INTERNATIONAL STANDARD

ISO 484-2

Second edition
2015-12-01

Shipbuilding — Ship screw propellers — Manufacturing tolerances —

Part 2: Propellers of diameter between 0,80 and 2,50 m inclusive

Construction navale — Hélices de navires — Tolérances de fabrication —
Partie 2: Hélices de diamètre compris entre 0,80 et 2,50 m inclus

Reference number
ISO 484-2:2015(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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

This second edition cancels and replaces the first edition (ISO 484-2:1981), which has been technically revised.

ISO 484 consists of the following parts, under the general title *Shipbuilding — Ship screw propellers — Manufacturing tolerances*:

— *Part 1: Propellers of diameter greater than 2,50 m*

— *Part 2: Propellers of diameter between 0,80 m and 2,50 m inclusive*

Introduction

The propeller manufacturer is at liberty to use any equipment and method that enables the tolerances to be verified to the required accuracy.

Shipbuilding — Ship screw propellers — Manufacturing tolerances —

Part 2: Propellers of diameter between 0,80 and 2,50 m inclusive

1 Scope

This part of ISO 484 defines manufacturing tolerances of ship screw propellers of a diameter between 0,80 m and 2,50 m.

NOTE Some deviations for the tolerance are permitted in certain cases subject to the discretion of the customer or of the designer and the customer.

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 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 1940-1:2003, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*

3 Field of application

This part of ISO 484 applies to monobloc, built-up, and controllable pitch propellers.

4 Methods of measuring pitch

4.1 The principle of one method of measurement consists in setting out along a helicoidal line of radius, r, a certain length, PQ, corresponding to the desired angle, α, and in measuring the difference, h, in the heights of the points P and Q with respect to a reference plane (see Figure 1).

The length PQ shall be set out using one of the methods described in 4.1.1, 4.1.2 or 4.1.3.

NOTE Other methods giving the required accuracy may be used if necessary.

4.1.1 Use of marking gauges

The length PQ shall be set out by means of marking gauges.

4.1.2 Method with a graduated ring

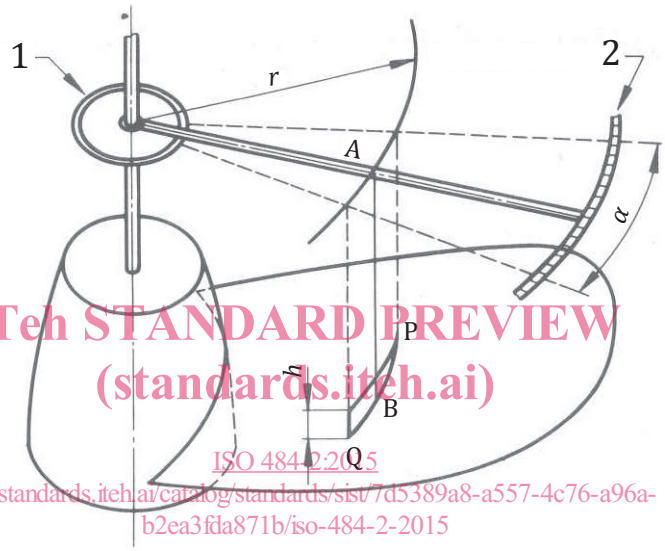
The length PQ shall be set out by means of angle, α, on a part of a graduated ring of suitable radius (see Figure 1).

4.1.3 Method using coordinate measuring machine

The height coordinates are taken at defined measuring points by means of coordinate measuring machine and they are related to each other (determination of height differences needed for pitch evaluation). Both cartesian coordinate system (x, y, z) and polar coordinate system (α, r, h) can be applied alternatively in order to define measuring points P and Q.

5 Methods of measuring the thickness of the section

5.1 The thickness of a cylindrical section at a point S shall be measured along direction SV (see Figure 2) on the plane tangent to the coaxial cylinder and perpendicular to the pitch line of the pressure side of the section (and only along direction SU perpendicular to the pressure side surface or direction S parallel to the propeller axis when defined in this way on the drawings).

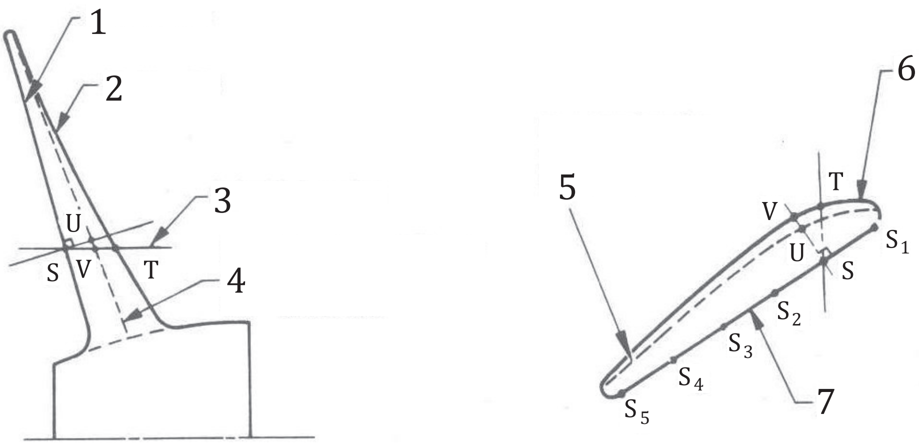


Key

1 small graduated ring

2 large graduated ring

Figure 1 — Pitch measurement



Key

1 pressure side
2 suction side
3 cylindrical section
4 line of maximum thickness of section perpendicular to the pressure side
5 developed section perpendicular to the pressure side
6 developed cylindrical section
7 pressure side

Figure 2 — Thickness measurement

5.2 The maximum thickness at each radius shall be determined by means of a pair of outside callipers or from the profile obtained by plotting the thickness at various points: S, S_1, S_2, S_3, etc.

6 Accuracy classes

The accuracy class shall be selected by the customer. The indications in Table 1 serve as guidance in this choice.

Table 1 — Accuracy of manufacturing

Class	Manufacturing accuracy
S	Very high accuracy
I	High accuracy
II	Medium accuracy
III	Wide tolerances

7 Tolerances on the pitch

Table 2 — Pitch tolerances

Designation of pitch	Class			
	S	I	II	III
a) Local pitch with a minimum of	±1,5 % ±10 mm	±2 % ±15 mm	±3 % ±20 mm	—
b) Mean pitch per radius of each blade with a minimum of	±1 % ±7,5 mm	±1,5 % ±10 mm	±2 % ±15 mm	±5 % ±25 mm
c) Mean pitch per blade with a minimum of	±0,75 % ±5 mm	±1 % ±7,5 mm	±1,5 % ±10 mm	±4 % ±20 mm
d) Mean pitch for propeller with a minimum of	±0,5 % ±4 mm	±0,75 % ±5 mm	±1 % ±7,5 mm	±3 % ±15 mm
NOTE The tolerances of Table 2 are expressed as percentages of the design pitch corresponding to the radius for designations a) and b) and the mean design pitch for designations c) and d).				

7.1 Pitch shall be measured at least at the radii indicated in Table 3. By agreement between the interested parties, different radii may be measured.

Table 3 — Pitch measurement locations

Class	Radii
S and I	A section near the hub – 0,4 R – 0,5 R – 0,6 R – 0,7 R – 0,8 R – 0,9 R – 0,95 R
II and III	A section near the hub – 0,5 R – 0,7 R – 0,9 R

7.2 The measurement of local pitches for Class S and Class I is further controlled as described in Clause 10.

7.3 The tolerances on the local pitch and on the mean pitch of each radius of each blade given in Table 2, a) and b) are increased by 50 % for sections at 0,4 R or less.

7.4 Should the propeller manufacturer wish to compensate for an error on the pitch (inside or outside the tabulated tolerances) by means of an alteration in the propeller diameter, he may do so only with the customer's agreement.

7.5 The design pitch is the pitch of the reference line as defined below.

The design pitch line of a section is a helical reference line for the section in question of which the section ordinates for the face and the back are given.

It could be a line joining the nose and tail of the section or any other conveniently placed helical line.

7.6 The local pitch at a point B (Figure 1) is determined by measuring the difference in height between two points, P and Q, situated at equal distances from point B and on either side of the latter (BP = BQ) and by multiplying the difference in height by $\frac{360}{\alpha}$. This shall be compared with the local pitch as calculated from the face offsets for the same points.

There shall be four pitch measurements for Class S, three for Class I, and two for Class II. These measurements shall be consecutive (the initial point of each measurement coinciding with the final

point of the adjacent measurement). Each measurement span shall be sufficiently long to maintain adequate accuracy in the pitch measurement in compliance with Clause 16. Where necessary, the number of measurements may be reduced in order to comply with the latter requirement.

7.7 The pitch per radius and per blade is determined for each radius by multiplying the difference in height between the most distant measuring points at each radius by $\frac{360}{\alpha}$.

7.8 The average pitch per blade is defined as the arithmetic mean (average) of the measured pitches per radius for the blade in question.

7.9 The average pitch for the screw propeller is defined as the arithmetic mean of the average pitches per blade.

8 Tolerances on the extreme radius of the screw propeller

8.1 The tolerances in Table 4 are expressed as percentages of screw propeller radius and as minimum absolute values.

Table 4 — Radius tolerance

Specification	Class			
	S	I	II	III
Tolerance	±0,2 %	±0,3 %	±0,4 %	±0,5 %
but not less than	1,5 mm	1,5 mm	2 mm	2,5 mm

8.2 In the case of a ducted propeller, these tolerances may need to be reduced.

9 Tolerances on the thickness of the blade section

Table 5 — Blade thickness tolerance

Specification	Class			
	S	I	II	III
Plus tolerances	+2 %	+2,5 %	+4 %	+6 %
but not less than	2 mm	2,5 mm	4 mm	6 mm
Minus tolerances	−1 %	−1,5 %	−2 %	−4 %
but not less than	−1 mm	−1,5 mm	−2 mm	−4 mm

9.1 The thickness shall be measured at the same radii as those at which the pitch is measured.

9.2 The tolerances in Table 5 are expressed as percentages of the local thickness and as minimum absolute values.

9.3 The maximum thicknesses indicated on the drawing shall not be less, after deduction of the minus tolerance, than the thicknesses required be the Classification Society concerned.