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Small craft — Principal data

Petits navires — Données principales

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8666 was prepared by Technical Committee ISO/TC 188, *Small craft*.

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Small craft — Principal data

1 Scope

This International Standard establishes uniformity of definitions of main dimensions and related data, and of mass specifications and loading conditions. It applies to small craft having a length of the hull of up to 24 m.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 10240:—¹⁾, *Small craft — Owner's manual*

ISO 12217 (all parts), *Small craft — Stability and buoyancy assessment and categorization*

ISO 14946, *Small craft — Maximum load capacity*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1

waterline

WL

intersection between the flotation plane and the hull which appears as a straight line in either the sheer plan or the body plan, but in its true form in the half-breadth plan

3.2

reference waterline

WL_{ref}

waterline in the fully loaded ready-for-use condition

3.3

sheerline

intersection between deck and hull, for rounded deck edges the natural intersection, or, where no deck is fitted or the hull extends above the deck (bulwark), the upper edge of the craft's hull

NOTE The upper position of the sheerline depends on the inclination between the hull/deck intersection and the actual deck (see Figure 3).

1) To be published. (Revision of ISO 10240:1995)

3.4
transom beam

B_T
maximum width of the hull at the transom at or below the sheerline, excluding extensions, handles and fittings

NOTE 1 Where spray rails act as chines or part of the planing surface, they are included in the transom beam measurement.

NOTE 2 For craft with a rounded or pointed stern or with a transom beam of less than half the maximum beam of the craft, the transom beam, B_T , is the widest beam at or below the sheerline at the aft quarter length of the hull forward of the stern.

3.5
displacement

mass of water displaced by the craft, including all appendages

NOTE Displacement is expressed in kilograms or tonnes.

3.5.1
loaded displacement

m_{LDC}
mass of the craft, including all appendages, when in the fully loaded, ready-for-use condition according to 7.3

3.5.2
displacement volume

V_D
volume of water displaced by the craft that corresponds to the displacement mass, as defined in 3.5

NOTE 1 Where the density of water used to calculate the volume of displacement is not salt water at a density of $1\,025\text{ kg/m}^3$, the density of water used to calculate the volume of displacement is specified.

NOTE 2 Displacement volume is expressed in cubic metres.

3.6
tank capacity

net usable volume of the tank(s) for the craft at rest at the reference waterline, WL_{ref}

4 Symbols, abbreviated terms and units

Unless specifically otherwise defined, the symbols, abbreviated terms and units used in this International Standard are given in Table 1.

Table 1 — Symbols, abbreviated terms and units

Symbol	Designation	Unit	Clause
A_S	Projected sail area	m ²	5.5.2
B_H	Beam of the hull	m	5.3.2
B_{max}	Maximum beam	m	5.3.1
B_{WL}	Beam at waterline	m	5.3.3
B_T	Transom beam	m	3.4
D_{max}	Maximum depth	m	5.4.1
$D_{LWL/2}$	Midship depth	m	5.4.2
F	Freeboard	m	5.4.3
F_A	Freeboard, aft	m	5.4.3.1
F_F	Freeboard, forward	m	5.4.3.3
F_M	Freeboard, midship	m	5.4.3.2
H_a	Air draught	m	5.4.6
L_H	Length of the hull	m	5.2.2
L_{max}	Maximum length	m	5.2.1
L_{WL}	Waterline length	m	5.2.3
m_G	Gross shipping mass	kg, t	6.2
m_{LDC}	Loaded displacement	kg	3.5.1
m_{LCC}	Light craft mass	kg, t	6.3
m_N	Net shipping mass	kg, t	6.1
m_P	Performance test mass	kg, t	6.4
m_T	Mass of craft when towed on trailer	kg, t	6.5
m_{MTL}	Maximum load	kg, t	6.6
T	Draught	m	5.4.4
T_C	Canoe body draught	m	5.4.4.3
T_{max}	Maximum draught	m	5.4.4.1
T_{min}	Minimum draught	m	5.4.4.2
V_D	Displacement volume	m ³	3.5.2
V	Volume of the craft	m ³	5.5.3
V_H	Volume of the hull	m ³	5.5.3.1
V_S	Volume of the superstructure	m ³	5.5.3.2
WL	Waterline		3.1
WL _{ref}	Reference waterline		3.2
β	Deadrise angle	degrees	5.5.1

5 Measurements

5.1 General

Measurements shall be established with the craft at rest at the reference waterline, WL_{ref} , unless otherwise stated.

5.2 Longitudinal

The lengths of a craft shall be measured parallel to the reference waterline and craft centreline as the distance between two vertical planes, perpendicular to the centreplane of the craft.

5.2.1 Maximum length, L_{max}

The maximum length, L_{max} , shall be measured in accordance with 5.2, one plane passing through the foremost part and the other through the aftermost part of the craft.

This length includes all structural and integral parts of the craft, such as wooden, plastic or metal stems or sterns, bulwarks and hull/deck joints.

This length includes parts which are normally fixed, such as fixed spars, bowsprits, pulpits at either end of the craft, stemhead fittings, rudders, outboard motor brackets, outdrives, waterjets and any propulsion units extending beyond the transom, diving and boarding platforms, rubbing strakes and permanent fenders.

Outdrives, waterjets, other propulsion units and all movable parts shall be measured in their normal operating condition to their maximum lengthwise extension when the craft is underway.

This length excludes:

- outboard motors;
- any other type of equipment that can be detached without the use of tools.

See Figure 1 for monohull measurements and Figure 2 for multihull measurements.

5.2.2 Length of the hull, L_H

The length of the hull, L_H , shall be measured in accordance with 5.2, one plane passing through the foremost part of the craft and the other through the aftermost part of the craft.

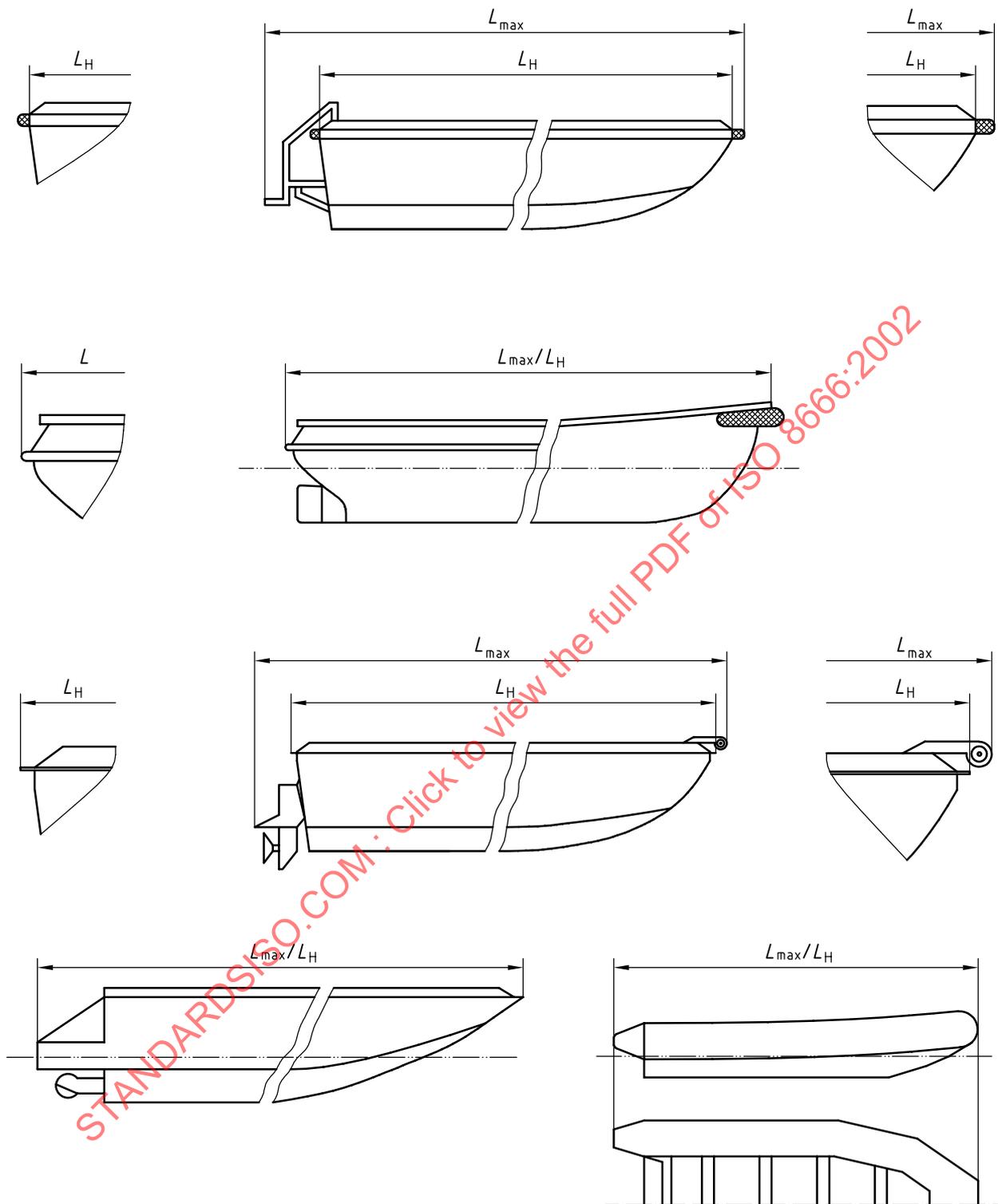
This length includes all structural and integral parts of the craft, such as wooden, plastic or metal stems or sterns, bulwarks and hull/deck joints.

This length excludes removable parts that can be detached in a non-destructive manner and without affecting the structural integrity of the craft, e.g. spars, bowsprits, pulpits at either end of the craft, stemhead fittings, rudders, outdrives, outboard motors and their mounting brackets and plates, diving platforms, boarding platforms, rubbing strakes and fenders.

This length does not exclude detachable parts of the hull, which act as hydrostatic or dynamic support when the craft is at rest or underway.

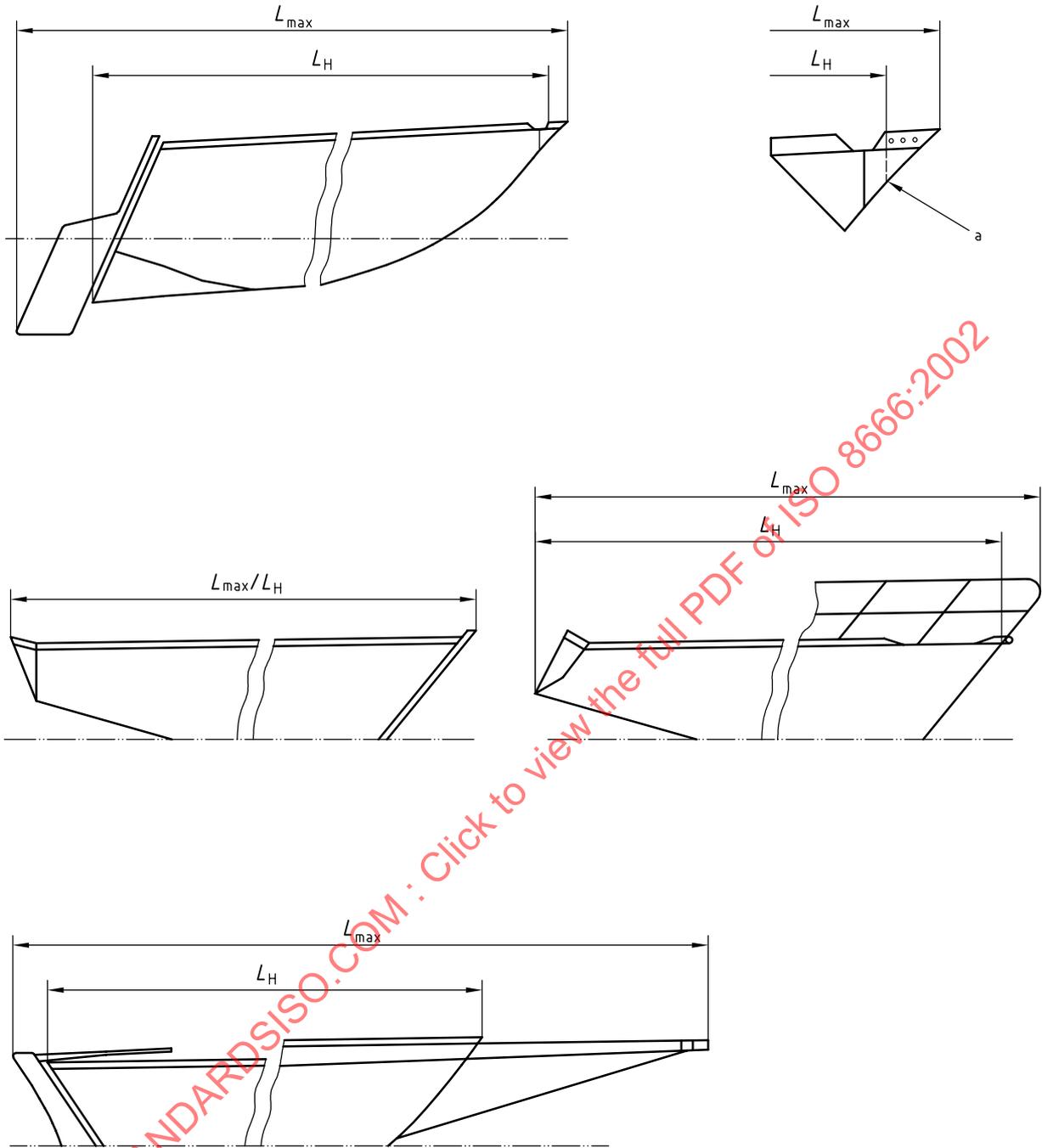
With multihull craft, the length of each hull shall be measured individually. The length of the hull, L_H , shall be taken as the longest of the individual measurements.

See Figure 1 for monohull measurements and Figure 2 for multihull measurements.



a) Determination of L_{max} and L_H for monohull powerboats

Figure 1 — Determination of L_{max} and L_H , for monohull boats



a Hall ends here.

b) Determination of L_{max} and L_H for monohull sailing boats

Figure 1 (continued)

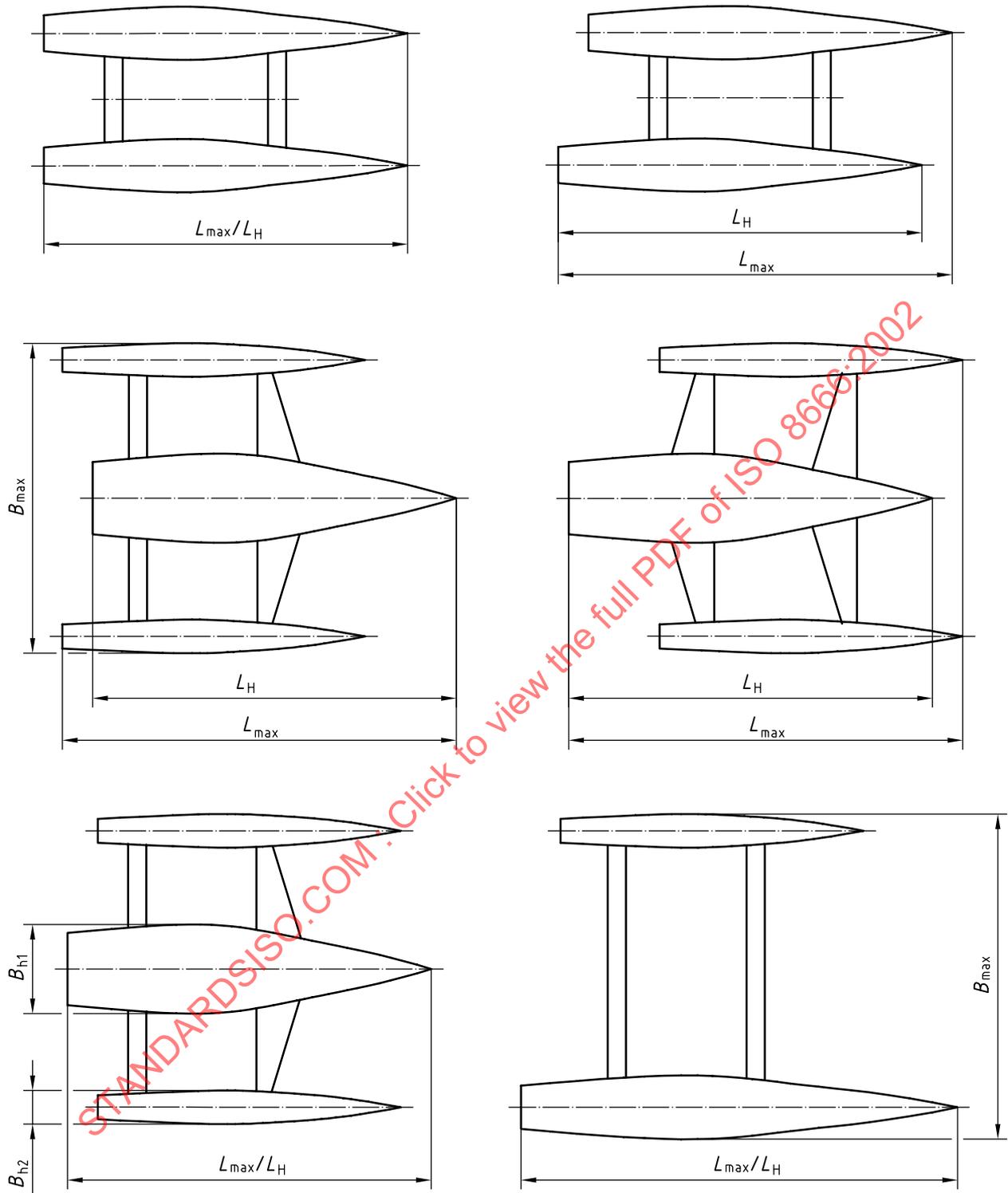


Figure 2 — Determination of L_{max} , L_H , B_{max} and B_H for multihulls

5.2.3 Waterline length, L_{WL}

The waterline length, L_{WL} , for a designated condition shall be measured in accordance with 5.2, one plane passing through the foremost intersection of the stem with the flotation plane and the other through the aftermost intersection of the hull and the flotation plane.

5.3 Athwartship

5.3.1 General

Athwartship dimensions shall be measured as the distance between two vertical planes parallel to the centreplane of the craft.

5.3.2 Maximum beam, B_{max}

The maximum beam, B_{max} , shall be measured between planes passing through the outermost parts of the craft.

The maximum beam includes all structural or integral parts of the craft, such as extensions of the hull, hull/deck joints, extensions such as doublings, sheer planks, chain plates, rubbing strakes, permanent fenders and liferails extending beyond the craft's side.

5.3.3 Beam of the hull, B_H

The beam of the hull, B_H , shall be measured in accordance with 5.3 between the outermost permanently fixed parts of the hull.

The beam of the hull includes all structural or integral parts of the craft such as extensions of the hull, hull/deck joints and bulwarks.

The beam of the hull excludes removable parts that can be detached in a non-destructive manner and without affecting the integrity of the craft, e.g. rubbing strakes, fenders, guardrails and stanchions extending beyond the craft's side, and other similar equipment.

The beam of the hull does not exclude detachable parts of the hull, which act as hydrostatic or dynamic support when the craft is at rest or underway.

For multihulls, the beam of the hull shall be established accordingly for each individual hull.

See Figure 3 for monohull measurements and Figure 2 for multihull measurements.

5.3.4 Beam at waterline, B_{WL}

The beam at waterline, B_{WL} , shall be measured in accordance with 5.3 as the maximum distance between the intersection of the hull surface and the flotation plane for a specific loading condition.

For multihulls, the beam at waterline shall be established for each hull individually.

5.4 Vertical

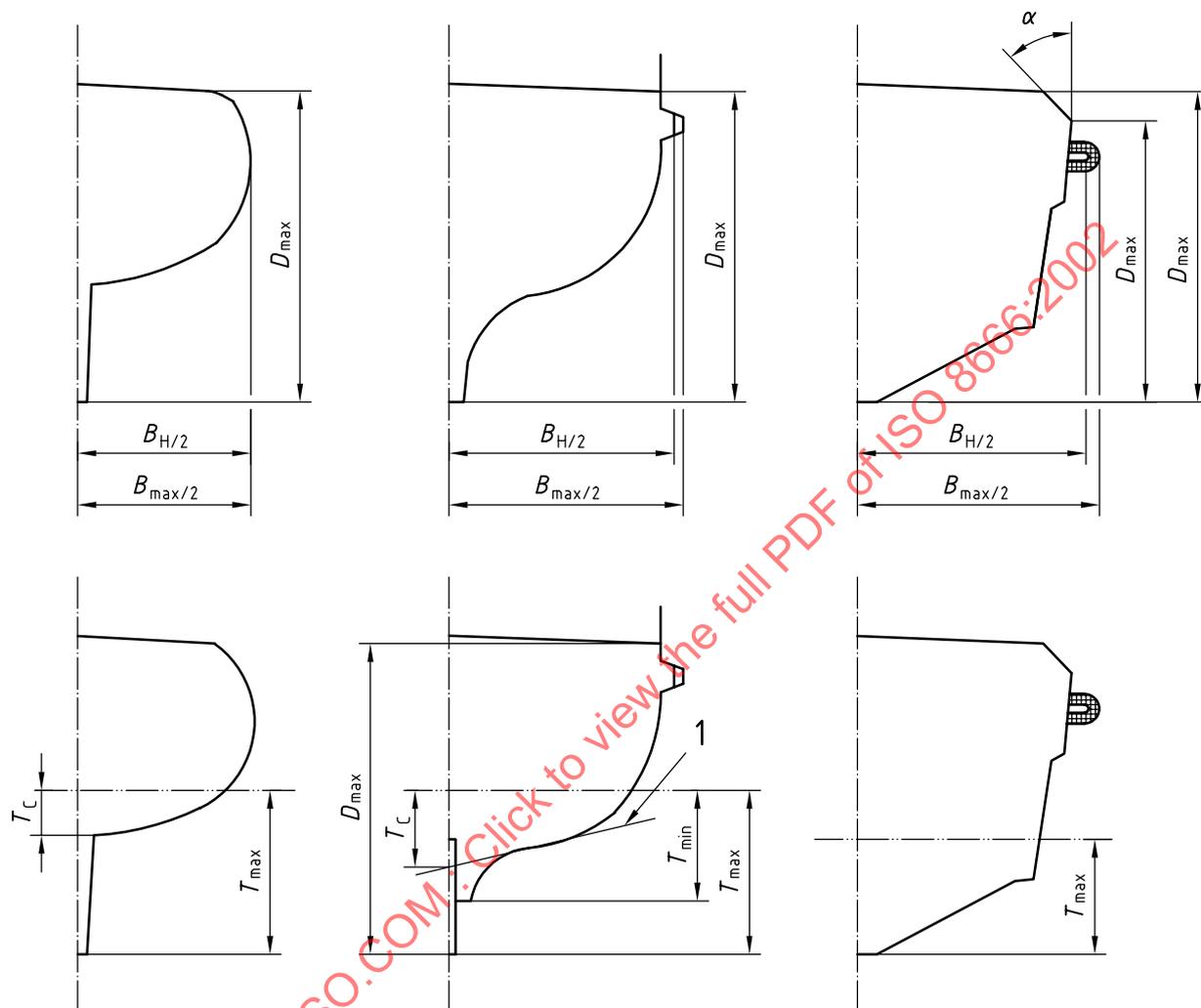
5.4.1 Maximum depth, D_{max}

The maximum depth, D_{max} , shall be measured as the vertical distance between the sheerline at half-length of the waterline, L_{WL} , and the lowest point of the keel.

NOTE With traditional long-keeled craft, the slope of the keel may result in increased draught aft, which is not at half-length of the waterline or length of the hull.

5.4.2 Midship depth, $D_{LWL/2}$

The midship depth, $D_{LWL/2}$, shall be measured at half-length of the waterline, L_{WL} , as the distance between the sheerline and the lowest point of the keel at the same position.



Key

1 Tangent

NOTE The upper position of D_{max} depends on the inclination between the hull/deck intersection and the actual deck. Where $\alpha \geq 45^\circ$, the lower position applies, where $\alpha < 45^\circ$, the upper position applies.

Figure 3 — Determination of B_{max} , B_H , D and T

5.4.3 Freeboard, F

The freeboard, F , shall be measured as the distance between the sheerline at the defined lengthwise location and the flotation plane in any specified loading condition.

5.4.3.1 Freeboard, aft, F_A

The aft freeboard, F_A , shall be measured in accordance with 5.4.3 at the aftermost point of the sheerline.

5.4.3.2 Freeboard, midship, F_M

The midship freeboard, F_M , shall be measured in accordance with 5.4.3 at half-length of the hull.

5.4.3.3 Freeboard, forward, F_F

The forward freeboard, F_F , shall be measured in accordance with 5.4.3 at the most forward point of the sheerline/deck at the side.

5.4.4 Draught, T

The draught, T , shall be measured as the vertical distance between the waterline in the fully loaded ready-for-use condition and a specific point of the underwater body (see Figure 3).

5.4.4.1 Maximum draught, T_{max}

The maximum draught, T_{max} , shall be measured to the lowest point of the underwater body or appendage, including centreboards, in their lowest position.

5.4.4.2 Minimum draught, T_{min}

The minimum draught, T_{min} , shall be measured to the lowest point of the craft or non-retractable appendage, whichever is lower. All movable underwater parts shall be in their uppermost possible position.

5.4.4.3 Canoe body draught, T_C

The canoe body draught, T_C , shall be measured between the intersection of the canoe body with the centreline of the craft at the lowest point of the canoe body. In cases where the keel form cannot be easily separated from that of the hull, the canoe body draught shall be determined by the intersection of the least steep tangent to the hull surface with the centreline plane.

5.4.5 Headroom

The headroom shall be measured as the vertical distance between the top of the cabin/compartments floor and the underside of the deck beam or deck head (whichever is lower) at a designated position. The manufacturer is free to state the headroom in other locations, e.g. above bunks.

5.4.6 Air draught, H_a

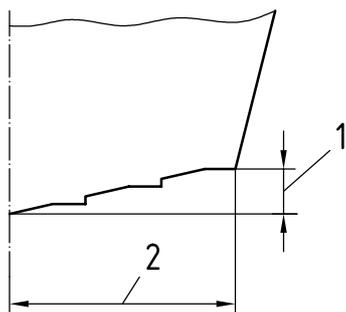
The air draught, H_a , shall be measured as the vertical distance between the flotation plane in the light craft condition and the highest point of the craft's structure or mast.

NOTE The manufacturer is free to state in the owner's manual that the boat owner is to make an allowance for a masthead light and possible fitting of aerial(s).

5.5 Other data

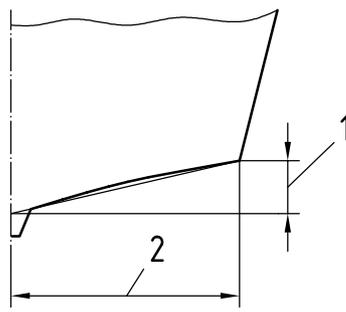
5.5.1 Deadrise angle, β

The deadrise angle, β , is the angle of the bottom from the horizontal measured athwartship, at a specific position, in degrees. The measurement shall be taken as indicated in Figure 4.



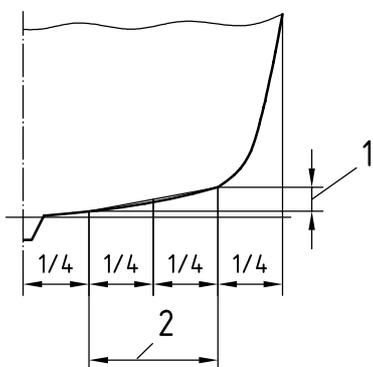
NOTE Steps and other protrusions are ignored.

a) Straight bottom



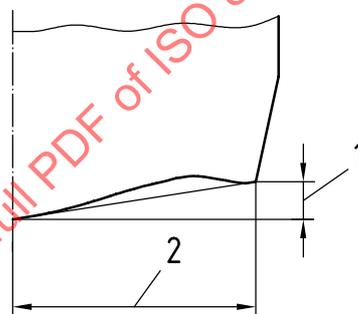
NOTE Deadrise is measured between keel intersection and chine.

b) Concave bottom plus keel



NOTE Deadrise is measured between 1/4 and 3/4 of $B_{H/2}$.

c) Convex bottom



NOTE Deadrise is measured between centreline and outer wing end.

d) Concave bottom with wing

Key

- 1 Height
- 2 Width

Figure 4 — Determination of deadrise

5.5.2 Projected sail area, A_S

The projected sail area of a vessel, A_S , is calculated as the sum of the projected profile areas of all sails that may be set when sailing to windward which are attached to booms, gaffs, sprits or other spars, plus the foretriangle area(s) to the outermost forestay(s) permanently attached during operation of the craft to that mast for which suitable sails are carried, without overlaps, luffs and leeches, taken as straight lines.

The foretriangle area for each mast shall be the area given by

$$\frac{IJ}{2}$$

where I and J are measurements between the forward side of the mast, the aft side of the forestay and the deckline at sidedeck, as shown in Figure 5. Where forestays between masts do not reach the deck, the area of the

foretriangle shall be taken as illustrated (*P* and *E*), but only if sails are carried that may be set on the stays concerned.

The area of spars is not included in the calculation of the projected sail except for wing masts.

NOTE A wing mast is characterized by its cross-section which shows a smooth transition at the aft end into the sail, thus contributing to its driving force. Cross-sections of masts are usually elliptic; they are less often circular or box-shaped.

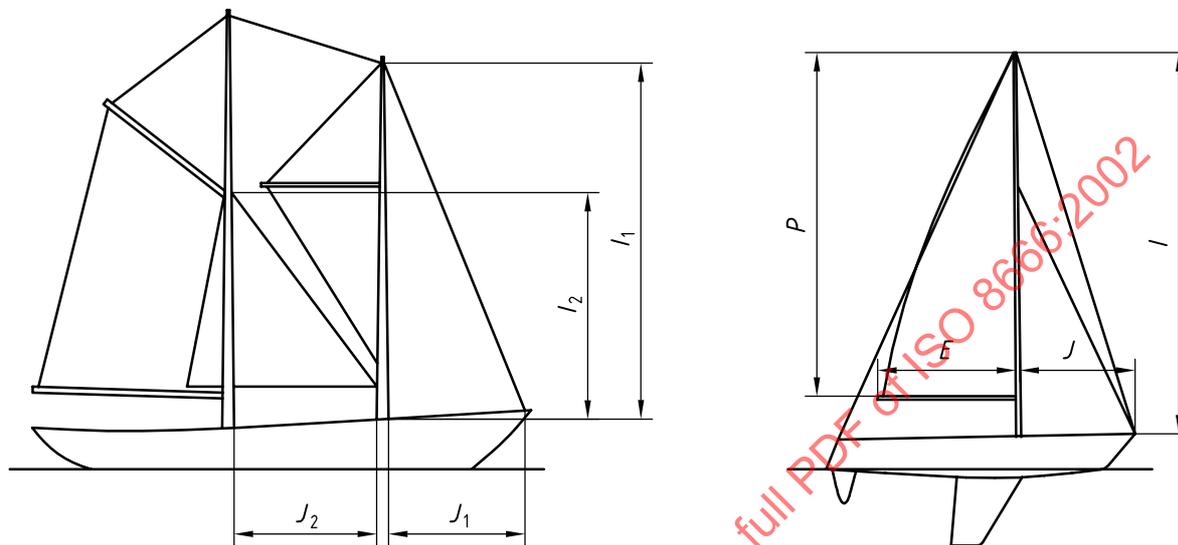


Figure 5 — Measurement of sail area

5.5.3 Volume of the craft, *V*

The volume, *V*, in cubic metres, of a small craft is given by the following formula:

$$V = V_H + V_S$$

where

V_H is the volume of the hull, in cubic metres;

V_S is the volume of the superstructure, in cubic metres.

The volume of the craft shall be established either by accepted naval architectural methods or by an approximate assessment according to 5.5.3.1 and 5.5.3.2.

The volume shall be measured as follows (see Figure 6).

5.5.3.1 Volume of the hull, *V_H*

Using the approximate method, the volume of the hull shall be determined as follows (see Figure 6):

$$V_H = 0,15 L_H (B_0 D_0 + B_{20} D_{20} + B_{40} D_{40} + B_{60} D_{60} + B_{80} D_{80} + B_{100} D_{100})$$

5.5.3.2 Volume of the superstructure, *V_S*

The volume of the superstructure, *V_S*, shall be the sum of the volume for each part of the superstructure above the sheerline/deck at the side. Any space that is open at no more than one side shall be incorporated in the calculation. Open in this sense means that no more than 10 % of the area may be covered.

Volumes of less than 0,05 m³ shall be omitted.

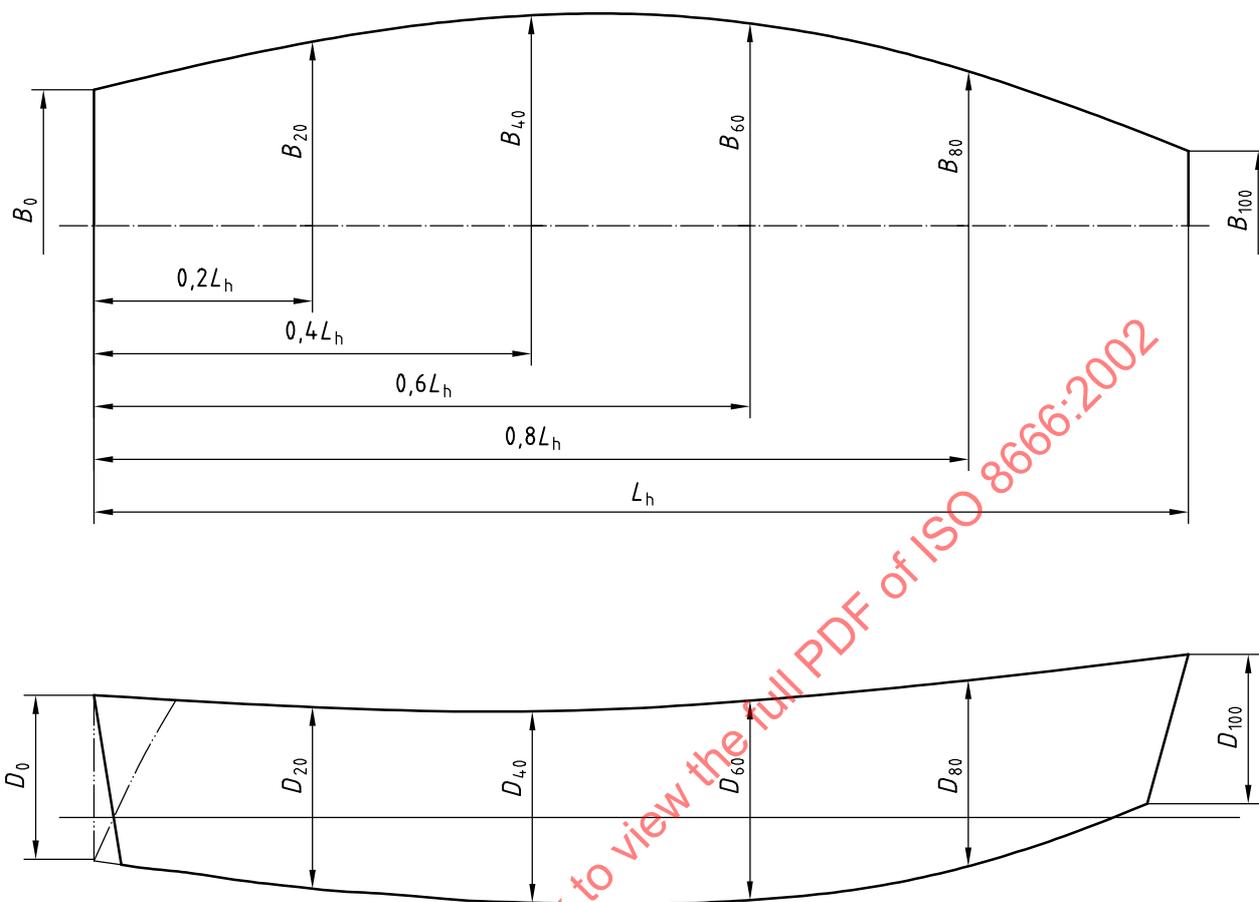


Figure 6 — Volume measurement

6 Masses

NOTE The mass of a craft or an item of equipment is expressed in tons, t, or kilograms, kg.

6.1 Net shipping mass, m_N

The net shipping mass, m_N , shall include all permanent and loose equipment delivered with the craft by the manufacturer, but no shipping materials.

6.2 Gross shipping mass, m_G

The gross shipping mass, m_G , is the net shipping mass, as defined above, plus shipping materials such as cradles, supports, fastening material and covers.

6.3 Light craft mass, m_{LCC}

6.3.1 Items of equipment included in m_{LCC}

The unladen mass of the boat, m_{LCC} (mass in the light craft condition) shall include items of equipment as listed below.

6.3.1.1 Structure

The structure is comprised of all the structural parts, including the ballast keel and/or centreboard/daggerboard(s) and rudder(s).

6.3.1.2 Ballast

The ballast is comprised of the removable ballast (whether solid or liquid) when supplied and/or intended by the manufacturer to be carried when the boat is underway.

6.3.1.3 Internal structure and accommodation

Bulkheads and partitions, insulation, lining, built-in furniture, flotation material, windows, hatches and doors, upholstery material are included in the internal structure and accommodation.

6.3.1.4 Engine and fuel system

6.3.1.4.1 Permanently installed engine and fuel systems

The permanently installed engine and fuel systems are comprised of inboard engine(s), including all supplies and controls as needed for their operation, and permanently installed fuel systems, including tanks.

6.3.1.4.2 Outboard engines

The mass of the craft shall be stated with the mass of the outboard motor(s) as follows:

- mass of the heaviest engine(s), as recommended by the boat manufacturer, irrespective of the fact that the manufacturer may have fitted a lighter engine and related equipment;
- mass of any permanently installed fuel system;
- mass of engine controls and steering system.

6.3.1.5 Internal equipment

This includes:

- all items of equipment permanently attached to the craft, e.g. tanks, toilet system(s), water transfer equipment, bilge pumping system(s), cooking and heating devices, cooling equipment, ventilation system(s);
- electrical installation and equipment, including batteries;
- fixed navigational and electronic equipment;
- fire fighting equipment, where fitted;
- mattresses, curtains.

6.3.1.6 External equipment

For all craft, this includes:

- all permanently attached standard or specified deck fittings, e.g. guardrails, pulpits and pushpits, bowsprits and their attachments, bathing platforms, boarding ladders, steering equipment, winches, sprayhood(s), awning(s), cockpit tables, gratings, signal mast(s), where fitted;

- anchor(s), anchor warps and chains;
- loose external equipment, e.g. fenders, warps, painters.

For craft with sailing rig(s), this includes:

- mast(s), boom(s), spinnaker poles and other pole(s), standing and running rigging, working sails where supplied as standard.

6.3.2 Items of equipment and other items not included in m_{LCC}

These items are:

- loose internal equipment, e.g. cutlery, crockery, kitchen utensils, linen;
- loose electronic and navigational equipment (e.g. charts);
- tools, spare parts;
- additional sails;
- personal safety and life-saving equipment;
- provisions;
- bilge water;
- waste water;
- potable water;
- fuel;
- personal equipment;
- life-raft;
- dinghy;
- persons.

6.4 Performance test mass, m_P

The performance test mass, m_P , of a craft shall include all permanently attached standard items of equipment. Further, the craft shall be fitted with all items of loose equipment needed for the safe operation of the boat, e.g.

- warps;
- anchors/chain/ropes;
- working sails;
- engine(s);
- batteries.

In addition, the masses of the following shall be included:

- number of persons needed for the safe operation of the boat;
- fuel at least at 25 % but no more than 50 % of the tank capacity of permanently installed fuel tanks, or one portable tank per engine, which shall be at least 50 % full at the beginning of each test trial;
- personal safety equipment for all people on board.

Excluded are:

- fresh water;
- waste water;
- provisions;
- loose equipment, e.g. cutlery, crockery, kitchen utensils, spare parts, etc.

6.5 Mass of the craft when towed on a trailer, m_T

6.5.1 General

The mass of the craft when towed on a trailer, m_T , shall only be established for craft advertised as trailerable to allow the owner/user to identify the mass of additional equipment that may be carried without exceeding the trailer capacity.

The mass, m_T , shall include items of equipment as listed under 6.5.2, plus fastenings to secure the boat on the trailer.

The manufacturer/dealer shall provide a list of parts, components and equipment that are included in the mass, m_T , as defined above and shall state the total sum in kilograms (kg). This may be in the format of general or itemized descriptions (for items included).

Any items of equipment normally supplied by the manufacturer/dealer not intended to be placed in the boat or on the trailer shall be listed separately.

6.5.2 Items of equipment included in m_T

6.5.2.1 Structure

The structure is made up of all structural parts, including ballast keel and/or centreboard/daggerboard(s) and rudder(s).

If loose ballast or parts of the ballast keel are not to be stowed on the trailer, these parts shall be specifically declared and listed under the non-included equipment (see 6.5.4).

6.5.2.2 Internal structure and accommodation

The internal structure and accommodation are made up of bulkheads and partitions, insulation, lining, built-in furniture, flotation material, windows, hatches and doors, and upholstery material.

6.5.2.3 Internal equipment

This includes:

- all items of equipment permanently attached to the craft, e.g. toilet system(s), water transfer equipment, bilge pumping system(s), cooking and heating devices, cooling equipment, ventilation system(s);