafts subject to the lubricating oil analysis specified in **8.1.1(18)**, the Partial Survey specified in **Table B8.3** may be carried out instead of an Ordinary Survey. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.3** is to be carried out.

3 Notwithstanding **-1** and **-2** above, for shafts with keyless or flanged connections and which are subject to the lubricating oil analysis specified in **8.1.1(18)**, the Simplified Partial Survey specified in **Table B8.3** may be carried out instead of an Ordinary Survey or Partial Survey. In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.3** is to be carried out.

4 Notwithstanding **-2** and **-3** above, for shafts Kind 1*B* and shafts Kind 1*C*, the interval of the Ordinary Survey specified in **Table B8.3** above is not to exceed 15 *years*. This interval may be extended for up to 3 *months*. No further extension may be granted.

5 For the surveys referred to **-1** to **-4** above completed with 3 *months* prior to the survey due date, the next period will start from the survey due date.

6 For shafts which are subject to the lubricating oil analysis specified in **8.1.1(18)**, the survey due date may be extended in cases where the survey is carried out in accordance with the following **(1)** to **(5)**.

(1) The survey due date may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out. No further extension survey may be carried out.

(2) The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.3** is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out.

(3) The survey due date may be extended for up to 3 *months* in cases where 3 Months Extension Survey specified in **Table B8.3** is carried out. No further 3 Months Extension Survey can be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* or 2.5 *years* in cases where a 1Year Extension Survey or 2.5Year Extension Survey specified in **Table B8.3** is carried out.

(4) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 *month* within the survey due date.

(5) The period of extension counts from the date on which the extension survey in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.

8.3.2 Surveys of Shaft of the ships affixed with the notation *PSCM*

1 Surveys of shafts of ships affixed with the notation *PSCM* are to be the Ordinary Surveys or Partial Surveys specified in **Table B8.3** and are to be completed within 5 *years* from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey. In cases where a Partial Survey is carried out and the result is not satisfactory, the Ordinary Survey specified in **Table B8.3** is to be carried out.

2 Notwithstanding **-1** above, for shafts with keyless or flanged connections, the Simplified Partial Survey specified in **Table B8.3** may be carried out instead of an Ordinary Survey or Partial Survey.

In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.3** is to be carried out.

3 Notwithstanding **-2** above, for shafts with keyless connections, the interval of the Ordinary Survey or Partial Survey specified in **Table B8.3** above is not to exceed 15 *years*. This interval may be extended for up to 3 *months*. No further extension may be granted. In cases where a Partial Survey is carried out and the result is not satisfactory, the Ordinary Survey specified in **Table B8.3** is to be carried out.

4 For the surveys referred to **-1** to **-3** above completed within 3 *months* prior to the survey due date, the next period is to start from the survey due date.

5 The survey due date may be extended in cases where a survey is carried out in accordance with the following **(1)** to **(5)**.

(1) The survey due date may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out. No further extension survey may be carried out.

(2) The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.3** is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.3** is carried out.

(3) The survey due date may be extended for up to 3 *months* in cases where the 3Month Extension Survey specified in **Table B8.3** is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* or 2.5 *years* in cases where the 1Year Extension Survey or 2.5 Year Extension Survey specified in **Table B8.3** is carried out.

(4) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 *month* within the survey due date.

(5) The period of extension counts from the date on which the extension survey in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.

Table B8.3 Surveys of Oil Lubricated Shafts – Shafts Kind 1*B*, 1*C* or Shafts of Ships Affixed with Notation *PSCM*

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
1 Drawing out of the shafts	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shafts, seals system and bearings. (2) Checking and recording the bearing clearances between the bush and the shafts.	○					
2 Propeller connections -1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the *NDE* is to be extended to the after edge of the liner.)	○	○				
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. (When shafts provided with liners, the *NDE* is to be extended to the after edge of the liner)	○	○				
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination (*NDE*) to the flange radius and coupling bolts with the method deemed appropriate by the surveyor.	○	○				
3 Weardown of shaft at the stern tube bearing	(1) Checking and recording the weardown. (For extension surveys, the checking and recording are to be carried out as far as practicable.) (2) Confirm the weardown value does not exceed 0.3 *mm* (0.3 *mm* is the standard value). In addition, factors such as the characteristics of the lubricating oil, the temperature fluctuation history of the lubricating oil or bearing material are to be taken into account.	○	○	○	○		
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (For extension survey, the information is to be confirmed by records etc.) (2) For ordinary surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in **7.3.1-1, Part D**.	○	○	○	○	○	

Table B8.3 Surveys of Oil Lubricated Shafts – Shafts Kind 1*B*, 1*C* or Shafts of Ships Affixed with Notation *PSCM* (Continued)

Items	Examinations	Ordinary Surveys	Partial Surveys	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard and outboard seals. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.) For 3Month Extension Survey, verification of inboard seals may be accepted. (2) Confirmation that the seal liner is placed in a satisfactory condition. For extension, this examination is not applied.	○	○	○	○	○	○
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For the surveys except Ordinary Survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination (*NDE*) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary.	○	○	○	○	○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○					
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○					
9 Controllable pitch propeller connections (Only applies to shafts with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination (*NDE*) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	○	○				
10 Low oil level alarms of the lubricating oil tanks, lubricating oil temperature measuring devices, oil lubricating lines and lubricating oil circulating pumps, etc.	(1) Examination of the systems for verifying whether stern tube bearings are being maintained in good working condition.	○	○	○	○	○	○

Table B8.3 Surveys of Oil Lubricated Shafts – Shafts Kind 1*B*, 1*C* or Shafts of Ships Affixed with Notation *PSCM* (Continued)

Items	Examinations	Ordinary Surveys	Partial Surveys	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
11 Review of records etc.	(1) Examinations are to be carried out in accordance with the following **(a)** to **(g)**. (a) Service records are to be reviewed. (b) Review of test records of the lubricating oil analysis is to be carried out to confirm that the reference standards specified in following **i)** and **ii)** are complied with. i) Metal particles (upper limit) *1 : 1) Iron (Fe): 50 *ppm* 2) Tin (Sn): 20 *ppm* 3) Lead (Pb): 20 *ppm* 4) Sodium (Na): 80 *ppm* ii) IR oxidation and separated water (Upper limit) *2 : 1) IR oxidation @ 5.85*μm*: 10 (*Abs.unit*/*cm*) 2) Separated water: 1.0 *%* (c) Oil sample examination is to be carried out. (d) Verification of no reported repairs by grinding or welding of shafts and/or propellers is to be carried out. (e) Examination of the lubricating oil record book. (f) For 1 year and 3 months extension surveys, review of the previous clearance recordings is to be carried out. (g) Confirmation from the chief engineer that the shafting arrangement is in good working condition is to be obtained.		○	○	○	○	○

Notes

*1 : If the test results of the oil analysis suggest that the sample oil does not represent the lubricating oil in the stern tube and is suspected to be invalid (e.g. when only iron (Fe) exceeds the upper limit of **(b)i)**, item **11**, it is suspected that rust in the lubricating oil tank is the cause.), the surveyor is to instruct the shipowner (or the ship management company) to promptly re-perform the oil analysis and to be verified the test results of the oil analysis by the time of the first periodical survey (excluding those specified in **1.1.3-1(5), Part B**) on or after the day 3 *months* after the day of receiving the said instruction.

*2 : Notwithstanding **(b)ii)**, item **11**, in the case of environmentally acceptable lubricants (EAL), observation of any trends (such as TAN (total acid number), viscosity and change in colour etc.) based on periodical oil analysis may be made. In such cases, observations of TAN trends are to be made based on sequential analyssis in conjunction with limits for continued use in service defined by oil makers.

8.4 Surveys of Fresh Water Lubricated Shafts

8.4.1 Surveys of Shafts Kind 1*W*

1 Surveys of shafts Kind 1*W* are to be the Ordinary Surveys specified in **Table B8.4** and ae to be carried out within 5 years from the date of completion (survey due date) of the Classification Survey or the previous Ordinary Survey.

2 Notwithstanding **-1** above, for shafts which are subject to the lubricating oil analysis specified in **8.1.1(19)**, Partial Survey specified in **Table B8.4** may be carried out instead of an Ordinary Survey. In cases where the results of the Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.4** is to be carried out.

3 Notwithstanding **-1** and **-2** above, for shafts with keyless or flanged connections and which are subject to the lubricating oil analysis specified in **8.1.1(19)**, the Simplified Partial Survey specified in **Table B8.4** may be carried out instead of an Ordinary Survey or Partial Survey. In cases where the results of the Simplified Partial Survey are not satisfactory, the Ordinary Survey specified in **Table B8.4** is to be carried out.

4 Notwithstanding **-2** and **-3** above, the interval of the Ordinary Survey specified in **Table B8.4** above is not to exceed 15 *years*. This interval may be extended for up to 3 *months*. No further extension may be granted.

5 For the surveys referred to **-1** to **-4** above completed with 3 *months* prior to the survey due date, the next period is to start from the survey due date.

6 For shafts which are carried out lubricating fresh water analysis specified in **8.1.1(19)**, the survey due date may be extended in cases where a survey is carried out in accordance with following **(1)** to **(5)**.

(1) The survey due date may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.4** is carried out. No further extension survey may be carried out.

(2) The survey due date may be extended for up to 1 *year* in cases where the 1Year Extension Survey specified in **Table B8.4** is carried out. No more than two consecutive 1Year Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 2.5 *years* in cases where the 2.5Year Extension Survey specified in **Table B8.4** is carried out.

(3) The survey due date may be extended for up to 3 *months* in cases where the 3Month Extension Survey specified in **Table B8.4** is carried out. No further 3Month Extension Surveys may be carried out. In the event an additional extension is requested, the survey due date, prior to the previous extension, may be extended for up to 1 *year* or 2.5 *years* in cases where the 1Year Extension Survey or 2.5Year Extension Survey specified in **Table B8.4** is carried out.

(4) The period of extension counts from the survey due date in cases where the extension survey is carried out within 1 *month* within the survey due date.

(5) The period of extension counts from the date on which the extension survey in cases where the extension survey is carried out more than 1 *month* prior to the survey due date.

Table B8.4 Surveys of Fresh Water Lubricated Shafts – Shafts Kind 1*W*

Items	Examinations	Ordinary Survey	Partial Survey	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
1 Drawing out of the shafts	(1) Drawing the propeller shaft and the stern tube shaft and examining the entire shafts, seals system and bearings. (2) Checking and recording the bearing clearances between the bush and the shafts.	○					
2 Propeller connections -1 Keyed connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section, including the keyway with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the *NDE* is to be extended to the after edge of the liner.)	○	○				
-2 Keyless connections	(1) Removing the propeller to expose the forward end of the taper. (2) Performing a non-destructive examination (*NDE*) to all around the shaft in way of the forward portion of the taper section with the method deemed appropriate by a surveyor. (When shafts are provided with liners, the *NDE* is to be extended to the after edge of the liner)	○	○				
-3 Flanged connections	(1) Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with overhaul, repairs or when deemed necessary by a surveyor, performing a non-destructive examination (*NDE*) to the flange radius and coupling bolts with the method deemed appropriate by the surveyor.	○	○				
3 Weardown of shaft at the stern tube bearing	(1) Checking and recording the weardown (For extension surveys, the checking and recording are to be carried out as far as practicable.) (2) Confirm the weardown value does not exceed the value used as reference for repairs specified by the manufacturer.	○	○	○	○		
4 Propeller	(1) Verification that the propeller is free of damages which may cause the propeller to be out of balance. (For extension surveys, the information is to be confirmed by records etc.) (2) For ordinary surveys, checking propeller fitting condition to shaft. When the propeller shaft with keyless connection is force fitted to the shaft, it is to be ascertained that the pull-up length is within the upper and lower limits given in **7.3.1-1, Part D**.	○	○	○	○	○	

Table B8.4 Surveys of Fresh Water Lubricated Shafts – Shafts Kind 1*W* (Continued)

Items	Examinations	Ordinary Surveys	Partial Surveys	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
5 Sealing device for stern tube	(1) Verification of the satisfactory conditions of inboard and outboard seals. (For ordinary surveys, the verification is carried out during the re-installation of the shaft and propeller.) For 3Month Extension Survey, verification of inboard seals may be accepted. (2) Confirmation that the seal liner is placed in a satisfactory condition. For extension, this examination is not applied.	○	○	○	○	○	○
6 Shaft and coupling bolts	(1) Examination of shaft and coupling bolts (For the surveys except Ordinary Survey, visual inspection of accessible parts of shaft and coupling bolts.). However, performing a non-destructive examination (*NDE*) to coupling bolts with the method deemed appropriate by a surveyor in cases where the surveyor, based on the results of external examinations, deems such addition examination to be necessary.	○	○	○	○	○	○
7 Stern tube bearing	(1) Examination of the stern tube bearings.	○					
8 Propeller boss surfaces in contact with the propeller shaft taper	(1) Examination of the propeller boss surface.	○					
9 Controllable pitch propeller connections (Only applies to shaft with flanged connections)	(1) Open-up examination of the pitch control gear and working parts as well as performing a non-destructive examination (*NDE*) to the propeller blade fixing bolts with the method deemed appropriate by a surveyor.	○	○				
10 Low level alarms of the lubricating fresh water tanks, lubricating fresh water temperature measuring devices, fresh water lubricating lines and lubricating fresh water circulating pumps, etc.	(1) Examination of the systems for verifying whether stern tube bearings are being maintained in good working condition.	○	○	○	○	○	○

Table B8.4 Surveys of Fresh Water Lubricated Shafts – Shafts Kind 1*W* (Continued)

Items	Examinations	Ordinary Surveys	Partial Surveys	Simplified Partial Survey	Extension Survey		
					2.5Year	1Year	3Month
11 Review of records etc.	(1) Examinations are to be carried out in accordance with the following **(a)** to **(g)**. (a) Service records are to be reviewed. (b) Review of test records of the fresh water analysis is to be carried out to confirm that the reference standards specified in following **i)** and **ii)** are complied with. i) Chloride content and sodium content (upper limit): 1) Chloride: 60 *ppm* 2) Sodium (Na): 70 *ppm* ii) pH : Lower limit values determined based upon characteristics of the correction inhibitors used, but not to be less than 11 iii) Metal particles (upper limit): 1) Iron (Fe): 25 *ppm* 2) Chromium (Cr): 5 *ppm* 3) Nickel (Ni): 5 *ppm* 4) Copper (Cu): 40 *ppm* 5) Silicon (Si): 30 *ppm* iv) Bearing particles (non-metallic content) : No polymer resins are to be found by micro-filter or microscopic testing (c) Fresh water sample test is to be carried out. (d) Verification of no reported repairs by grinding or welding of shafts or propellers is to be carried out. (e) Examination of the lubricating fresh water record book. (f) For 1year and 3month extension surveys, review of the previous clearance recordings is to be carried out. (g) Confirmation from the chief engineer that the shafting arrangement is in good working condition is to be obtained.		○	○	○	○	○

Chapter 12 SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES

12.1 General

Paragraph 12.1.3 has been amended as follows.

12.1.3 Postponement of Periodical Surveys*

For propeller shafts of mobile offshore drilling units ~~(excluding those affixed with the notation "*APSS • O*" or "*APSS • W*")~~ fitted with oil lubricated stern tube bearings that have low running hours, the following examinations may be conducted as an alternative survey to the Ordinary Survey (specified in ~~**1.1.3-1(6)(a) to (d)**~~ **8.3.1-1**). If the units are found in good condition, the Ordinary Survey may be postponed for not more than a *year* from the date of completion of the alternative survey. However, this postponement is not to be granted to shafts which operated over 7,000 *hours* from the date of completion of the Classification Survey or the previous Ordinary Survey.
((1) to (4) are omitted.)

EFFECTIVE DATE AND APPLICATION (Amendment 1-4)

1. The effective date of the amendments is 1 October 2022.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part B Class Surveys

2022 AMENDMENT NO.1

Notice No.31 30 June 2022

Resolved by Technical Committee on 26 January 2022

Amendment 1-3

B1 GENERAL

B1.1 Surveys

Paragraph B1.1.3 has been amended as follows.

B1.1.3 Intervals of Class Maintenance Surveys

(-1 and -2 are omitted.)

~~**3** Survey due dates of Ordinary Surveys of the propeller shafts Kind 1 and stern tube shafts Kind 1 specified in **1.1.3-1(6)(a)i), Part B of the Rules** may be extended in accordance with the following **(1)** to **(3)** after carrying out an Occasional Survey, except for propeller shafts of ships affixed with the notation "*PSCM*" or "*PSCM* • *A*" subject also to Note 1 of **Table B8.1.3-1**.~~

~~(1) The following **(a)** and **(b)** apply in the case of oil lubricated or freshwater lubricated shafts subject to the following **-4**.~~

~~(a) Extension of 1 *year*~~

~~The survey due date may be extended for up to 1 *year* in cases where a survey is carried out in accordance with the following **i)** to **v)** and the shaft condition is confirmed to be satisfactory.~~

~~i) Examinations are to be carried out in accordance with the following **1)** to **3)**:~~

~~1) Review of the previous weardown and/or clearance (between the bush and the shaft) recordings is to be carried out.~~

~~2) The examinations specified in **8.1.2-1(2), Part B of the Rules** are to be carried out.~~

~~3) Confirmation from the Chief Engineer that the shafting arrangement is in good working condition is to be obtained.~~

~~ii) A visual inspection of all accessible parts of the shafting system is to be carried out.~~

~~iii) Verification that the propeller is free of damages which may cause the propeller to be out of balance is to be carried out.~~

~~iv) Verification of the effectiveness of the inboard seal and outboard seals is to be carried out.~~

~~v) The examinations specified in items 12 and 13 of **Table B8.1, Part B of the Rules** are to be carried out.~~

~~(b) Extension of 3 *months*~~

~~The survey due date may be extended for up to 3 *months* in cases where a survey is carried out in accordance with the following **i)** to **iv)** and the shaft condition is confirmed to be satisfactory.~~

~~i) Examinations are to be carried out in accordance with the following **1)** to **3)**:~~

~~1) Review of the previous weardown and/or clearance (between the bush and the shaft) recordings is to be carried out.~~

~~2) The examinations specified in **8.1.2-1(2), Part B of the Rules** are to be carried out.~~

~~3) Confirmation from the Chief Engineer that the shafting arrangement is in good working condition is to be obtained.~~

~~ii) A visual inspection of all accessible parts of the shafting system is to be carried out.~~

~~iii) Verification of the effectiveness of the inboard seal is to be carried out.~~

~~iv) The examinations specified in items 12 and 13 of **Table B8.1, Part B of the Rules** are to be carried out.~~

(2) The following **(a)** and **(b)** apply in the case of water lubricated shafts subject to the following **-5.**

(a) Extension of 1 *year*

The survey due date may be extended for up to 1 *year* in cases where a survey is carried out in accordance with the following **i)** to **vi)** and the shaft condition is confirmed to be satisfactory.

i) Examinations are to be carried out in accordance with the following **1)** to **4):**

1) Review of the previous clearance (between the bush and the shaft) recordings is to be carried out.

2) Service records are to be reviewed.

3) Verification of no reported repairs by grinding or welding of shafts and/or propellers is to be carried out.

4) Confirmation from the Chief Engineer that the shafting arrangement is in good working condition is to be obtained.

ii) A visual inspection of all accessible parts of the shafting system is to be carried out.

iii) Verification that the propeller is free of damages which may cause the propeller to be out of balance is to be carried out.

iv) Checking and recording the clearances between the bush and the shaft are to be carried out.

v) Verification of the effectiveness of the inboard seal is to be carried out.

vi) The examinations specified in items 11 of **Table B8.1, Part B of the Rules** are to be carried out.

(b) Extension of 3 *months*

The survey due date may be extended for up to 3 *month* in cases where a survey is carried out in accordance with the following **i)** to **v)** and the shaft condition is confirmed to be satisfactory.

i) Examinations are to be carried out in accordance with the following **1)** to **4):**

1) Review of the previous clearance (between the bush and the shaft) recordings is to be carried out.

2) Service records are to be reviewed.

3) Verification of no reported repairs by grinding or welding of shafts and/or propellers is to be carried out.

4) Confirmation from the Chief Engineer that the shafting arrangement is in good working condition is to be obtained.

ii) A visual inspection of all accessible parts of the shafting system is to be carried out.

iii) Verification that the propeller is free of damages which may cause the propeller to be out of balance is to be carried out.

iv) Verification of the effectiveness of the inboard seal is to be carried out.

v) The examinations specified in items 11 of **Table B8.1, Part B of the Rules** are to be carried out.

(3) The Occasional Surveys specified in **(1)** and **(2)** above are, in principle, to be carried out within 1 *month* of the survey due date, and the extension specified in **(1)** and **(2)** above counts from said survey due date. If the Occasional Survey is carried out more than 1 *month* prior to the survey due date, then the period of extension counts from the date on which the Occasional Survey was completed.

4 The following **(1)** and **(2)** apply in the case of an extension of the survey due date specified in **-3(1)** above until an Ordinary Survey specified in **8.1.1, Part B of the Rules** or a Partial Survey specified in **8.1.2, Part B of the Rules** is completed.

(1) No more than two consecutive "1 *year*" extensions can be granted. No further extension of

~~another type (that in accordance with **-3(1)(b)** above) can be granted.~~

~~(2) No more than one "3 *months*" extension can be granted. In the event an additional extension is requested, an Occasional Survey in accordance with **-3(1)(a)** above is to be carried out, and the survey due date, prior to the previous extension, is to be extended for up to 1 *year*.~~

~~**5** The following **(1)** and **(2)** apply in the case of an extension of the survey due date specified in **-3(2)** above until an Ordinary Survey specified in **8.1.1, Part B of the Rules** is completed.~~

~~(1) No more than one "1 *year*" extension can be granted. No further extension of another type (that in accordance with **-3(2)(b)** above) can be granted.~~

~~(2) No more than one "3 *months*" extension can be granted. In the event an additional extension is requested, an Occasional Survey in accordance with **-3(2)(a)** above is to be carried out, and the survey due date, prior to the previous extension, is to be extended for up to 1 *year*.~~

~~**6** Upon postponement of the Ordinary Surveys of propeller shafts Kind 1 other than those of ships affixed with the notation "*PSCM*" or "*PSCM • A*" and stern tube shafts Kind 1 facilitated by the Occasional Survey specified in **-3** above or the Partial Survey specified in **1.1.3-1(6)(b), Part B of the Rules**, the interval of the Ordinary Surveys of such shafts is not to exceed the following limits:~~

~~(1) 6 *years* for shafts Kind 1*A*~~

~~(2) 12 *years* for shafts Kind 1*B*, shafts Kind 1*C* and shafts Kind 1*W*~~

~~**7** Due dates of the "non-destructive examination (*NDE*)" specified in **1.1.3-1(6)(a)iii), Part B of the Rules** may be extended for up to 3 *months* in cases where a survey specified in **i)** to **v)** of **-3(2)(b)** above is carried out and the shaft condition is confirmed to be satisfactory. In such cases, further extension of the due date according to **(a)** or **(b)** of **-3(2)** above is not allowed until the non-destructive examination (*NDE*) is completed. The provisions of **-3(3)** above apply to the calculation of the extension of the due date.~~

~~**8** The wording "as specified separately by the Society" in **1.1.3-1(6)(c), Part B of the Rules** means that surveys are to be carried out in accordance with **Annex B1.1.3-7 "Alternative Propeller Shaft Survey Methods".**~~

~~**9**~~**3** (Omitted)

~~**10**~~**4** With respect to the provisions of ~~**-9**~~**3** above, for ships at beginning stage of construction, such construction began before the effective date of each Occasional Survey requirements and such ships are delivered after these effective date, the Classification Survey of such ships is regarded as either their "first survey" or their "first scheduled dry docking"; therefore, these ships need to comply with each of the requirements of Occasional Surveys by the completion date of their Classification Survey.

~~**11**~~**5** (Omitted)

~~**12**~~**6** (Omitted)

B3 ANNUAL SURVEYS

B3.3 Annual Surveys for Machinery

B3.3.1 General Examinations

Sub-paragraph -2 has been amended as follows.

2 The "reference standards deemed appropriate by the Society" referred to in **3.3.1-1(4), Part B of the Rules** refer to the following **(1)** and **(2)**:
(1) those specified in ~~**B8.1.2-1**~~ **(1)(b)**, Item **11**, **Table B8.3** for oil lubricated shafts; and
(2) those specified in ~~**B8.1.2-2**~~ **(1)(b)**, Item **11**, **Table B8.4** for fresh water lubricated shafts.

B6 DOCKING SURVEYS

B6.1 Docking Surveys

Paragraph B6.1.3 has been amended as follows.

B6.1.3 Other Surveys

The "reference standards deemed appropriate by the Society" referred to in **6.1.3-2, Part B of the Rules** refer to the following **(1)** and **(2)**:
(1) those specified in ~~**B8.1.2-1**~~ **(1)(b)**, item **11**, **Table B8.3** for oil lubricated shafts; and
(2) those specified in ~~**B8.1.2-2**~~ **(1)(b)**, item **11**, **Table B8.4** for fresh water lubricated shafts.

B8 has been deleted.

~~**B8 PROPELLER SHAFT AND STERN TUBE SHAFT SURVEYS**~~

~~**(Omitted)**~~

Annex B1.1.3-7 has been deleted.

~~**Annex B1.1.3-7 ALTERNATIVE PROPELLER SHAFT AND STERN TUBE SHAFT SURVEY METHODS**~~

~~**(Omitted)**~~

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 October 2022.