1260/71/307), as amended, apply to ships the keels of which have been laid or which have been at a similar stage of construction before 1 November 1986. On the owner's request, the requirements of the 1985 Ice Class Rules or the 2008 Ice Class Regulations may, however, be applied to the engine output of such ships.

However, ships of ice class IA Super or IA the keels of which have been laid or which have been at a similar stage of construction before 1 September 2003 shall comply with the requirements in section 3.2.2 or 3.2.4 of the Ice Class Regulations of 2017 not later than 1 January in the year when twenty years have elapsed since the year the ship was delivered.

1.8 Ice classes

Under section 3 of the Act on the Ice Classes of Ships and Icebreaker Assistance (1121/2005), ships are assigned to ice classes as follows:

1. ice class IA Super; ships with such a structure, engine output and other properties that they are normally capable of navigating in difficult ice conditions without the assistance of icebreakers;
2. ice class IA; ships with such a structure, engine output and other properties that they are capable of navigating in difficult ice conditions, with the assistance of icebreakers when necessary;
3. ice class IB; ships with such a structure, engine output and other properties that they are capable of navigating in moderate ice conditions, with the assistance of icebreakers when necessary;
4. ice class IC; ships with such a structure, engine output and other properties that they are capable of navigating in light ice conditions, with the assistance of icebreakers when necessary;
5. ice class II; ships that have a steel hull and that are structurally fit for navigation in the open sea and that, despite not being strengthened for navigation in ice, are capable of navigating in very light ice conditions using their own propulsion machinery;
6. ice class III; ships that do not belong to the ice classes referred to in paragraphs 1-5.

2 ICE CLASS DRAUGHT

2.1 Upper and lower ice waterlines

The upper ice waterline (UIWL) shall be the envelope of the highest points of the waterlines at which the ship is intended to operate in ice. The line may be a broken line.

The lower ice waterline (LIWL) shall be the envelope of the lowest points of the waterlines at which the ship is intended to operate in ice. The line may be a broken line.

2.2 Maximum and minimum draught fore and aft

The maximum and minimum ice class draughts at fore and aft perpendiculars shall be determined in accordance with the upper and lower ice waterlines and the draught of the ship at fore and aft perpendiculars, when ice conditions require the ship to be ice-strengthened, shall always be between the upper and lower ice waterlines.

Restrictions on draughts when operating in ice shall be documented and kept on board readily available to the master. The maximum and minimum ice class draughts fore, amidships and aft shall be indicated in the class certificate. For ships built on or after 1 July 2007, if the summer load line in fresh water is anywhere located at a higher level than the UIWL, the ship's sides are to be provided with a warning triangle and with an ice class draught mark at the maximum permissible ice class draught amidships (see Annex III). Ships built before 1 July 2007 shall be provided with such a marking, if the UIWL is below the summer load line, not later than the first scheduled dry docking after 1 July 2007.

The draught and trim, limited by the UIWL, must not be exceeded when the ship is navigating in ice. The salinity of the sea water along the intended route shall be taken into account when loading the ship.

The ship shall always be loaded down at least to the draught of LIWL amidships when navigating in ice. Any ballast tank, situated above the LIWL and needed to load down the ship to this water line, shall be equipped with devices to prevent the water from freezing. In determining the LIWL, regard shall be paid to the need to ensure a reasonable degree of ice-going capability in ballast. The highest point of the propeller shall be submerged and if possible at a depth of at least h_i below the water surface in all loading conditions. The forward draught shall be at least:

$$(2 + 0.00025\,\Delta)h_i\text{[m], but need not exceed } 4h_i, \qquad (2.1)$$

where

Δ is the displacement of the ship [t] determined from the waterline on the UIWL (see section 2.1). Where multiple waterlines are used for determining the UIWL, the displacement must be determined from the waterline corresponding to the greatest displacement.

h_i is the level ice thickness [m] according to section 4.2.1.

3 ENGINE OUTPUT

3.1 Definition of engine output

The engine output *P* is the total maximum output the propulsion machinery can continuously deliver to the propeller(s). If the output of the machinery is restricted by technical means or by any regulations applicable to the ship, *P* shall be taken as the restricted output. If additional power sources are available for propulsion power (e.g. shaft motors), in addition to the power of the main engine(s), they shall also be included in the total engine output.

3.2 Required engine output for ice classes IA Super, IA, IB and IC

The engine output shall not be less than that determined by the formula below and in no case less than 1,000 kW for ice class IA, IB and IC, and no less than 2,800 kW for IA Super.

3.2.1 Definitions

The dimensions of the ship and some other parameters are defined as follows:

L	m	the length of the ship between the perpendiculars
L_{BOW}	m	the length of the bow
L_{PAR}	m	the length of the parallel midship body
B	m	the maximum breadth of the ship
T	m	the actual ice class draughts of the ship according to 3.2.2
A_{wf}	m^2	the area of the waterline of the bow
α	degree	the angle of the waterline at $B/4$
φ_1	degree	the rake of the stem at the centerline
φ_2	degree	the rake of the bow at $B/4$
ψ	degree	the flare angle calculated as $\psi = \tan^{-1}\left(\frac{\tan\phi}{\sin\alpha}\right)$ using local angles α and φ at each location. For chapter 3, the flare angle is calculated using $\varphi = \varphi_2$
D_P	m	the diameter of the propeller
H_M	m	the thickness of the brash ice in mid channel
H_F	m	the thickness of the brash ice layer displaced by the bow

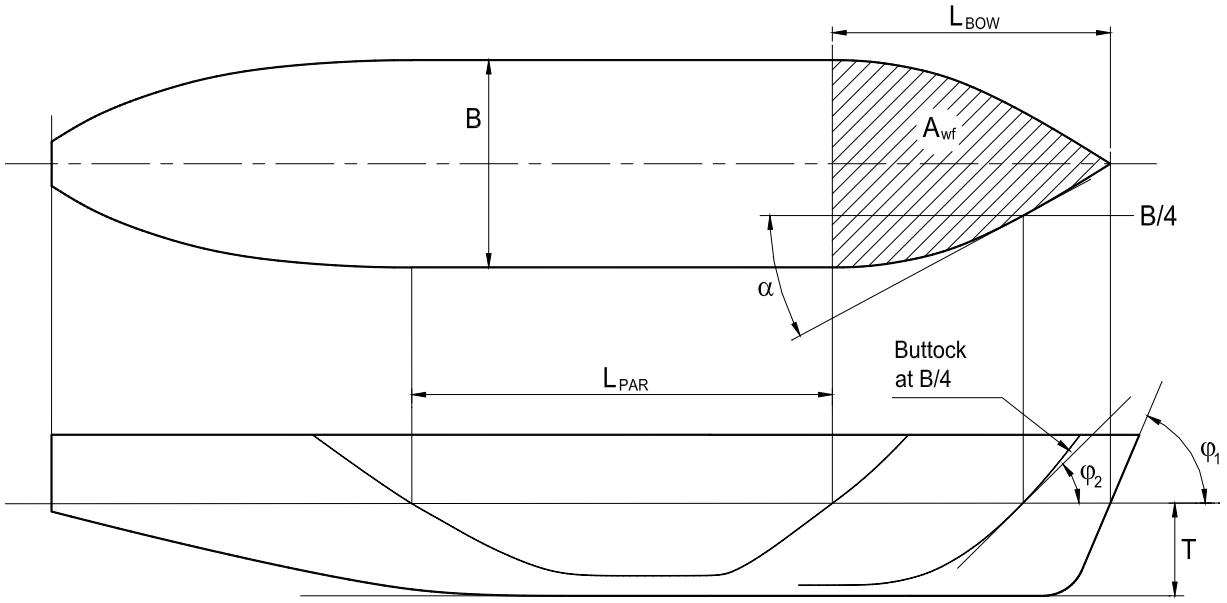

Figure 3-1. Determination of the geometric quantities of the hull. If the ship has a bulbous bow, then φ_1 = 90°.

3.2.2 New ships

To qualify for ice class IA Super, IA, IB or IC, a ship the keel of which is laid or which is at a similar stage of construction on or after 1 September 2003 shall comply with the following requirements regarding its engine output. The engine output requirement shall be calculated for