RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

Part I Ships Operating in Polar Waters, Polar Class Ships and Ice Class Ships

2021 AMENDMENT NO.1

Rule No.29 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.29 30 June 2021
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

Amendment 1-1

Part I SHIPS OPERATING IN POLAR WATERS, POLAR CLASS SHIPS AND ICE CLASS SHIPS

Chapter 8 ICE CLASS SHIPS

8.4 Fundamental Requirements of Machinery

8.4.3 Rudders and Steering Arrangements*

Sub-paragraphs -1 and -2 have been amended as follows.

1 The rudder scantlings of rudder post, rudder stock, pintles, steering gear, etc. are to comply with the requirements in **Chapter 3** of **Part C** and **Chapter 15, Part D**. ~~In this case~~ However, for I*A Super*, I*A*, I*B* and I*C* ice class ships, the maximum service speed of the ship to be used in these calculations is not to be taken less than that given in the **Table I8.13**.
2 For I*A Super*, I*A*, I*B* and I*C* ice class ships, ~~T~~the local scantlings of rudders are to be determined assuming that the whole rudder belongs to the ice belt. The rudder plating and frames are to be designed using the ice pressure for the plating and frames in the midbody region.
3 For I*A Super* and I*A* ice class ships, the rudder stock and the upper part of the rudder are to be protected from direct contact with intact ice by either an ice knife that extends blew the *LIWL* or by equivalent means. Special consideration is to be given to the design of the rudder and the ice knife for ships with flap-type rudders.
4 For I*A Super* and I*A* ice class ships, the rudders and steering arrangements are to be designed as follows to endure the loads that work on the rudders by the ice when backing into an ice ridge.
(1) Relief valves for hydraulic pressure are to be installed.
(2) The components of the steering gear (e.g. rudder stock, rudder coupling, rudder horn etc.) are to be dimensioned to withstand loads causing yield stresses within the required diameter of the rudder stock.
(3) Suitable arrangements such as rudder stoppers are to be installed.

Table I8.13 has been amended as follows.

Table I8.13 Minimum Speed

Class	Speed (*kt*)
I*A Super*	20
I*A*	18
I*B*	16
I*C*	14
~~I*D*~~	~~14~~

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 of the applicant.

Amendment 1-2

Chapter 8 ICE CLASS SHIPS

8.6 Design of Propellers and Propulsion Shafting Systems (Ice Classes I*A Super*, I*A*, I*B* and I*C*)

Paragraph 8.6.5 has been amended as follows.

8.6.5 Azimuthing Main Propulsors*

With respect to the azimuthing main propulsors, the followings are to be complied with in addition to the requirements specified in **8.6.1**:

((1) is omitted.)

(2) Extreme ice impact loads

(a) The thruster is to withstand the loads occurring when the design ice block defined in **Table I8.14** impacts on the thruster body when the ship is sailing at a typical ice operating speed. Load cases for impact loads are given in **Table I8.25**. The contact geometry is estimated to be hemispherical in shape. If the actual contact geometry differs from the shape of the hemisphere, a sphere radius is to be estimated so that the growth of the contact area as a function of penetration of ice corresponds as closely as possible to the actual geometrical shape penetration.

(b) The ice impact contact load F_{ti} is to be calculated using the following formula. The related parameter values are given in **Table I8.26**. The design operation speed in ice can be derived from **Table I8.27** and **I8.28**, or the ship in question's actual design operation speed in ice can be used. For the pulling propeller configuration, the longitudinal impact speed is used for load case T2 (See **Table I8.25**), impact on hub; and for the pushing propeller unit, the longitudinal impact speed is used for load case T1 (See **Table I8.25**), impact on thruster end cap. For the opposite direction, the impact speed for transversal impact is applied.

$$F_{ti} = C_{DMI} 34.5 R_c{}^{0.5} (m_{ice} v_s{}^2)^{0.333} \quad (kN)$$

where

R_c: Impacting part sphere radius (See **Fig. I8.14**)

m_{ice}: Ice block mass (kg)

v_s: Ship speed at the time of contact(m/s)

C_{DMI}: Dynamic magnification factor for impact loads. If unknown, C_{DMI} is to be taken from **Table I8.26**.

For impacts on non-hemispherical areas, such as the impact on the nozzle, the equivalent impact sphere radius R_{ceq} instead of R_c is to be used, where R_{ceq} is estimated using the equation below.

$$R_{ceq} = \sqrt{\frac{A}{\pi}} \ (m)$$

where

A: The max contact area that the ice block can have. When determining A, the dimensions of the relevant part of the thruster as well as the size of the ice block need to be considered.

If the $2R_{ceq}$ is greater than the ice block thickness, ~~the radius~~ R_{ceq} is set to half of the ice block thickness. For the impact on the thruster side, the pod body diameter can be used as a basis for determining the radius. For the impact on the propeller hub, the hub diameter can be used as a basis for the radius.

((3) to (5) are omitted.)

EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

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

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

Part I Ships Operating in Polar Waters, Polar Class Ships and Ice Class Ships

2021 AMENDMENT NO.1

Notice No.28 30 June 2021

Resolved by Technical Committee on 27 January 2021

Notice No.28 30 June 2021
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

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

I8 ICE CLASS SHIPS

I8.6 Design of Propellers and Propulsion Shafting Systems (Ice Classes I*A Super*, I*A*, I*B* and I*C*)

Paragraph I8.6.5 has been added as follows.

I8.6.5 Azimuthing Main Propulsors

The value of "*A*" specified in **8.6.5(2)(b), Part I of the Rules** according to load cases given in **Table I8.25, Part I of the Rules** is to comply with following **(1)** to **(3)** respectively:

(1) In the case of T1c (non-symmetric longitudinal ice impact on nozzle), the value of "*A*" is the nozzle thickness (H_{nz}) × the contact height (H_{ice}).

(2) In the case of T3a (symmetric lateral ice impact on thruster body), the value of "*A*" is the area of the circle whose diameter is equal to the pod body diameter.

(3) In the case of T3b (non-symmetric lateral ice impact on thruster body or nozzle), the followings are to apply.

(a) In the case of ice impact on thruster body, the value of "*A*" is the area of the circle whose diameter is equal to the pod body diameter.

(b) In the case of ice impact on nozzle, the value of "*A*" is the area of the circle whose diameter is equal to the nozzle length (L_{nz}).

EFFECTIVE DATE AND APPLICATION

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