DRAFT INTERNATIONAL STANDARD

ISO/DIS 3715-1

ISO/TC **8**/SC **3**

Secretariat: **ANSI**

Voting begins on:
2018-01-19

Voting terminates on:
2018-04-13

Ships and marine technology — Propulsion plants for ships —

Part 1:
Vocabulary for geometry of propellers

Navires et technologie maritime — Installations de propulsion des navires —

Partie 1: Termes et définitions relatifs à la géométrie de l'hélice

ICS: 01.040.47; 47.020.20

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 3715-1:2018(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

ISO 3715 consists of the following parts, under the general title *Ships and marine technology — Propulsion plants for ships*:

— *Part 1: Vocabulary for geometry of propellers*

— *Part 2: Vocabulary for controllable-pitch propeller plants*

Ships and marine technology — Propulsion plants for ships —

Part 1: Vocabulary for geometry of propellers

1 Scope

This part of ISO 3715 gives terms and definitions for screw propellers used in the propulsion plants of ships and other vessels (such as mobile offshore drilling units) that are self-propelled or propulsion-assisted. Exceptional designs, as e.g. rim drives, are not covered.

The definitions are valid only for the hydrodynamically effective part of the propeller based on cylindrical blade sections. No definitions are given for the mechanical design of the hub.

Vocabulary for hydraulically operated controllable-pitch propeller plants is given in ISO 3715-2.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 484-1, *Shipbuilding — Ship screw propellers — Manufacturing tolerances — Part 1: Propellers of diameter greater than 2,50 m*

ISO 3715-2, *Ships and marine technology — Propulsion plants for ships — Part 2: Vocabulary for controllable-pitch propeller plants*

3 Terms and definitions

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

3.1
screw propeller

3.1.1
propeller radius
R [General]
RP [Computer]
largest distance of the extreme point of a blade (i.e. blade tip) rectangular to the x-axis

Note 1 to entry: For propellers with adjustable blades and controllable-pitch propellers, this definition is valid for design pitch.

Note 2 to entry: For definition of coordinate system see Figure 2.

3.1.2
propeller diameter
D [General]
DP [Computer]
diameter of the circle passed by the extreme point of a blade whilst turning around the x-axis

Note 1 to entry: $D = 2R$

Note 2 to entry: For propellers with mounted blades and controllable-pitch propellers, this definition is valid for design pitch.

3.1.3
number of blades
Z [General]
Z [Computer]
total number of blades of a propeller

3.1.4
disc area
A_0 [General]
A0 [Computer]
disc area calculated by means of the propeller diameter

$$A_0 = D^2 \frac{\pi}{4}$$

Note 1 to entry: See Figure 2.

3.1.5
area ratio
ratio of any area based on blade geometry and the propeller disc area

Note 1 to entry: See 3.6.1 for further details.

3.1.6
propeller plane
y- and *z*-plane

Note 1 to entry: See Figure 2.

3.1.7
direction of rotation, right-handed
<clockwise>
when going ahead the propeller moves in the upper point from left to right (seen from aft)

3.1.8
direction of rotation, left-handed
<counter clockwise>
when going ahead the propeller moves in the upper point from right to left (seen from aft)

3.1.9
angular coordinate
Θ [General]
is coordinate, positive in direction of propeller rotation

Note 1 to entry: See Figure 3.

3.2
hub
boss
part of the propeller the blades are fitted to (integral or removable), and forming the connection to the propellers shaft and, in the case of controllable pitch propellers, the housing of the mechanism to pitch the blades

Note 1 to entry: The propeller cap is usually not part of the hub.

3.2.1
hub diameter
d_h [General]
DH [Computer]
diameter of the hub in the propeller plane

Note 1 to entry: See Figure A.1.

3.2.2
fore diameter of hub
d_{hf} [General]
DHF [Computer]
fore diameter of the hub, not considering any shoulder

Note 1 to entry: See Figure A.1.

3.2.3
aft diameter of hub
d_{ha} [General]
DHA [Computer]
aft diameter of the hub, not considering any shoulder

Note 1 to entry: See Figure A.1.

3.2.4
hub length
l_h [General]
LH [Computer]
length of the hub, any shoulder aft and fore included

Note 1 to entry: See Figure A.1.

3.2.5
aft length of hub
l_{ha} [General]
LHA [Computer]
length of the hub taken from propeller plane to aft end of the hub including aft shoulder

Note 1 to entry: See Figure A.1.

3.2.6
fore length of hub
l_{hf} [General]
LHF [Computer]
length of the hub taken from propeller plane to fore end of the hub including fore shoulder

3.2.7
hub diameter ratio
d_h/D [General]
DHR [Computer]
relation of hub diameter to propeller diameter

3.3
blade
part of a propeller beginning at the contour of the hub and ending at the blade tip

3.3.1
blade tip
outermost part of a blade, positioned at the propeller radius *R*

Note 1 to entry: In special cases, the blade tip is represented by the mid chord point of a cylindrical section at the propeller radius *R.*

3.3.2
blade root
zone of transition between blade and hub

3.3.3
leading edge
LE [General and computer]
blade edge directed to the inflow under normal operating conditions starting from the blade root and ending at the blade tip

3.3.4
trailing edge
TE [General and computer]
blade edge opposite to the inflow under normal operating conditions starting from the blade root and ending at the blade tip

3.3.5
shape of edges
shape of the fore and aft part of a cylindrical section

Note 1 to entry: E.g. rounded, sharpened edges.

Note 2 to entry: Examples of shapes: anti-singing edge, edge with rounded nose (see e.g. 3.4.7.3).

3.3.6
suction side
back
SS [General and Computer]
blade side, directed to the inflow under normal operating conditions

Note 1 to entry: It is the upper side of a cylindrical profile section (see Figure A.2).

3.3.7
pressure side
face
PS [General and Computer]
blade side opposite to the suction side (see Figure A.2)

3.3.8
blade outline
shape or contour of blade

3.3.9
centre of gravity of blade
mass centre of blade

3.4
cylindrical blade section
developed penetration area of a cylinder coaxial related to the x-axis of a propeller with a propeller blade at design pitch

Note 1 to entry: See Figure A.2.

3.4.1
chord line of blade section
CLS [General]
the chord line coincides with coordinates x_c

Note 1 to entry: See Figure 5.

3.4.2
mean line of blade section
camber line
MLS [General]
connecting line of the centres of contact circles between suction and pressure side

3.4.3
camber
f [General]
F [Computer]
f is equal to maximum y_c-value of the mean line

Note 1 to entry: See Figure A.2.

3.4.4
chord length
c [General]
C [Computer]
developed length of a cylindrical profile section from the leading edge to the trailing edge

Note 1 to entry: Maximum x_c see Figure A.2.

3.4.5
leading part of chord length
c_{LE} [General]
CLE [Computer]
developed length of a cylindrical profile section taken from the leading edge to the reference line, related to the x_c-coordinate of the cylindrical section

Note 1 to entry: See system of coordinates in Figure A.4 for information.

3.4.6
trailing part of chord length
c_{TE} [General]
CTE [Computer]
developed length of a cylindrical section taken from the trailing edge to the reference line, related to the x_c-coordinate of the cylindrical section

Note 1 to entry: See system of coordinates in Figure A.4.

3.4.7
thickness of blade section

3.4.7.1
maximum thickness of blade section
t [General]
T [Computer]
maximum distance between pressure and suction side perpendicular to mean line

Note 1 to entry: See system of coordinates; see also Figure A.2 and Figure A.4 for information.

3.4.7.2
local thickness of blade section
t_X [General]
TX [Computer]
blade thickness at any location along the x_c-coordinate axis, measured perpendicular to mean line

Note 1 to entry: See also Figure A.2.

Note 2 to entry: Local thickness refers to contact circle diameter see 3.4.2, except for the leading edge region where the leading edge radius determines the contour.

3.4.7.3
Leading edge radius
r_{LE} [General]
RLE [Computer]
radius defining the curvature of the leading edge (see also Figure A.2)

3.5
pitch
P_r [General]
PR [Computer]
covered distance of a point in x-direction after one revolution ($\Theta = 2\pi$) moving on a screw line at radius r

EXAMPLE For $r = 0{,}7\ R$, the pitch is $P_{0,7}$.

Note 1 to entry: See system of coordinates in Figure 3.

Note 2 to entry: The pitch is unambiguously defined only for a helix of a constant lead. The area of a propeller blade is in general not an ideal helicoidal surface, but an area similar to a helicoidal surface. Therefore only area elements have defined pitch values.

Note 3 to entry: The pitch values of area elements are in general different in both directions, radial and peripheral as well.

3.5.1
pitch angle
ϕ [General]
PHI [Computer]
angle between the helix of constant lead and the propeller plane, taken on the cylindrical surface

$$\phi = \arctan \frac{P}{2\pi r}$$

3.5.2
pitch of pressure side
P_{PS} [General]
PPS [Computer]
pitch of the line between the first and the last measuring point of the pressure side of a developed cylindrical section

Note 1 to entry: See ISO 484-1.

Note 2 to entry: See Figure A.6.

3.5.3
pitch of chord line
P_{CL} [General]
PCL [Computer]
pitch of the chord between leading edge and trailing edge point of the developed chord line

3.5.4
local pitch
P_X [General]
PX [Computer]
pitch of the tangent of a curved line

Note 1 to entry: E.g. pressure side of a cylindrical section, at a certain point.

Note 2 to entry: Approximately, the pitch of the line between two adjacent points of a curved line is named local pitch.

Note 3 to entry: These measures will be used for examination purpose of the manufactured propeller in accordance with ISO 484-1.

3.5.5
mean pitch of blade
P_{MB} [General]
PMB [Computer]
nominal mean pitch of the blade calculated by means of a defined formula using the pitch of $n-$ individual cylindrical sections and the corresponding chord lengthsThe defining formula is:

$$P_{MB} = \frac{\sum_{i=1}^{n} P_{CL}(i) \cdot c(i) \cdot r(i)}{\sum_{i=1}^{n} c(i) \cdot r(i)}$$

3.5.6
mean pitch of propeller
P_m [General]
PM [Computer]
arithmetical mean, calculated from the mean pitch of the individual blades

Note 1 to entry: This value is used, for example to calculate the true slip and the apparent slip value as well.

Note 2 to entry: It is used with restrictions for comparison purpose of the propulsion quality of different propellers.

3.5.7
pitch ratio
P_r/D [General]
PRD [Computer]
quotient of a pitch at radius r and the propeller diameter

3.6
description of propeller (see **Figure A.4**)

3.6.1
blade areas