Machinery of Polar Class Ships

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part I

Reason for Amendment

IACS Unified Requirements (UR) I3(Rev.2) specifies requirements for the machinery of Polar Class Ships, and these requirements have already been incorporated into the NK Rules.

IACS adopted UR I3(Rev.2, Corr.1) in December 2024 to correct some descriptive errors found in formulae and other things in UR I3(Rev.2).

Accordingly, relevant requirements are amended based on the UR I3 (Rev.2, Corr.1).

Outline of Amendment

Amends formula for determining the number of ice load cycles per propeller blade.

Effective Date and Application

Effective date of this amendment is 1 January 2026.

ID:DD25-16

Amended-Original Requirements Comparison Table (Machinery of Polar Class Ships)

Amended	Original	Remarks

RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS
 	
Part I SHIPS OPERATING IN POLAR WATERS, POLAR CLASS SHIPS AND ICE CLASS SHIPS
 	
ANNEX 1   SPECIAL REQUIREMENTS FOR THE MATERIALS, HULL STRUCTURES, EQUIPMENT AND MACHINERY OF POLAR CLASS SHIPS
 	
Chapter 4   MACHINERY INSTALLATIONS
 	
4.4 Design Loads
 	
4.4.8   Number of Ice Loads
 	
1   The number of load cycles per propeller blade in the load spectrum is to be determined according to the following formula:
$$N_{ice} = k_1 k_2 k_3 N_{class} \frac{n_n}{60}$$
where
    N_{class}: Reference number of loads for ice classes, as specified in **Table 4.4.8-1**
    n_n: Nominal propeller rotational speed at maximum continuous revolutions in free
	RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS
	
	Part I SHIPS OPERATING IN POLAR WATERS, POLAR CLASS SHIPS AND ICE CLASS SHIPS
	
	ANNEX 1 SPECIAL REQUIREMENTS FOR THE MATERIALS, HULL STRUCTURES, EQUIPMENT AND MACHINERY OF POLAR CLASS SHIPS
	
	Chapter 4 MACHINERY INSTALLATIONS
	
	4.4 Design Loads
	
	4.4.8 Number of Ice Loads
	
	1 The number of load cycles per propeller blade in the load spectrum is to be determined according to the following formula:
	$$N_{ice} = k_1 k_2 N_{class} \frac{n_n}{60}$$
	where
	    N_{class} : Reference number of loads for ice classes, as specified in **Table 4.4.8-1**
	    n_n : Nominal propeller rotational speed at maximum continuous revolutions in free
		UR I3(Corr.1) Para.5.3.9
		
		Same formula as Chapter 8, 8.5.5-2, Part I of the Rules

Amended-Original Requirements Comparison Table (Machinery of Polar Class Ships)

Amended	Original	Remarks
running condition (*rpm*) k_1: Propeller location factor, as specified in **Table 4.4.8-2** k_2: The submersion factor k_2 is determined from the following equation. $$k_2 = \begin{cases} 0.8 - f & : f < 0 \\ 0.8 - 0.4f & : 0 \le f \le 1 \\ 0.6 - 0.2f & : 1 < f \le 2.5 \\ 0.1 & : f > 2.5 \end{cases}$$ where $$f = \frac{h_0 - H_{ice}}{D/2} - 1$$ h_0: The depth of the propeller centreline at the lower ice waterline (*LIWL*) of the ship (*m*). If h_0 is not known, $h_0 = \underline{D/2.}$ $\underline{k_3\text{: Propulsion machinery type factor, to be taken}}$ $\underline{\text{as follows.}}$ $\underline{\text{Fixed propulsors: } k_3 = 1}$ $\underline{\text{Azimuthing propulsors: } k_3 = 1.2}$	running condition (*rpm*) k_1: Propeller location factor, as specified in **Table 4.4.8-2** k_2: The submersion factor k_2 is determined from the following equation. $$k_2 = \begin{cases} 0.8 - f & : f < 0 \\ 0.8 - 0.4f & : 0 \le f \le 1 \\ 0.6 - 0.2f & : 1 < f \le 2.5 \\ 0.1 & : f > 2.5 \end{cases}$$ where $$f = \frac{h_0 - H_{ice}}{D/2} - 1$$ h_0: The depth of the propeller centreline at the lower ice waterline (*LIWL*) of the ship (*m*). If h_0 is not known, $h_0 = 2/D.$	Typographical correction UR I3(Corr.1) Para.5.3.9 Same as Chapter 8, 8.5.5-2, Part I of the Rules
EFFECTIVE DATE AND APPLICATION 1. The effective date of the amendments is 1 January 2026.		