RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

Rules for the Survey and Construction of Inland Waterway Ships
2021 AMENDMENT NO.1
Guidance for the Survey and Construction of Inland Waterway Ships
2021 AMENDMENT NO.1

Rule No.37 / Notice No.37 30 June 2021
Resolved by Technical Committee on 27 January 2021

ClassNK
NIPPON KAIJI KYOKAI

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

RULES

2021 AMENDMENT NO.1

Rule No.37 30 June 2021

Resolved by Technical Committee on 27 January 2021

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.37 30 June 2021
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

"Rules for the survey and construction of inland waterway ships" has been partly amended as follows:

Amendment 1-1

Part 7 MACHINERY INSTALLATIONS

Chapter 11 PIPING SYSTEMS

11.6 Air Pipes

Paragraph 11.6.1 has been amended as follows.

11.6.1 General

1 All tanks ~~and~~, cofferdams and similar spaces are to be provided with air pipes having sufficient ~~cross~~ sectional areas to permit easy venting from any part of the tank ~~and~~, cofferdam and similar spaces.

2 Tanks having top plates not less than 7 *metres* either in length or in width are to be provided with two or more pipes arranged a suitable distance apart. However, tanks having inclined top plates may be provided with one air pipe located at the highest part of the top plate.

3 For tanks requiring more than one air pipe, overflow pipes which comply with requirement **13.7.2** may be used in lieu of air pipes as long as proper air flow from the tank to the atmosphere is ensured; all tanks, however, are to be provided with at least one air pipe.

~~**3**~~**4** In cases where tanks or cofferdams are of a complicated profile, special consideration is to be given to the number and positions of all air pipes.

~~**4**~~**5** Air pipes are to be arranged to be self-draining.

Paragraph 11.6.3 has been amended as follows.

11.6.3 Size of Air Pipes

The total sectional area of air pipes to tanks, which hold liquids and are filled by pumps, is not to be less than 1.25 *times* the total sectional area of the filling pipes. In cases where the tank is provided with an overflow pipe specified in **11.7**, the total sectional area may include the sectional areas of air pipes in tanks to which overflow pipes are connected. ~~t~~The internal diameter of the air pipes ~~may be reduced to~~is not to be less than 50 *mm*.

11.8 Sounding Pipes

Paragraph 11.8.1 has been amended as follows.

11.8.1 General

1 All tanks, cofferdams and ~~areas which are difficult to access~~ similar spaces are to be provided with a sounding pipe or a liquid level indicator. These devices are to be capable of checking the liquid levels in such spaces at readily accessible positions at all times.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 30 June 2021

2. Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to ships for which the date of contract for construction is before the effective date upon request by the owner.

Amendment 1-2

Part 2 CLASS SURVEYS

Chapter 1 GENERAL

1.1 Surveys

1.1.2 Class Maintenance Surveys*

Sub-paragraph -2(2) has been amended as follows.

2 Class Maintenance Surveys consist of Periodical Surveys, Planned Machinery Surveys, Occasional Surveys and Unscheduled Surveys, which are as specified in the following **(1)** to **(4)**. At each of these surveys, inspections, tests or examinations are to be carried out to verify that all necessary items are in good order.

((1) is omitted.)

(2) Planned Machinery Survey

(a) Continuous Machinery Survey (CMS): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out systematically, continuously and sequentially so that each survey interval for all CMS items does not exceed the prescribed period.

(b) Planned Machinery Maintenance Scheme (PMS): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out based upon an open-up inspection by the shipowner according to the machinery maintenance scheme approved by the Society.

(c) Condition Based Maintenance Scheme (CBM): The Survey consists of open-up examinations of machinery and equipment specified in **Chapter 9** of this Part which are to be carried out based upon the results of condition monitoring and diagnosis according to a machinery condition based maintenance scheme approved by the Society.

((3) and (4) are omitted.)

1.1.3 Intervals of Class Maintenance Surveys*

Sub-paragraph -2 has been amended as follows.

2 Planned Machinery Surveys are to be carried out as specified in **(1)** ~~and **(2)**~~to **(3)**. However, in the case of azimuth thrusters, surveys of gears, gear shafts, shaft couplings, bearings and clutches for propulsion as well as azimuth steering gear may be carried out concurrently with survey specified in **-1(6)** above. In addition to the above, in consideration of the navigating area and operating mode, the intervals of Class Maintenance Surveys may be in accordance mutatis mutandis with standards deemed appropriate by the Society.

(1) In the Continuous Machinery Survey, survey items are to be examined at the interval not exceeding 6 *years*.

(2) In the Planned Machinery Maintenance Scheme, survey items are to be examined according to the survey schedule table specified in **9.1.3** and at the general examination (including review of maintenance records) which is to be carried out every year.

(3) In the Condition Based Maintenance Scheme, each survey item or part is to be examined

according to the survey schedule table specified in **9.1.4** and at the annual survey.

Chapter 9 PLANNED MACHINERY SURVEYS

9.1 Planned Machinery Surveys

Paragraph 9.1.1 has been amended as follows.

9.1.1 Application*

In a Planned Machinery Survey, surveys in accordance with the applicable requirements prescribed in **9.1.2** ~~and **9.1.3**~~ to **9.1.4** are to be carried out. In cases where **9.1.3** or **9.1.4** is adopted, the survey items to be covered by the scheme are to be determined according to the shipowner's (or the ship management company's) application, while the rest of the items are to apply **9.1.2**.

Paragraph 9.1.2 has been amended as follows.

9.1.2 Continuous Machinery Survey (CMS)*

In a Continuous Machinery Survey (hereinafter referred to as "CMS" in this Chapter), every item specified in **Table 2.9.1** is to be surveyed in accordance with the following **(1)** to **(3)**:

(1) The above items are to be surveyed systematically, continuously and sequentially in accordance with the survey schedule table approved by the Society so that each survey interval for all CMS items ~~may~~does not exceed 6 *years*.

(2) During the CMS, when any defect or damage is found, similar machinery and equipment, or a part of them, may be required to be opened up for further examination as deemed necessary by the Surveyor, and all the defective items or failures found are to be repaired to the Surveyor's satisfaction.

(3) Survey items deemed appropriate by the Society may be delegated to overhaul inspections by the shipowner (or the ship management company). In this case, the records of the overhaul inspections of the machinery and equipment concerned are to be ascertained as soon as possible. When it is regarded that satisfactory maintenance has not been carried out, an open-up examination in the presence of the Surveyor may be required.

Paragraph 9.1.3 has been amended as follows.

9.1.3 Planned Machinery Maintenance Scheme (PMS)*

1 A shipowner (or ship management company) that has an established maintenance system may apply to adopt the planned maintenance method in which the shipowner is permitted to carry out planned overhaul inspections and maintenance as specified in **(1)** to **(4)** in place of the open-up surveys specified in **Table 2.9.1**. ~~In addition to **(1)**, the shipowner (or ship management company) may apply to adopt the condition monitoring maintenance method as specified in **(2)** which is based on the results of condition monitoring and diagnoses for the machinery and equipment.~~

(1) The planned maintenance method is to be implemented in accordance with the machinery maintenance scheme approved by the Society.

(2) The Society will perform a general examination yearly on every item including review of the maintenance records in order to ascertain that the machinery and equipment covered are placed in good order.

(3) Where it is regarded that satisfactory maintenance has not been carried out for any of the

machinery and equipment, an open-up examination of the item in the presence of the Surveyor may be required.

(4) For machinery and equipment deemed necessary by the Society, open-up examinations in the presence of the Surveyor are to be performed according to the survey schedule table based on the machinery maintenance scheme.

~~(2) The condition monitoring maintenance method is to be implemented in accordance with the machinery maintenance scheme approved by the Society. When any abnormalities are found through the condition monitoring data or diagnoses, the shipowner (or ship management company) is to request an examination in the presence of the Surveyor as soon as possible in accordance with the survey schedule table based on the machinery maintenance scheme. The Society will perform a general examination yearly on every item including review of the condition monitoring data and the maintenance records in order to ascertain that the machinery and equipment covered are placed in good order. Where it is regarded that satisfactory maintenance has not been carried out for any of the machinery and equipment, an open-up examination of the item in the presence of the Surveyor may be required. The planned overhaul inspections and maintenance method is to be required where the condition monitoring maintenance method is not applied.~~

2 The survey of machinery for which condition monitoring and maintenance is carried out according to a machinery maintenance scheme approved by the Society on or before 1 July 2021 is to be in accordance with requirements specified otherwise by the Society.

Paragraph 9.1.4 has been renumbered to Paragraph 9.1.5, and Paragraph 9.1.4 has been added as follows.

9.1.4 Condition Based Maintenance Scheme (CBM)*

A shipowner (or ship management company) that has an established maintenance system may apply to adopt the method in which maintenance of machinery is carried out according to the results of condition monitoring and diagnosis, as specified in the following **(1)** to **(6)**, in place of the open-up surveys specified in **Table 2.9.1**.

(1) The condition based maintenance method is to be implemented in accordance with a machinery maintenance scheme for CBM approved by the Society.

(2) In cases where no abnormality is found in the results of condition monitoring and diagnosis, a general examination may be carried out as an alternative to the open-up examinations specified in **Table 2.9.1** based upon manufacturer recommendations regarding maintenance. In cases where an abnormality is found, the shipowner (or ship management company) is to request an examination in the presence of the Surveyor as soon as possible in accordance with the survey schedule table based on the machinery maintenance scheme for CBM.

(3) The condition monitoring system is to be approved by the Society.

(4) The condition monitoring and diagnosis is not to replace routine surveillance or the chief engineer’s responsibility for making decisions in accordance with his judgement.

(5) The Society confirms on a yearly basis that the condition monitoring system works effectively and is in good condition; this includes inspection of condition monitoring records and machinery maintenance records subject to the scheme so as to confirm said machinery is in good condition, and that maintenance was carried out in cases where monitoring parameter of the machinery exceeded its limiting value.

(6) Where it is regarded that satisfactory maintenance has not been carried out for any of the machinery and equipment, an open-up examination of the item in the presence of the Surveyor may be required.

Paragraph 9.1.5 has been amended as follows.

9.1.45 Periodical Surveys

In place of the Planned Machinery Surveys prescribed in **9.1.2** ~~and~~to **9.1.3~~3~~4**, the surveys specified in ~~the following (1) and (2)~~**Table 2.9.1** may be carried out at ~~Intermediate Surveys and~~ Special Surveys prescribed in **1.1.3** to ascertain that all the machinery is placed in good order. ~~In addition, the Surveyor is to examine as needed any machinery and equipment for which an open up survey was carried out for maintenance, etc. at the discretion of the shipowner at times other than during Intermediate Surveys and Special Surveys.~~

~~(1) During the Intermediate Survey, the surveys specified in **Table 2.9.2** are to be carried out to ascertain that all the machinery is placed in good order. However, in cases where the machinery consists of duplicate systems, surveys for either of the machinery may be carried out.~~

~~(2) During the Special Survey, the surveys specified in **Table 2.9.1** are to be carried out to ascertain that all the machinery is placed in good order.~~ However, at Special Surveys of ships equipped with two or more propeller shafting systems driven by identical main engines, surveys of the main engine components that were examined in accordance with the requirements for Special Surveys after the Classification Survey or the previous Special Survey may be omitted where deemed appropriate by the Surveyor, considering the time the engines were examined, the service history of the engines, the present condition and whether or not they were subject to a Classification Survey during Construction.

Table 2.9.1 Open-up Surveys of Machinery and Equipment

（Table is omitted.）

Table 2.9.2 has been deleated.

~~Table 2.9.2 Surveys of Machinery and Equipment in place of the Planned Machinery Surveys~~

~~Items~~	~~Examinations~~
~~1 Reciprocating internal combustion engines (main engine)~~	~~• Inside of cylinders and inside and outside of cylinder covers are to be examined. However, pistons need not to be removed unless deemed necessary by the surveyor.~~ ~~• Crank pin bearings in the number of one third of cylinders are to be removed and examined by turning the crank shaft.~~ ~~• Blades and bearings for turbo chargers are to be examined.~~
~~2 Power transmission systems and shafting systems~~	~~• For reduction gears, gears are to be examined from inspection holes.~~ ~~• Thrust shafts, intermediate shafts and their bearings (excluding stern tube bearings and shaft bracket bearings) are to be examined by removing the upper bearing halves or their bearing metals and thrust pads and turning the shaft.~~
~~3 Auxiliary engines~~	~~Generators, auxiliary engines driving auxiliary machinery essential for main propulsion and auxiliary machinery for manoeuvring and personnel safety are to be handled in accordance with the requirements applicable to main engines.~~
~~4 Auxiliary machinery~~	~~Auxiliary machinery are to be examined in accordance with item 4 of Table 2.9.1~~

Part 7 MACHINERY INSTALLATIONS

Chapter 1 GENERAL

1.5 Tests

1.5.1 Shop Tests

Sub-paragraph -1 has been amended as follows.

1 Before being installed on board, all equipment and components constituting a machinery installation (excluding auxiliary machinery for specific use, etc.) are to be tested at facilities (hereinafter referred to as “Shop Tests”) that have the proper equipment necessary to conduct such tests in accordance with the relevant requirements of this Part. To implement tests, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate.

Part 8 ELECTRICAL INSTALLATIONS

Chapter 1 GENERAL

1.2 Testing

1.2.1 Shop Tests*

Sub-paragraph -1 has been amended as follows.

1 The electrical equipment specified below is to be tested in accordance with the respective requirements in this Part at the place of manufacture or at other locations having adequate apparatus for testing and inspections. However, to implement tests, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate. In addition, tests for any equipment with small capacities as specified in **(4)** and **(5)** are to be conducted as deemed appropriate by the Society.
((1) to (7) are omitted.)

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 July 2021.

Amendment 1-3

Part 8 ELECTRICAL INSTALLATIONS

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.4 Rotating Machines

Paragraph 2.4.5 has been amended as follows.

2.4.5 Overload and Overcurrent Capability*

Rotating machines are to withstand the following ~~excess~~ overcurrent or torque tests by maintaining their voltage, rotating speed and frequency as near to their rated values as possible. In the case of special types of deck machinery motors (winch, windlass, capstan, etc.), overload scaling may be dealt with as considered appropriate by the Society.

(1) ~~Excess~~ Overcurrent capability

(a) (Omitted)

(b) *A.C.* motors

150 % of rated current for 2 *minutes*.

However, in the case of *A.C.* motors having rated outputs exceeding 315 *kW* or rated voltages exceeding 1 *kV*, the load and time of ~~excess~~ overcurrent capability may be increased or decreased in consideration of use conditions and the like.

(c) (Omitted)

(2) (Omitted)

Paragraph 2.4.15 has been amended as follows.

2.4.15 Shop Tests*

1 Rotating machines are to be tested in accordance with the requirements given in this **2.4.15-2 to -13 in accordance with Table 8.2.5**. However, those tests required by **-6~~, -7~~** and **-8** below may be omitted subject to the Society's permission for each generator or motor which is produced in series having identical type with their unit. In addition, those tests required by **-5** below may be omitted for each generator or motor which is of small capacity and which is produced in a series of identical types with their unit.

2 ~~No-load tests of rotating machines are to be carried out. During such tests, machine vibrations and bearing lubrication system operations are to be within the order.~~ Visual examinations of rotating machines are to be carried out. Such visual examinations are to ensure, as far as is practicable, that rotating machines comply with their technical documentation (e.g. design drawings, specifications).

3 (Omitted)

4 (Omitted)

5 (Omitted)

6 (Omitted)

7 Overspeed tests for rotating machines are to be carried out and comply with the requirements given in **2.4.7**. Such tests, however, are not applicable to squirrel cage motors.

8 (Omitted)

9 The high voltage levels specified in **Table 8.2.5~~5~~6** are to be applied for a period of 1 *minute* between live parts and frames of rotating machines, with those cores and windings not under going testing connected to such frames. ~~In cases where machines with rated voltage above 1 *kV* having both ends of each phase individually accessible, test voltages are to be applied between~~

~~each phase and frames.~~ Furthermore, where those temperature rise tests specified in **-8** above are applied, high voltage tests are to be carried out after the test.

10 Immediately after those high voltage tests specified in **-9** above have been performed, the insulation resistance of such rotating machines is to be measured in accordance with **Table 8.2.~~6~~7** and all values are not to be less than any of those specified in **Table 8.2.~~6~~7**. In addition, during such measuring, temperatures of rotating machines are to be near operating temperature. However, in cases where this is difficult, appropriate methods of calculation may be used instead.

11 Machine winding resistance is to be measured. The resistances of the machine windings are to be measured and recorded using either an appropriate bridge method, or a voltage and current method.

12 No-load tests of rotating machines are to be carried out. Machines are to be operated at no load and rated speed whilst being supplied at rated voltage and frequency when used as a motor, or are to be driven by a suitable means and excited to give rated terminal voltage when used as a generator. During such tests, machine vibrations and bearing lubrication system operations are to be checked and confirmed to be in good order.

~~12~~13 (Omitted)

Table 8.2.5 to 8.2.15 have been renumbered to Table 8.2.6 to 8.2.16, and Table 8.2.5 has been added as follows.

Table 8.2.5 Tests for Rotating Machines

No.	Tests	Generators		Motors	
		First generator produced in a series of identical type units (1)	Other generators produced in a series of identical type units(2)	First motor produced in a series of identical type units(1)	Other motors produced in a series of identical type units(2)
1	Examination of the technical documentation, as appropriate and visual examination	x	x	x	x
2	Insulation resistance measurement	x	x	x	x
3	Winding resistance measurement	x	x	x	x
4	Verification of the voltage regulation system(7)	x	x(3)		
5	Rated load test and temperature rise measurements	x		x	
6	Overload/overcurrent test	x	x(4)	x	x(4)
7	Verification of steady short circuit conditions(5)	x			
8	Overspeed test	x	x	x(6)	x(6)
9	High voltage tests	x	x	x	x
10	No-load test	x	x	x	x
11	Verification of degree of protection	x		x	
12	Verification of bearings	x	x	x	x

Notes:

(1) Type tests on prototype machine or tests on at least the first batch of machines.

(2) The report of machines produced as part of a series of identical type units are to contain the manufacturer's serial number of the machine which has been type tested and the corresponding test results.

(3) Only functional tests of voltage regulator systems.

(4) Only applicable to machines with rated outputs above of 100 *kW* used for essential services.

(5) Verification of steady short circuit condition applies to synchronous generators only.

(6) Not applicable to squirrel cage motors.

(7) Not applicable to *D.C.* generators.

Table 8.2.~~5~~6 Testing Voltages
(Omitted)

Table 8.2.~~6~~7 Minimum Values of Test Voltages and Insulation Resistance
(Omitted)

Table 8.2.~~7~~8 Minimum Air Clearances for Busbars
(Omitted)

Table 8.2.~~8~~9 Instruments for *d.c.* Generator Panels
(Omitted)

Table 8.2.~~9~~10 Instruments for *a.c.* Generator Panels
(Omitted)

Table 8.2.1~~0~~1 Limits of Temperature Rise of Electrical Appliances for Switch Boards
(Omitted)

Table 8.2.1~~1~~2 Minimum Clearances and Creepage Distances for Control Appliances
(Omitted)

Table 8.2.1~~2~~3 Limits of Temperature Rise of Controlgears for Motors
(Omitted)

Table 8.2.1~~3~~4 Current Ratings of Cables (for continuous service)(1)
(Omitted)

Table 8.2.1~~4~~5 Correction Factor for Various Ambient Temperatures
(Omitted)

Table 8.2.1~~5~~6 Limits of Temperature Rise of Transformers
(Omitted)

2.5 Switchboards, Section Boards and Distribution Boards

2.5.3 Construction and Materials

Sub-paragraph -5(1) has been amended as follows.

5 Wiring materials are to conform to the following requirements:

(1) Insulated wires for switchboards are to be flame-retardant and non-hygroscopic which have appropriate maximum permissible conductor temperatures of not less than 75 ℃.

((2) and (3) are omitted.)

2.5.4 Busbars*

Sub-paragraph -5 has been amended as follows.

5 Air clearances (phase-to-phase, pole-to-pole and phase-to-earth) of non-insulated busbars are not to be less than the values given in **Table 8.2.~~7~~8**.

Paragraphs 2.5.6 and 2.5.7 have been amended as follows.

2.5.6 Measuring Instruments for *D.C.* Generators

Ship service *d.c.* generator panels are to be at least provided with the instruments given in **Table 8.2.~~8~~9**.

2.5.7 Measuring Instruments for *A.C.* Generators

Ship service *a.c.* generator panels are at least to be provided with the instruments given in **Table 8.2.~~9~~10**.

2.5.10 Shop Tests

Sub-paragraph -2 has been amended as follows.

2 Temperature rises of switchboards are not to exceed those values given in **Table 8.2.1~~0~~1** under the specified currents and/or rated voltages, except in those cases specified in the chapters of this Part.

2.7 Control Appliances

2.7.1 Clearances and Creepage Distances

Sub-paragraph -2 has been amended as follows.

2 Minimum clearances and creepage distances of control appliances (*e.g.*, electromagnetic contactors, control switches, terminal boards) are not to be less than those values given in **Table 8.2.1~~1~~2** if such appliances are designed and constructed in consideration of moisture, dust, etc. or if they are operated in ambient conditions not affected by extremely high humidity and heavy deposit of dusts.

2.8 Controlgears for Motors and Magnetic Brakes

Paragraph 2.8.3 has been amended as follows.

2.8.3 Temperature Rise

Temperature rises of controlgears for motors are not to exceed, under specified currents or rated voltages, the values given in **Table 8.2.1~~2~~3**, except as separately specified in this Part.

2.9 Cables

Paragraph 2.9.9 has been amended as follows.

2.9.9 Current Rating of Cables

The current rating of cables is to comply with the following **(1)** to **(5)**.

(1) The current rating of cables for continuous service is not to exceed the values given in **Table 8.2.1~~3~~4**.

(2) The current rating of cables for short-time services (30 *minutes* or 60 *minutes*) may be increased by multiplying the value given in **Table 8.2.1~~3~~4** by the following correction factor.

correction factor: $\sqrt{1.12/(1-exp(-ts/0.245/d^{1.35}))}$

ts: 30 or 60 (*min*)

d: overall diameter of the finished cable (*mm*)

(3) The current rating of cables for intermittent services (for periods of 10 *minutes*, of which 4 *minutes* are with constant loads and 6 *minutes* without any loads at all) may be increased by multiplying the value given in **Table 8.2.1~~3~~4** by the following correction factor.

correction factor: $\sqrt{\frac{1-exp\,(-10/0.245/d^{1.35})}{1-exp\,(-4/0.245/d^{1.35})}}$

d: overall diameter of the finished cable (*mm*)

The current rating for other intermittent ratings is to be deemed appropriate by the Society.

(4) (Omitted)

(5) In cases where ambient temperatures are different from those specified in **(1)** to **(3)**, the correction factor in **Table 8.2.1~~4~~5** may be applied.

2.10 Transformers for Power and Lighting

Paragraph 2.10.3 has been amended as follows.

2.10.3 Temperature Rise

Temperature rises of transformers are not to exceed those values given in **Table 8.2.1~~5~~6** during any continuous operation at rated outputs.

2.10.4 Modification of the Limits of Temperature Rise*

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

1 In cases where ambient temperatures exceed 45 ℃, limits of temperature rise are to be decreased by the difference from those values given in **Table 8.2.1~~5~~6**.

2 (Omitted)

3 In cases where ambient temperatures do not exceed 45 ℃, limits of temperature rise may be increased by the difference from those values given by **Table 8.2.1~~5~~6**. In such cases, ambient temperatures are not to be set below 40 ℃.

2.17 Tests after Installation On Board

2.17.1 Insulation Resistance Test

Sub-paragraph -3 has been amended as follows.

3 The insulation resistance of generators and motors under working temperatures is to be those values specified in **Table 8.2.~~6~~7**.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 July 2021.

2. Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

GUIDANCE

2021 AMENDMENT NO.1

Notice No.37 30 June 2021

Resolved by Technical Committee on 27 January 2021

Notice No.37 30 June 2021
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF INLAND WATERWAY SHIPS

"Guidance for the survey and construction of inland waterway ships" has been partly amended as follows:

Amendment 1-1

Part 7 MACHINERY INSTALLATIONS

Chapter 11 PIPING SYSTEMS

11.5 Bilge and Ballast Piping

11.5.1 General

Sub-paragraph -1 has been amended as follows.

1 Alternatives to or the ~~O~~omission of bilge ~~suction~~ pip~~es~~ing

~~For small compartments such as echo sounder recesses, etc., the provision of bilge suction pipes may be omitted with Society approval~~With respect to the bilge piping required by **11.5.1-1, Part 7 of the Rules**, the Society may accept the other measures described in the following **(1)** and **(2)**.

(1) For spaces where it is difficult to install bilge piping, other drainage arrangement such as drain plug may be allowed to be installed as an alternative to the bilge piping.

(2) For small spaces where there is no risk of water accumulation, the omission of bilge piping may be allowed.

11.6 Air Pipes

Paragraph 11.6.1 has been added as follows.

11.6.1 General

1 The word "cofferdams" in **11.6.1-1, Part 7 of the Rules** means spaces between two bulkheads or decks primarily designed as a safeguard against leakage of oil from one compartment to another.

2 The Society may accept the omission of the air pipes required by **11.6.1-1, Part 7 of the Rules** for small spaces which have no permanent means of suction or discharge of bilge by pump (i.e. the small spaces specified in **11.5.1-1(2)**).

11.8 Sounding Pipes

Paragraph 11.8.1 has been added as follows.

11.8.1 General

1 The word "cofferdams" in **11.8.1-1, Part 7 of the Rules** means the spaces specified in **11.6.1-1**.

2 With respect to sounding pipes and liquid level indicators required by **11.8.1-1, Part 7 of the**

Rules, the Society may accept the other measures described in the following **(1)** and **(2)**.

(1) For small spaces (i.e. the spaces specified in **11.5.1-1(2)**), the omission of sounding pipes and liquid level indicators may be allowed.

(2) For small spaces which are not covered by **11.5.1-1(2)** that comply with the following **(a)** and **(b)**, the omission of sounding pipes and liquid level indicators may be allowed.

(a) The spaces are readily accessible.

(b) Other means of checking for presence of liquid inside the space are provided.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

1. The effective date of the amendments is 30 June 2021.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction is before the effective date.

3. Notwithstanding the provision of preceding **2.**, the amendments to the Guidance may apply to ships for which the date of contract for construction is before the effective date upon request by the owner.

Amendment 1-2

Part 2 CLASS SURVEYS

Chapter 1 GENERAL

1.1 Surveys

1.1.3 Intervals of Class Maintenance Surveys

Sub-paragraph -9(7) has been amended as follows.

9 For ships navigating in the Parana River Basin and the Paraguay River Basin, etc., "***HIDROVIA Parana - Paraguay***" may be applied as the "standards deemed appropriate by the Society". Intervals of Periodical Survey may, in principal, be treated as follows where such standards are applied mutatis mutandis. However, the extent and contents of Periodical Surveys and Planned Machinery Surveys are to comply with this Rules in accordance with the age of the ship.

((1) to (6) are omitted.)

(7) Planned Machinery Surveys

(a) For self-propelled ships and manned non-propelled ships, survey items are to be examined at intervals not exceeding 6 *years* in the Continuous Machinery Survey.

(b) For unmanned ships, survey items are to be examined at intervals not exceeding the intervals between special surveys.

(c) In the Planned Machinery Maintenance Scheme, survey items are to be examined according to the survey schedule table specified in **9.1.3, Part 2 of the Rules** and at the general examination (including review of maintenance records) which is to be carried out during the Intermediate Survey.

(d) In the Condition Based Maintenance Scheme, survey items are to be examined according to the survey schedule table specified in **9.1.4, Part 2 of the Rules** and at the Intermediate Survey.

Chapter 9 PLANNED MACHINERY SURVEYS

9.1 Planned Machinery Surveys

Paragraph 9.1.3 has been amended as follows.

9.1.3 Planned Machinery Maintenance Scheme (PMS)

1 Application of PMS

~~(1) PMS generally applies to machinery and equipment installed in the following ships.~~

~~(a) Ships with machinery and equipment less than 15 *years* old at the time of application.~~

~~(b) Ships operated by a shipowner or ship management company that has an established maintenance system and organization.~~

~~(2)~~ PMS may be appl~~y~~ied to the open-up examinations of machinery and equipment prescribed in

9.1.2-1.

2 Terms

The definition~~s~~ of ~~terms~~ "maintenance management system" which appear~~s~~ in **9.1.3** ~~are as specified in the following **(1)** and **(2)**.~~is

~~(1) Maintenance management system~~

~~A~~ a computer system for managing the maintenance and inspection plans of machinery and its components that are subject to the Planned Machinery Maintenance Scheme.

~~(2) Condition monitoring system~~

~~A system which is composed of displays for diagnosing the deterioration trend of the machinery and its components from data continuously or periodically measured by sensors and computers for saving and maintaining this data~~

3 Application Procedure for PMS

To apply for PMS, the shipowner or ship management company or representative is to submit an Application for PMS accompanying the following documents to the Society.

(1) Documents for approval (3 sets: one each for the ship's file, shipowner's file and Society's file)
   (a) Machinery maintenance scheme
   (b) Survey schedule table
   (c) Function descriptions for maintenance management system
   ~~(d) The following documents in addition to **(a)** through **(c)** above, when applying for the condition monitoring maintenance method~~
      ~~i) Function description for condition monitoring system~~
      ~~ii) Condition monitoring procedures and sensor lists~~
      ~~iii) Kinds and contents of output information~~

(2) Documents for reference (1 set)
   (a) Sample form of machinery maintenance records
   (b) Organization chart identifying the section and the personnel responsibility for the machinery maintenance

4 Approval of PMS

Conditions for approval of PMS are as follows:

(1) ~~Planned maintenance method~~ Machinery maintenance scheme

The machinery maintenance scheme for PMS ~~made based on the planned maintenance system is to cover the maintenance plans not only for survey items but for all machinery. It~~ is to specify maintenance works such as overhaul inspection, replacement of parts and general inspection with their time schedule and/or running hours for each item of machinery and equipment including their parts. The scheme is to be prepared based on the inspection and maintenance intervals recommended by the manufacturers of the machinery and equipment with input from the experience and knowledge of the shipowner and ship management company. The inspection intervals for all items covered by PMS are generally planned not to exceed 6 *years*. However, for the items whose overhaul intervals are specified on the basis of their running hours, longer intervals may be accepted as long as the intervals are based on the manufacturer's recommendations. When the machinery maintenance scheme is changed, the amended scheme is to be submitted to the Society for approval.

~~(2) Condition monitoring maintenance method~~

~~The machinery maintenance scheme is to cover the maintenance plan for all the machinery as **(1)** above. For machinery, equipment and parts with a condition monitoring system which complies with the following requirements, the inspection intervals may be prolonged until an abnormal condition is observed. In this case, the machinery maintenance scheme for PMS is also to cover all condition monitoring functions, criteria for judgment and procedures for~~

~~monitoring, analysis and handling (including reporting observed abnormal conditions to the Society) of the system.~~

~~(a) Condition monitoring systems are to be suited to diagnosing any deterioration of equipment or its components on the basis of the data from sensors or centralized machinery monitoring and control systems. The sensors are to be subject to the tests specified in **14.7.1, Part 7 of the Rules**.~~

~~(b) Condition monitoring systems are to be suited to diagnosing the condition of equipment or its components on the basis of independent or coalesced data or their trends.~~

~~(c) Back-ups of the data can be made.~~

(~~3~~2) Survey Schedule Table

Survey intervals of the survey items are not to exceed those specified in the machinery maintenance scheme. The following items are to be generally opened and examined in the presence of the Surveyor. ~~Where the condition monitoring maintenance method is applied, the items are to be opened and examined only when an abnormal condition is observed.~~

(a) Reduction gears for main propulsion
(b) Flexible couplings for main propulsion
(c) Other items deemed necessary by the Society.

When this survey schedule table is amended, the amended survey schedule table is to be submitted to the Society for approval.

(~~4~~3) Machinery Maintenance Records

Machinery maintenance records are to include at least the following items. These records are to be retained on board the ship at all times.

(a) Date of maintenance work
(b) Signature by the Chief Engineer
(c) Details of maintenance work and results
(d) Total running hours (parts replacement intervals and overhaul intervals)
(e) Names of parts replaced
(f) Measuring data (including original design dimensions and allowable tolerance)
(g) The condition of damage and repair method
(h) Results of visual examinations of lubricating oil conditions carried out through open-up examinations of the lubricating oil filters, etc. of crankpins, crank journals, thrust shafts and bearings of reciprocating internal combustion engines used as main propulsion machinery (in cases where the principle components of such engines were inspected through independent open-up surveys conducted by chief engineers)

~~(5) Condition monitoring records~~

~~Condition monitoring records are to include at least the following items.~~

~~(a) Date of condition monitoring and relevant content of survey~~

~~(b) Signature of the Chief Engineer at the condition monitoring~~

~~(c) Contents and results of condition monitoring (including criteria for judgment)~~

(~~6~~4) Chief Engineer

The Chief Engineer in charge of PMS is to be a person designated by the shipowner or ship management company.

(~~7~~5) Computer

Computers used for ~~condition monitoring and diagnosis systems~~ maintenance management system are to satisfy the following requirements specified in **(a)** through **(f)**:

(a) Computers are to be configured so that the effects of a system failure in part of the circuits or devices can be limited to a certain range as far as possible.
(b) Each system component is to be protected against overvoltages (electrical noise) likely to enter through input/output terminals.

(c) Central processing units and important peripheral devices are to have a self-monitoring function.

(d) Important programmes and data are not to be deleted in the event of a temporary failure of the external source of power supply.

(e) Spare parts for important system components that require specialist services for repairs are to be supplied in readily replaceable part units.

(f) It is recommended that the software is approved in accordance with **Annex B9.1.3-4 "PROCEDURES FOR APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE", Part B of the Guidance for the Survey and Construction of Steel Ships**.

5 Surveys for PMS

(1) Initial Survey

The initial survey is to be carried out by the Surveyor within 1 *year* from the date of approval for application of PMS, and it is to be verified that planned machinery maintenance is being carried out in accordance with the approval scheme.

(2) Annual Survey

General examinations (including review of maintenance records) are to be carried out yearly to confirm that the planned machinery maintenance is being carried out by the designated Chief Engineer in accordance with the approved scheme on relevant machinery, equipment, and parts, and that these items are in good condition. ~~Where the condition monitoring maintenance method is applied, it is to be verified that condition monitoring has been properly carried out and as a result of which, machinery, equipment and parts are in good order. Confirmation that the condition monitoring system and maintenance management system are being operated effectively and are also in good order is to be made. Condition monitoring data and the results of the diagnosis are to be evaluated before the survey and are to be retained on board at all times.~~

~~(3) Special Survey~~

~~Where the condition monitoring maintenance method is applied, confirmation that the condition monitoring system and maintenance management system are being operated effectively and are also in good order is to be made. Condition monitoring data and the results of the diagnosis are to be evaluated before the survey and are to be retained on board at all times.~~

(~~4~~3) Open-up Survey

The items prescribed in **-4(~~3~~2)** above are to be opened and examined in the presence of the Surveyor in accordance with the survey schedule table.

(~~5~~4) Occasional Survey

Any damage to items covered by PMS ~~or any abnormal conditions observed by the condition monitoring system specified in -4(2)~~ are to be reported to the Society immediately. Upon review of the reports, the Society may request an occasional survey when considered necessary.

6 Surveys based on condition monitoring and diagnosis

The wording "requirements specified otherwise by the Society" in **9.1.3-2, Part 2 of the Rules** means the following:

(1) Annual Survey

It is to be verified that condition monitoring has been properly carried out and as a result of which, machinery, equipment and parts are in good order. Confirmation that the condition monitoring system and maintenance management system are being operated effectively and are also in good order is to be made. If as a result of this confirmation, the Society deems that proper maintenance has not been carried out, an open-up examination in the presence of the

surveyor may be required. Condition monitoring data and the results of the diagnosis are to be evaluated before the survey and are to be retained on board at all times.

(2) Occasional Survey

Any damage to items covered by PMS or any abnormal conditions observed by the condition monitoring system are to be reported to the Society without delay. Upon review of the reports, the Society may request an occasional survey when considered necessary.

~~6~~7 Cancellation of PMS

The Society may cancel approval for PMS when it is considered difficult to continue PMS for any of the following reasons.

(1) It is found that PMS is not operated in accordance with the approved scheme
(2) Damages or deficiencies found on items covered by PMS have not been rectified by the due date ~~recommended~~
(3) When the shipowner or ship management company has been changed
(4) When the class of the ship has been transferred
(5) When the shipowner or ship management company requests cancellation of the approval

Paragraph 9.1.4 has been added as follows.

9.1.4 Condition Based Maintenance Scheme (CBM)

1 General

The purpose of a condition based maintenance scheme is to obtain maintenance efficiency by performing maintenance at the early stage of an abnormality detected by condition monitoring and diagnosis and by continuously using components when no abnormality is found. The condition monitoring systems are to be arranged to provide an equivalent or greater degree of confidence in the condition of the machinery to traditional survey techniques.

2 Application of CBM

(1) The wording "an established maintenance system" in **9.1.4**, **Part 2 of the Rules** refers to those which satisfy the requirements of **Rules for the Audit and Registration of Safety Management Systems** or their equivalent. In addition, all personnel involved in condition monitoring and diagnosis are to be properly qualified.
(2) CBM may apply to items subjected to the open-up examinations of machinery and equipment prescribed in **9.1.2-1.**

3 Terms

The definitions of terms which appear in **9.1.4** are as specified in the following **(1)** to **(5)**.

(1) Condition monitoring

Acquisition and processing of information and data that indicate the state (The machine state deteriorates if faults or failures occur.) of machineries, equipment or its components over time

(2) Diagnostic

Examination of symptoms and syndromes to determine the nature of faults or failures

(3) Condition based maintenance

Maintenance performed as governed by **9.1.4**.

(4) Condition monitoring system

A system which is composed of displays for diagnosing the deterioration trend of the machineries, equipment, and its components from data continuously or periodically measured by sensors and computers for saving and maintaining this data

(5) Maintenance management system

A computer system for managing the maintenance and inspection plans of machineries, equipment, and its components which are subject to the Condition Based Maintenance Scheme

4 Application Procedure for CBM

To apply for CBM, the shipowner or ship management company or representative is to submit an Application for CBM accompanying the following documents to the Society. The baseline data specified in **(1)(i)** may be submitted to the Society so as to be approved before the implementation survey specified in **-6.(2)**.

(1) Documents for approval (3 sets: one each for the ship's file, shipowner's file and Society's file)
  (a) Machinery maintenance scheme for CBM
  (b) Survey schedule table
  (c) List of the machinery, etc. subject to the scheme
  (d) List of equipment comprising the condition monitoring system as well as function descriptions and maintenance instructions for the condition monitoring system
  (e) List of sensors
  (f) Kinds and contents of output information from the condition monitoring system (kinds of abnormalities, maintenance recommendations, remaining years of service life, etc.)
  (g) List of limiting parameters used in condition monitoring (alarms and warnings determined from manufacturer recommendations or international standards)
  (h) Procedures for changes to software systems and limiting parameters
  (i) Baseline data
  (j) Function descriptions for maintenance management system
  (k) Qualification of personnel and organizations responsible for analysing condition monitoring results

(2) Documents for reference (1 set)
  (a) Sample form of condition monitoring records
  (b) Sample form of machinery maintenance records
  (c) Organization chart identifying the section and the personnel responsibility for the condition monitoring and diagnosis

5 Approval of CBM

Conditions for approval of CBM are as follows:

(1) Machinery maintenance scheme for CBM

The machinery maintenance scheme for CBM is to include maintenance and management of the records of machinery, equipment or associated components subject to the scheme and specify the following **(a)** to **(d)**. When the machinery maintenance scheme is changed, the amended scheme is to be submitted to the Society for approval.
  (a) The functions of the condition monitoring system
  (b) Procedures related to condition monitoring and diagnosis
  (c) Handling procedures in cases where an abnormality is found (including procedures for creating maintenance records and reporting to the Society)
  (d) Procedures for identifying defects and failures that were not prevented by condition monitoring and diagnosis and for modifying the machinery maintenance scheme for CBM accordingly

(2) Condition monitoring system

The condition monitoring system is to satisfy the following requirements specified in **(a)** to **(h)**. In cases where this system is modified, that modification is to be approved by the Society.
  (a) The computer collects data from sensors or centralized machinery monitoring and control systems. The sensors are to be subject to the tests equivalent to those specified in **18.7.1, Part D of the Rules for the Survey and Construction of Steel Ships.**
  (b) The hardware and software of the computer is to comply with **9.1.3-4(5)(a)** to **(e)** and **Annex D18.1.1 "COMPUTER BASED SYSTEMS", Part D of the Guidance for the Survey and Construction of Steel Ships.**

(c) In addition to **(b)**, the software is to have condition monitoring function specified in **Annex B9.1.3-4 "Procedures for approval of PMS/CBM management software", Part B of the Guidance for the Survey and Construction of Steel Ships** and be suited to diagnosing any deterioration of machinery, equipment or associated components on the basis of the data from the sensors or centralized machinery monitoring and control systems specified in **(a)**. The software is to be suitable for diagnosing the condition of equipment or its components on the basis of independent or coalesced data, or their trends.

(d) The condition monitoring system is to produce condition monitoring records.

(e) In cases where condition monitoring and diagnosis are conducted on board ships, the condition monitoring system is to be such that no specialized knowledge of data analysis is required to use the system.

(f) In cases where remote condition monitoring and diagnosis are conducted (i.e. the data sent from the ship is analyzed remotely), the condition monitoring systems are to include a communication function to transfer the data collected by the sensors or centralized machinery monitoring and control systems specified in **(a)**. Particular attention is to be paid to the cyber safety and security of said communication function. The system equipped on board is to be arranged to store the condition monitoring data in the event of loss of the communication function and transfer the data after the communication function is restored.

(g) In cases where limiting parameters are modified, such modifications are to be identified.

(h) The condition monitoring system is to include a method for backing up data at regular intervals.

(3) Maintenance management system

The maintenance management system is to have the maintenance records function specified in **Annex B9.1.3-4 "Procedures for approval of PMS/CBM management software", Part B of the Guidance for the Survey and Construction of Steel Ships**. This function may be incorporated into the condition monitoring system specified in **(2)**.

(4) Survey Schedule Table

Annual surveys are to be performed to confirm that the machinery maintenance scheme for CBM is being properly implemented. In cases where there is any damage to the machinery, equipment or associated components subject to the scheme or an abnormality is found in the results of condition monitoring and diagnosis, the shipowner (or ship management company) is to promptly report this to the Society and apply for an occasional survey if instructed to do so by the Society. When this survey schedule table is amended, the amended survey schedule table is to be submitted to the Society for approval.

(5) Condition monitoring record

Condition monitoring records are to include at least the following items.

(a) Condition monitoring data, including all data since last open-up inspection, the original baseline data specified in **-6(2)** and relevant maintenance data.

(b) Signature of the chief engineer.

(c) Contents and results of condition monitoring and diagnosis (including criteria for judgment).

(6) Machinery maintenance record

The machinery maintenance records are to include the items specified in **9.1.3-4(3)** for the machinery, equipment or associated components subject to the scheme. Those records are to be created by the chief engineer and always to be available on board the ship.

(7) Chief engineer and other ship personnel

The machinery maintenance scheme for CBM is to be implemented by a chief engineer

designated by the shipowner or ship management company. Access to the condition monitoring system and maintenance management system is to be permitted only to the chief engineer and other ship personnel who are designated by the shipowner or ship management company.

6 Surveys of CBM

(1) Installation survey

It is to be confirmed in the presence of the Surveyor that the equipment necessary for condition monitoring and diagnosis, e.g. sensors, are installed and available in accordance with the machinery maintenance scheme for CBM. In addition, a set of baseline readings is to be taken.

(2) Implementation survey

An implementation survey is to be carried out no earlier than 6 months after the installation survey and no later than the first periodical survey (i.e. the Annual Survey, Intermediate Survey or Special Survey specified in **1.1.2-2, Part 2 of the Rules**). At the implementation survey the following **(a)** to **(f)** are to be verified. At this implementation survey, a report which specifies the implementation status of these items is to be submitted to the Society. The baseline data are to be approved by the Society prior to the implementation survey

(a) Baseline data are incorporated in the condition monitoring system.

(b) Condition monitoring and maintenance are conducted in accordance with the machinery maintenance scheme for CBM (including a comparison of condition monitoring results to the baseline data).

(c) Condition monitoring records and machinery maintenance records are available on board the ship and the contents of said records are sufficient as an alternative to the open-up surveys specified in **Table 2.9.1, Part 2, Chapter 9 of the Rules**.

(d) The familiarity of the chief engineer and other designated personnel with the operation of the machinery maintenance scheme for CBM.

(e) Records of any limiting parameters that have been modified.

(f) In cases where there is any failure on machinery, equipment or associated components subject to the scheme, appropriate modification of the machinery maintenance scheme for CBM has been undertaken to address said failure.

(3) Annual survey

An annual survey is to be carried out to verify that the scheme is being correctly operated and maintenance of machinery, equipment or associated components whose condition monitoring and diagnosis results were abnormal since the last survey has been carried out. At the annual survey the following **(a)** to **(g)** are to be verified. In cases where it is deemed necessary by the Surveyor (in consideration of the results of this verification) open-up examinations, function tests, confirmatory tests and readings of condition monitoring parameters may be required as far as practicable. In addition, condition monitoring records and maintenance records are to be available onboard ships.

(a) The results of condition monitoring and diagnosis (including confirmation of maintenance records and general inspections) of machinery, equipment and associated components subject to the scheme are good.

(b) Condition monitoring systems and maintenance management systems work effectively and are in good condition.

(c) Records of any limiting parameters that have been modified since the last survey

(d) Written details of breakdowns or malfunctions

(e) The familiarity of the chief engineer and other designated personnel with the operation of the machinery maintenance scheme for CBM.

(f) In cases where there is a failure of machinery, equipment or associated components

subject to the scheme, appropriate modification of the machinery maintenance scheme for CBM has been undertaken based to address said failure.

(g) The following documents are available on board ships

i) Documents specified in -**4(1)** and **(2)**

ii) Maintenance instructions issued by manufacturers or shipyards

iii) Condition monitoring records and initial obtained baseline data specified in -**5(5)**

iv) Machinery maintenance records specified in -**5(6)**

v) Reference documents (trend investigation procedures, etc.)

vi) Records of changes to software systems and parameters

vii) Sensors calibration records / certification / status

(4) Occasional Survey

Any damage to machinery, equipment or associated components subject to the scheme or any abnormality observed by the condition monitoring and diagnosis is to be reported to the Society immediately according to an approved machinery maintenance scheme for CBM. Upon review of the reports, the Society may request an occasional survey if necessary. Any machinery part that is damaged and subsequently replaced by a spare part is to be retained on board where possible until examined by the Surveyor.

7 Cancellation of CBM

The Society may cancel all or part of approval for CBM scheme when it is considered difficult to continue CBM scheme for any of the following reasons. In such cases, items which have been monitored under the scheme since the last survey are to be subjected to surveys deemed appropriate by the Society.

(1) It is found that CBM scheme is not operated in accordance with the approved scheme

(2) Damages or deficiencies found on items covered by CBM scheme have not been rectified by the due date

(3) When the shipowner or ship management company has been changed

(4) When the class of the ship has been transferred

(5) When the shipowner or ship management company requests the cancellation of approval

(6) When deemed appropriate by the Society (e.g. a critical deficiency in the condition monitoring system is not expected to be rectified.)

Part 7 MACHINERY INSTALLATIONS

Chapter 1 GENERAL

1.5 Tests

Paragraph 1.5.1 has been added as follows.

1.5.1 Shop Tests

The wording "survey methods which it considers to be appropriate" in **1.5.1, Part 7 of the Rules** means survey methods which the Society considers to be able to obtain information equivalent to that obtained through traditional ordinary surveys where surveyor is in attendance, notwithstanding any of the requirements in this Part.

Part 8 ELECTRICAL INSTALLATIONS

Chapter 1 GENERAL

1.2 Testing

1.2.1 Shop Tests

Sub-paragraph -1 has been amended as follows.

1 The wording "survey methods which it considers to be appropriate" in **1.2.1-1, Part 8 of the Rules** and the wording "tests for any equipment with small capacities as specified in **(4)** and **(5)** are to be conducted as deemed appropriate by the Society" specified in **1.2.1-1, Part 8 of the Rules** mean to be in accordance with the following **(1)** and **(2)** respectively:

(1) The wording "survey methods which it considers to be appropriate" means survey methods which the Society considers to be able to obtain information equivalent to that obtained through traditional ordinary surveys where surveyor is in attendance, notwithstanding any of the requirements in this Part.

(2) The wording "tests for any equipment with small capacities as specified in **(4)** and **(5)** are to be conducted as deemed appropriate by the Society" means those shop tests for electrical motors whose capacities at continuous ratings are less than 100 *kW* and controlgears of those motors may be substituted for by manufacturer tests. In such cases, submission or presentation of test records may be required by the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

1. The effective date of the amendments is 1 July 2021.

Amendment 1-3

Part 8 ELECTRICAL INSTALLATIONS

Chapter 2 ELECTRICAL INSTALLATIONS AND SYSTEM DESIGN

2.4 Rotating Machines

Title of Paragraph 2.4.5 has been amended as follows.

2.4.5 Overload and Overcurrent Capability

Paragraph 2.4.15 has been amended as follows.

2.4.15 Shop Tests

1 (Omitted)

2 Procedures, etc. for omitting temperature rise tests, overcurrent or excess torque tests, and steady short-circuit tests (hereinafter referred to as "temperature rise tests, etc."), are to comply with the following:

(1) Scope

Rotating machines to which **2.4.15-1, Part 8 of the Rules** applies and for which temperature rise tests, etc. for the same type of rotating machines are applied are to be recognized as being acceptable products in view of the results of tests and inspections previously carried out by the Society when they are products manufactured at plants according to quality control standards approved by the Society in accordance with **1.2.1-3, Part 8 of the Rules**.

(2) Application

Applications for omission of temperature rise tests, etc. are to be submitted in duplicate for each manufacturing plant to the Society branch office in charge of the required testing. The branch office is to examine the application and, in those cases where deemed appropriate, stamp one of copies of the submitted application with its seal of acceptance (i.e. the branch office stamp) and then return the stamped copy to the applicant.

(3) Representative machine tests

Prior to accepting the omission of temperature rise tests, etc., for products for which the application referred to in **(2)** above is submitted, all specified tests are to be carried out for a representative machine in the presence of the Surveyors, and a corresponding representative machine tests report is to be prepared. In addition to the standard measurement items, representative machine test reports are to contain those items related to the temperature rise and the definition of the same type specified in **-1** above.

(4) Representative machine test reports

The Surveyors are to examine the test reports specified in **(3)** above and, in those cases where deemed appropriate, sign them and require the quality control manager of the manufacturing plant to keep them together with the copy of the application specified in **(2)** above. In cases where the margin between the actual measured temperature rise value of the representative machine and the specified standard measured value is small, it is to be confirmed that there is no possibility of any of the subsequently produced units exceeding the specified value due to machine differences. For cases where the same or a similar model was approved in the past, confirmation may be made by examining prior test reports; however, for cases where a model is being produced for the first time, confirmation is to be made by carrying out temperature rise tests, etc. on additional units.

(5) Individual machine tests

The consent of the party ordering the machines is to be obtained by manufacturer in cases where the omission of temperature rise tests, etc. is permitted for each subsequent unit produced of a machine for which representative machine tests are passed. In addition, the quality control manager is to make a checklist (such as that shown in **Table 8.2.4.15-1**) for each unit so that it is possible to easily confirm that the unit is of the same type as the representative machine. (However, checklist need not be provided when it is clear that the same type is used; for example, in the case of main generators for the same ship in which all required tests are carried out for a single generator, and temperature rise tests, etc. are omitted for the other generators.)

(6) Individual machine test reports

The temperature rise test results for a representative machine are to be entered into the corresponding column of the individual machine test report, and the wording "*TYPE TESTED*" is to also be entered or stamped next to results.

(7) Checklists

The checklist shown in **Table 8.2.4.15-1** is an example of checklist that allows easy confirmation of an individual machine being of the same type as a representative machine in the individual testing of a product. Appropriate checklists are to be prepared by the manufacturer after discussion among relevant parties according to the type of the product to be tested with reference made to **Table 8.2.4.15-1**. In addition, values for entries with checkboxes in the "Identical" column only are required to be the same as that of the representative machine, whereas the values for entries with checkboxes in both the "Identical" and "Almost identical" column may be equal to or less than those of the representative machine.

~~2~~**3** (Omitted)

~~3~~**4** (Omitted)

~~4~~**5** (Omitted)

~~5~~**6** Notwithstanding -~~4~~5 above, sparks which cause any scorching or damage to the commutator surfaces or which wear out or break up brushes during temperature tests and overload tests are deemed to be harmful.

~~6~~**7** (Omitted)

Table 8.2.4.15-1 has been added as follows.

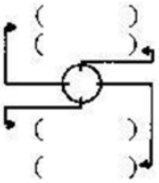
Table 8.2.4.15-1 Checklist for Rotating Machines

CHECKLIST for omission of temperature rise tests, overcurrent or excess torque tests, and steady short-circuit tests

Date: _____

Nippon Kaiji Kyokai _____ Branch Office Manufacturer name: _____

Representative rotating machines:

Factory		Representative rotating machines test date: _____
Item □ Generator □ Motor Test result list no.: _____ Drawing no.: _____	Capacity:____[*kVA/kW*] Voltage:____[*V*] Load current:____[*A*] Number of poles:____[*P*] Revolutions:____[*r.p.m*] Thermal class:_____Degree of protection:_____ Principal dimensions: Shaft length:____[*mm*] Shaft axis height:____[*mm*] Inlet / outlet area:_____/_____[m^2] Air gap measurements [*mm*] Ventilation method:_____ Inlet / outlet filter: Available / Not available Air cooler: Available / Not available Cooling area:____[m^2] Cooling water flow rate:____[m^3/h] Winding resistance (75°C):____[Ω] Air volume:_____[m^3/h] Rated load revolution (or slip):____[*r.p.m*] Total weight:_____[*kg*]	

The items for omission of temperature rise tests, etc. in **2.4.15-1, Part 8 of the Rules** [compared to representative rotating machines]

(Check if applicable)

	Ship builder: _____ Hull number: _____ Shipowner: _____ Intended use: _____ Number of units: _____ Serial number(s): _____	Identical	Almost identical
1	Capacity:_____[*kVA/kW*] Voltage:____[*V*] Load current:____[*A*] Number of poles:____[*P*] Revolutions:____[*r.p.m*] Thermal class:_____Degree of protection:_____	□	
2	Shaft length: [*mm*] Shaft axis height: [*mm*] Air gap measurements to [*mm*]	□	
3	Ventilation method:_____Inlet / outlet area:____/____[m^2] Inlet / outlet filter: Available / Not available Air cooler: Available / Not available Cooling area:____[m^2] Cooling water flow rate:____[m^3/h]	□	
4	Shaft material:_____Machining method, accuracy and degree of finishing Shaft bearings or shaft bearing metal type Fans and fans guide structures and dimensions Stator core stacking dimensions and structure, coil insulation, and processing method	□ □ □ □	
5	Terminal arrangement and shape, cable connection parts structure, wiring type and structure Rotor balancing test	□ □	 □
6	Results of bearing metal mating results Winding resistance measurement results (75°C):____[Ω] No load current value____[*A*] Air volume measurement results:_____[m^3/h] Rated load revolution (or slip):____[*r.p.m*]	□ □ □ □	□ □ □ □
7	The use of subcontracted products is managed by incoming inspection standards Key working standards, equipment, and operator skills with respect to the production method remain the same or have been improved. The facilities, procedures and criteria for testing and inspection are under sufficient management.	□ □ □	

As stated above, we certify that the _____, which are tested in this time, is of the same type, manufactured at the same factory and by the same production method as the representative rotating machines mentioned above.

Testing and Inspection Director:_____

2.5 Switchboards, Section Boards and Distribution Boards

Paragraph 2.5.8 has been added as follows.

2.5.8 Instrument Scales

"Instrument scales" means the effective measuring range. When an extended scale is required for the starting current as in the case of ammeters for motors, it is not necessary to apply the requirements given in **2.5.8, Part 8 of the Rules** to the extended part.

Paragraph 2.5.10 has been added as follows.

2.5.10 Shop Tests

1 The wording "switchboard which is produced in series having the identical type with its first unit" referred to in **2.5.10-1, Part 8 of the Rules** means those switchboards which are manufactured according to the same process at the same plant and which comply with the following requirements:

(1) The outer dimensions, internal volume and ventilation method of generator panels (including synchronization panels) are almost the same.

(2) The types and ratings of circuit breakers and switches for generators are the same, and the dimensions, layout and structure of busbars and connecting conductors are almost the same.

(3) The load currents of busbars and connecting conductors are almost the same or less.

(4) The layout of the mounting devices in the board that generate heat (e.g. transformers, relays, fuses, and resistors) is almost the same, and the total power consumption is almost the same or less.

(5) The structure and arrangement of the terminals are almost the same except for the control circuits, instrument circuits, etc.

2 The procedures for omitting the temperature rise tests specified in **2.5.10-1, Part 8 of the Rules** are the same as those specified for rotating machines in **2.4.15-2(1) to (7)**; however, the term "rotating machines" is to be read as "switchboards". In addition, the sample checklist given in **2.4.15-2(5)** is to be in accordance with **Table 8.2.5.10-1.**

3 The wording "auxiliary apparatus" referred to in **2.5.10-4, Part 8 of the Rules** means the indicator lights, small transformers, relays, etc. which are connected between different poles or phases.

4 In the requirements given in **2.5.10-4, Part 8 of the Rules**, instruments and auxiliary apparatuses can be removed for high voltage tests of switchboards. However, it is necessary to carry out a high voltage test on individual instrument and auxiliary apparatus, and to comply with the requirements given in **2.5.10-4, Part 8 of the Rules**.

5 Except where otherwise specified, the requirements given in **2.5.10-4, Part 8 of the Rules** need not be applied to electronic equipment or apparatuses incorporated into switchboards that are not directly connected to the main circuit of the switchboard and the main power distribution circuits on board the ship.

Table 8.2.5.10-1 has been added as follows.

Table 8.2.5.10-1 Checklist for Switchboards

CHECKLIST for omission of temperature rise tests

Date: _____

Nippon Kaiji Kyokai _____ Branch Office Manufacturer name: _____

Representative switchboards:

Factory		Representative switchboard test date: _____
Item □ Main switchboard □ Emer. switchboard □ Charging/discharging board Test result list no.: _____ Drawing no.: _____	Configuration: Generator panel No.1,_____,_____Synchronization panels: Available / Not available Generator capacity:____[*kVA/ kW*] Number:_____Rated voltage:_____[*V*] Rated current:_____[*A*] Circuit-breakers for generator: Type_____Rating_____(Manufacturer:_____) Switches: Rated voltage:____[*V*] Rated current:____[*A*] Dimensions:_____x_____x_____[*mm*] (Generator panels including synchronization panels) Internal volume:_____[m^3] Opening area:_____[m^2] In-board mounting devices (transformers, relays, resistors, etc.) total power consumption:_____[*W*] Generator panel (including synchronization panels, but excluding feeder panels) total weight:_____[*kg*]	

The items for omission of temperature rise tests, etc. in **2.5.10-1, Part 8 of the Rules** [compared to representative switchboards]

Ship builder: _____ Shipowner: _____
Intended use: _____ Serial number(s): _____

		(Check if applicable) Identical	Almost identical
1	Configuration: Number of generator panels: Synchronization panels: Available / Not available	□	
2	Circuit-breakers for generator: Type_____Rating_____(Manufacturer:_____) Switches: Rated voltage:_____[*V*] Rated current:_____[*A*]	□	
3	Dimensions:_____x____x_____[*mm*] Internal volume:_____[m^3] Opening area:_____[m^2] Ventilation method:_____	□	□
4	Busbars and connecting conductor dimensions, layout and structure Busbars and connecting conductors load currents Terminals structure and arrangement (except for the control circuits, instrument circuits, etc.)	□ □ □	□ □ □
5	In-board mounting devices (transformers, relays, resistors, etc.) arrangement Total power consumption:_____[*W*]	□ □	□ □
6	The use of subcontracted products is managed by incoming inspection standards Key working standards, equipment, and operator skills with respect to the production method remain the same or have been improved. The facilities, procedures and criteria for testing and inspection are under sufficient management.	□ □ □	

As stated above, we certify that the _____, which are tested in this time, is of the same type, manufactured at the same factory and by the same production method as the representative switchboards mentioned above.

Testing and Inspection Director:_____

Section 2.8 has been added as follows.

2.8 Controlgears for Motors and Magnetic Brakes

2.8.1 Controlgears for Motors

The wording "their equivalent" in **2.8.1-5, Part 8 of the Rules** means those methods in which each pole fuse of the main circuit can be easily removed and stored by the person in charge is permitted.

2.8.4 Shop Tests

1 The wording "each controlgear and magnetic brakes which is produced in series having identical type with its first unit" in **2.8.4-1, Part 8 of the Rules** means those controlgears and magnetic brakes which are manufactured according to the same process at the same plant and which comply with the following:

(1) Outer dimensions, internal volume and ventilation method of containers such as boards and boxes are to be almost the same.

(2) The types and ratings of circuit breakers, switches, and electromagnetic contactors of the main circuit are to be the same, and the dimensions, layout, connections, and terminal structures of the main circuit conductors are to be almost the same.

(3) The load current of the main circuit is to be almost the same or less.

(4) The layout of the mounting devices in the board that generate heat such as transformers, relays, fuses, and resistors are to be almost the same, and the total power consumption is to be almost the same or less.

2 The procedure for omitting the temperature rise tests, etc. specified in **2.8.4, Part 8 of the Rules** is the same as that specified for rotating machines in **8.2.4.15-2(1)** to **(7)**; however, the term "rotating machines" is to be read as "controlgears for motors". In addition, the sample checklist given in **8.2.4.15-2(7)** is to be in accordance with **Table 8.2.8.4-1**.

3 High voltage tests are to be in accordance with **8.2.5.10-3** to **-5** as far as practicable.

Table 8.2.8.4-1 has been added as follows.

Table 8.2.8.4-1 Checklist for Starters

CHECKLIST for omission of temperature rise tests

Date: _____

Nippon Kaiji Kyokai _____ Branch Office Manufacturer name: _____

Representative starters:

Factory		Representative starters test date: _____
Item □ Starters □ A.C. motor □ D.C. motor □ Controlgear Test result list no.: _____ Drawing no.: _____	Capacity: _____ [*kW*] Rated voltage: _____ [*V*] Control circuit voltage: _____ [*V*] Main circuit load current: _____ [*A*] Motor starting system: Direct input / Star-delta / Voltage drop External dimensions: _____ x _____ x _____ [*mm*] Opening area: _____ [m^2] Main circuit-breakers: Type _____ Rating _____ (Manufacturer: _____) Electromagnetic contactors: Type _____ Rating _____ (Manufacturer: _____) In-board mounting devices (Transformers, relays, etc.) total power consumption: _____ [*W*]	

The items for omission of temperature rise tests, etc. in **2.8.4-1, Part 8 of the Rules** [compared to representative starters]

Ship builder: _____ Hull number: _____
Intended use: _____ Serial number(s): _____

		(Check if applicable) Identical	Almost identical
1	Capacity: _____ [*kW*] Rated voltage: _____ [*V*] (Control circuit voltage: _____ [*V*]) Degree of protection: _____ Motor starting system: Direct input / Star-delta / Voltage drop	□	
2	Main circuit load current: _____ [*A*]	□	□
3	Main circuit-breakers (or electromagnetic contactor) type and rating (manufactures)	□	
4	Cooling vent opening arear: _____ [m^2]	□	
5	Containers (boards, boxes, etc.) external dimensions, internal volume and ventilation method	□	□
6	Main circuit conductor dimensions, layout, connections and terminal structure	□	□
7	In-board mounting devices (Transformers, relays, resistors, etc.) arrangement Total power consumption: _____ [*W*]	□ □	□ □
8	Rectifiers [selenium, semiconductors, other: _____] and rating Reactors type and rating	□	
9	The use of subcontracted products is managed by incoming inspection standards Key working standards, equipment, and operator skills with respect to the production method remain the same or have been improved. The facilities, procedures and criteria for testing and inspection are under sufficient management.	□ □ □	

As stated above, we certify that the _____, which are tested in this time, is of the same type, manufactured at the same factory and by the same production method as the representative starters mentioned above.

Testing and Inspection Director: _____

2.10 Transformers for Power and Lighting

2.10.4 Modification of the Limits of Temperature Rise

The wording "in those cases where deemed appropriate by the Society" in **2.10.4-2, Part 8 of the Rules** means that limits of temperature rise may be modified as follows:

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

(1) In cases where forced cooling is provided and the temperatures of cooling water at the inlets of air coolers are not higher than 32 °C, limits of temperature rise may be set 13 *K* higher than those limits specified in **Table 8.2.15~~5~~6, Part 8 of the Rules**.

Paragraph 2.10.6 has been added as follows.

2.10.6 Shop Tests

1 The wording "transformers which are produced in a series of identical types" referred to in **2.10.6-1, Part 8 of the Rules** means those transformers which are the same in terms of rated capacity, voltage, current, dimension, method for cooling and thermal class, and which are produced at the same factory by the same production method.

2 The procedures for omitting the temperature rise tests specified in **2.10.6-1, Part 8 of the Rules** are the same as those specified for rotating machines in **2.4.15-2(1)** to **(7)**; however, the term "rotating machines" is to be read as "transformers". In addition, the sample checklist given in **2.4.15-2(5)** is to be in accordance with **Table 8.2.10.6-1**.

3 Calculations for voltage regulation specified in **2.10.6-3, Part 8 of the Rules** may be performed using the following method.

$$\text{Voltage regulation (\%)} = q_r + \frac{{q_x}^2}{200}$$

q_r : voltage drop (%) caused by register

Single-phase: $q_r = \frac{P_{75}}{EI} \times 100$ or $q_r = \frac{P_{115}}{EI} \times 100$

Three-phase: $q_r = \frac{P_{75}}{\sqrt{3}EI} \times 100$ or $q_r = \frac{P_{115}}{\sqrt{3}EI} \times 100$

q_x : voltage drop (%) caused by reactance

$$q_x = \frac{E_x}{E} \times 100$$

P_t : load loss (*W*) to rated capacity at *t* ℃

P_{75} : load loss (*W*) to rated capacity converted to 75 ℃

P_{115}: load loss (*W*) to rated capacity at 115 ℃

E_z : Impedance voltage (*V*), namely, the voltage at primary terminals when measuring P_t

E_x : Reactance voltage (*V*)

Single-phase: $E_x = \sqrt{{E_z}^2 - (\frac{P_t}{I})^2}$

Three-phase $E_x = \sqrt{{E_z}^2 - (\frac{P_t}{\sqrt{3}I})^2}$

E : Rated primary voltage (*V*)

I : Rated primary current (*A*)

In the above equation, P_{75} applies to insulating materials of thermal classes *A*, *E* and *B* of insulating materials, while P_{115} applies to insulating materials of thermal classes *F* and *H*.

Table 8.2.10.6-1 has been added as follows.

Table 8.2.10.6-1 Checklist for Transformers

CHECKLIST for omission of temperature rise tests

Date: _____

Nippon Kaiji Kyokai _____ Branch Name of manufacturer: _____

Representative transformer:

Factory		Test date for representative transformer: _____
Item Test result list no.: _____ Drawing no.: _____	Total capacity: _____ [*kVA*] Total number of transformers: _____ (_____ [phase(s)], _____ [*kVA*]) Voltage(primary / secondary): _____ / _____ [*V*] Current (primary / secondary): _____ / _____ [*A*] Thermal class: _____ Dimensions of housing: _____×_____×_____ [*mm*] (Total number of transformers: _____) Area of opening: _____ [m^2] No-load loss / No-load current: _____ [*W*] / _____ [*A*] (%) Load loss / Impedance voltage: _____ [*W*] / _____ [*V*] (%) Total weight:_____ [*kg*]	

The items for omission of temperature rise tests in **2.10.6-1, Part 8 of the Rules** [compared to representative transformer]

(Check if applicable)

	Ship builder: _____ Ship number: _____ How to use: _____ Product number _____	Identical	Almost identical
1	Total capacity: _____ [*kVA*] Total number of transformers: _____ (_____ [phase(s)], _____ [*kVA*]) Voltage (primary / secondary): _____ / _____ [*V*] Current (primary / secondary): _____ / _____ [*A*] Thermal class: _____, Degree of protection: _____	☐	
2	Cooling method: _____, Dimensions of housing: _____×_____×_____ [*mm*]	☐	
3	Area of opening: _____ [m^2], Total weight:_____ [*kg*]	☐	
4	Material for iron core, composition, production method and accuracy Sizes and species of conductors used for string Types and processing methods for insulating materials (impregnation method, drying method, etc.) Construction of terminals, processing methods for terminals of internal wiring	☐ ☐ ☐ ☐	
5	Resistance measurements for each winding (primary / secondary): _____ / _____ [Ω] No-load loss / No-load current: _____ [*W*] / _____ [*A*] (%) Load loss / Impedance voltage: _____ [*W*] / _____ [*V*] (%)	□ □ □	□ □ □
6	The use of subcontracted products is managed by incoming inspection standards Key working standards, equipment, and operator skills with respect to the production method remain the same or have been improved. The facilities, procedures and criteria for testing and inspection are under sufficient management.	☐ ☐ ☐	

As stated above, we certify that the _____ , which are tested in this time, is of the same type, manufactured at the same factory and by the same production method as the representative transformer mentioned above.

Testing and Inspection Director: _____

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

1. The effective date of the amendments is 1 July 2021.

2. Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction is before the effective date.