Amendments to the "Rules for Marine Operations related to Sea Transport of Special Cargoes"

Effective from 1/1/2025

List of the amendments:

Part/Chapter/Paragraph amended	Reason
Pt B, Ch 5, [1.4.2], [1.5.1], [1.5.2], [1.5.3], Tab 4, [2.2.2], Tab 10	to update the towing arrangement requirements (Pt B, Ch 5) to: • introduce the forward speed in the calculation of towing pull, in weather restricted conditions • introduce minor corrections in formulas of test load for weak links/fuses • better clarify units of measurement in some formulas. (Prop 268)

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CHAPTER 5 Towing Arrangement

1 General

1.1 Application

1.1.1 This item covers towing operations intended for commercial and industrial purpose. Salvage or rescue towing services may be subject to special consideration.

1.2 General requirements

1.2.1 Towing operations shall be planned and executed according to the minimum requirements and criteria of this Chapter for the assessment of the adequacy of towing lines, based on design data and conditions such as tug pull, weather limitations, etc.

1.2.2 For towing operations where the distance between designated ports of refuge or safe anchoring requires more than 24 hours of navigation, guidelines can be found in IMO MSC/Circ.884.

1.2.3 For details and aspects not covered by these Rules, guidelines can be found in Clause 12 of ISO 19901-6:2009.

1.3 Definitions

1.3.1 The abbreviations used in this chapter have the following meaning:

BP: documented continuous bollard pull of tug

RBP: required bollard pull for the specific voyage

R_t: total resistance foreseen for the voyage

MBL: minimum breaking load

TL: Test load

SWL: safe working load

Hs: significant wave height, in m

1.4 Towing plan

1.4.1 The tug Master shall provide a towing plan drawing (see example in Appendix 2) showing position, identification and capacity (MBL or SWL or TL) of each component of the towing line (wires, chains, shackles, triple plate, etc.), including bridle legs and, at owner's request or for unrestricted operations, relevant connections to the tow. The towing plan must report also the value BP, RBP and the emergency line, where applicable.

1.4.2 The continuous bollard pull BP of the towing vessel(s) involved is to be sufficient to ~~maintain station keeping of~~ perform the tow in the design environmental conditions, therefore BP must not be lower than RBP.

1.4.3 All the elements in the towing plan must have adequate capacity with respect to BP except for oversized tug according to [2.5].

1.5 Calculation of required towing pull

1.5.1 The required pull RBP is to be calculated by means of recognized formulas, based on the design combination of wind, wave, ~~and~~ current~~, considering zero~~and forward speed.

1.5.2 For weather unrestricted operations, RBP must be related at least to the following environmental conditions acting in the same direction with zero forward speed:

Wind speed: 20 m/s

Significant wave height: 5 m

Current speed: 0,5 m/s.

For weather restricted operations, RBP must be calculated for the limiting environmental conditions defined by the operator, in combination with the forward speed necessary to cover the route (or each leg between sheltered locations) in the foreseen time, under coverage of weather forecast.

1.5.3 For typical pontoons and barges with "box" shape and raked or spoon bow in deep and open water the following formula may be used for the calculation of RBP:

$RBP = R_t / ~~\eta~~\eta \cdot 100$

Where:

$~~\eta~~\eta$: tug efficiency % according to Table 4

$R_t = R_c + R_{wa} + R_{wi}$

Where:

R_c current resistance, to be calculated as follows:

$R_c = \rho \cdot (2{,}89/1000) \cdot (L \cdot B + 2 \cdot (L+B) \cdot T) \cdot V^2$ [kN]

Where:

ρ: ~~sea~~ water density [t / m^3]~~, to be taken as 1,025 t/m^3~~

$V = V_T + V_C$, in m/s

V_T: towing speed, in m/s

V_C: current speed, in m/s

R_{wa}: wave resistance, to be calculated as follows:

$$R_{wa} = \rho \cdot g \cdot Hs^2 \cdot B/16 \text{ [kN]}$$

R_{wi}: wind resistance, to be calculated as follows:

$R_{wi} = (A_C+1,2 \cdot B \cdot (D-T)) \cdot (V_w+V_T)^2)/1600$ [kN]

Where:

D: depth of cargo barge is the distance, in m, measured vertically on the midship transverse section, from the moulded base line to the top of the deck beam at side

V_W: wind speed, in m/s

A_C: exposed frontal area of cargo, in m^2

Table 4: Estimation of tug efficiency

BP (kN)	Tug efficiency η [%]		
	Calm	Hs = 2,0 m	Hs = 5,0 m
BP ≤ 300	80	50 + BP/10	BP/10
300 < BP ≤ 900	80	80	30 + 0,75 · (BP/10 – 30)
BP > 900	80	80	75

1.6 Emergency towing line

1.6.1 For unrestricted towing operations, the tow must be equipped with an emergency towing line sized according to the same criteria and safety factors applicable to the main line.

2 Towing equipment capacity

2.1 Towline Safety Factor

2.1.1 Each component in the towing line, including bridle legs and relevant connections to the tow, must have a documented MBL in excess of BP according to the safety factors reported in Table 5.

Table 5: Towing equipment safety factors

BP (KN)	Safety factor MBL / BP
BP ≤ 400	3,0
400 < BP ≤ 900	3,8 - BP/500
BP > 900	2,0

2.1.2 Components identified by SWL instead of MBL are acceptable if RBP does not exceed SWL, provided that SWL has been defined, by the manufacturer or certification body, considering a safety factor against breaking not lower that those reported in Table 5.

2.1.3 The capacity of cables and ropes with terminal connection forming eye or loopsplices adopting clamps or hand splicing are to be reduced by following correction coefficients:

- 0,90, for wire up to 10 mm
- 0,75, for wire equal to or greater than 40 mm
- for intermediate wire diameters, correction coefficients are to be derived by linear interpolation between 0,90 and 0,75.

2.2 Shackles and connections

2.2.1 All connecting items such as shackles, rings, etc., must have a documented MBL in excess of BP according to the safety factors reported in Table 5, increased by 10%.

2.2.2 All connecting items such as shackles, rings, etc., should have a documented MBL at least 50% in excess of the towline documented ultimate capacity (i.e. MBL of the weakest element in the towline).

2.3 Pennant and weak link/fuse

2.3.1 Pennants must have a documented MBL in compliance with the safety factors reported in Table 5, reduced by factor 0,95.

2.3.2 Weak links or fuses must have a documented MBL in compliance with the safety factors reported in Table 5, reduced by factor 0,9.

2.4 Fibre ropes

2.4.1 If fibre rope elements are used, they must have a documented MBL in excess of BP according to the safety factors reported in Table 5, increased by factor 1,5.

2.4.2 For unrestricted operations, pennants fibre ropes should have a documented MBL in excess of the towline documented ultimate capacity (i.e. MBL of the weakest element in the towline) according to the safety factors reported in Table 6.

Table 6: Fibre rope safety factors

BP (KN)	Safety Factor $MBL_{fibrerope}$ / $MBL_{towline}$
BP ≤ 500	2,0
500 < BP ≤ 1000	2,5 - BP/1000
BP > 1000	1,5

2.5 Oversized tug

2.5.1 If the available towing vessel is oversized with regard to the specific needs of the towage to perform, in particular for weather restricted operations, then the towline capacity may be related to the calculated RBP instead of the available BP. Therefore, the towline safety margin can be assessed by replacing BP with RBP in Table 5.

2.5.2 In this case, the tug must be equipped with a suitable monitoring system (load cell on winch cable, weather forecast service, etc.) so that the Master can properly adjust route and speed in order to avoid any risk of exceeding RBP during the voyage.

2.6 Connecting items on the tow

2.6.1 The towline attachments on the towed object (fairleads, chain brackets, bollards, padeyes, etc.) are to be verified at owner's request or for unrestricted towing operation. They and their supporting structures are to be approved by a QSCS Classification Society (as defined by Tasneef Rules) for a SWL greater than BP for normal towing operation (harbour operation) or equal to the equivalent test loads of Table 8 for other towing operations.

If such approval is not documented, the capacity must be assessed by means of suitable structural calculations, according to Pt B, Ch 10, Sec 4, [3] of the Rules for Classification of Ships, as applicable.

2.7 Multiple towing

2.7.1 In case of multiple towing, in series (Figure 2) or parallel (Figure 3) in Appendix 2, the above criteria apply to each line of the tow, considering the whole BP for each line.

2.8 Limited towing operation

2.8.1 Ring or shackles may be accepted instead of triple plate only for limited towing operation. (e.g. when the distance from a safe anchoring along the route can be covered in less than 6 hours of navigation in the weather conditions expected for the towing operation) or when the towing operation are limited to favourable weather condition (e.g. sea state not more than 3 of Douglas scale, wind not more than 3 of Beaufort scale).

3 Towing equipment testing

3.1 Load test certificates

3.1.1 Each component in the towing line not provided with a MBL certificate should be provided with a test certificate in compliance with the test loads reported in the following tables.

Table 7: Test load for steel wires

BP (KN)	Test load
BP ≤ 400	1,52 · BP
400 < BP ≤ 900	(1,728 - 0,00052 · BP) · BP
BP > 900	1,26 · BP

Table 8: Test load for link elements (chains, triangular plates, etc.)

BP (KN)	Test load
BP≤ 400	1,53 · BP
400 < BP ≤ 800	(1,77 - 0,0006 · BP) · BP
BP > 800	1,29 · BP

Table 9: Test load for shackles

BP (KN)	Test load
BP ≤ 400	1,59 · BP
400 < BP ≤ 900	(1,87 - 0,0007 · BP) · BP
BP > 900	1,24 · BP

Table 10: Test load for weak links/fuses

BP (KN)	Test load
BP ≤ 400	1,~~59~~ 36 · BP
400 < BP ≤ 900	(1,~~87~~ 544 - 0,~~0007~~ 00046 · BP) · BP
BP > 900	1,~~24~~ 13 · BP

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