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**Ships and marine technology — Loose  
gear of lifting appliances on ships —  
Pulleys**

*Navires et technologie maritime — Accessoires mobiles des appareils  
de levage sur les navires — Poulies*

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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.

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](http://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](http://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 4, *Outfitting and deck machinery*.

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# Ships and marine technology — Loose gear of lifting appliances on ships — Pulleys

## 1 Scope

This International Standard specifies the structural types, basic parameters, technical requirements, test methods, inspection rules, marking, storage, and transportation of sheaves, loose gear of lifting appliances on ships.

This International Standard is applicable to hot-rolled sheaves of lifting appliances on ships.

## 2 Normative references

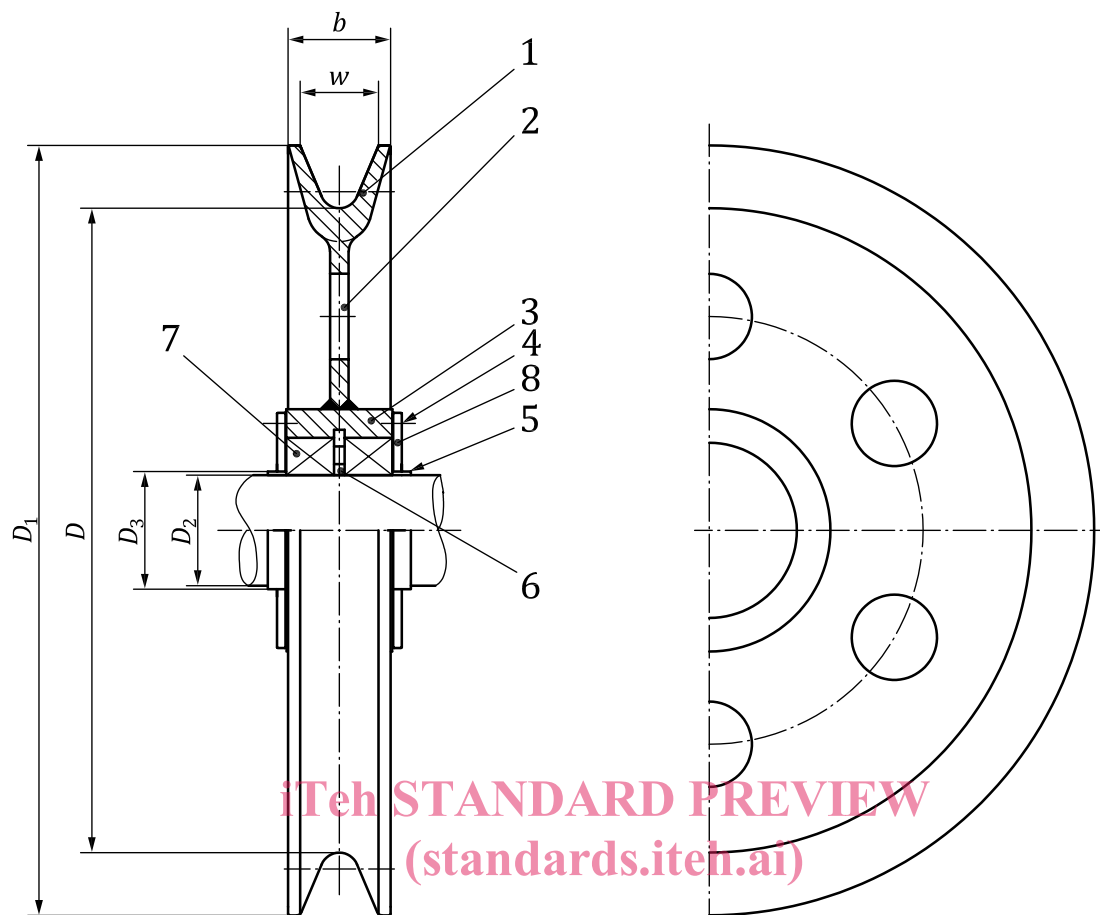
The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16855, *Ships and Marine Technology — Loose gear of lifting appliances on ships — General requirements*

## 3 Sheave components

For the components and basic dimensions of hot-rolled sheaves, see [Figure 1](#).

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**Key**

- 1 rim
- 2 plate
- 3 hub
- 4 bolt
- 5 spacer
- 6 spacer sleeve
- 7 bearing
- 8 dust washer (optional)

**Figure 1 — Sheave components**

## 4 Designation of sheaves

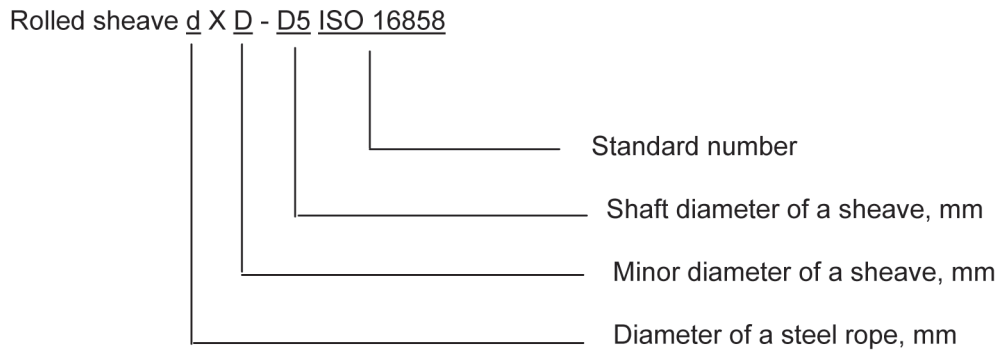


Figure — Example

## 5 Technical requirements

### 5.1 Materials

The materials of sheave components shall comply with the provisions in [Table 1](#).

**Table 1 — Requirements of component materials**  
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Component name	Materials
Rim, plate, hub	$\sigma_s \geq 235$ MPa for common carbon steel
Spacer	$\sigma_s \geq 235$ MPa for common carbon steel or $\sigma_b \geq 160$ MPa for gray cast-iron
Spacer sleeve	$\sigma_s \geq 600$ MPa for quality carbon steel
Bolt	Above grade 8,8 specified in ISO 898
Dust cover	Wool felt

### 5.2 Ranges

For the ranges of sheaves, see [Annex A](#).

### 5.3 Process

#### 5.3.1 Rims and web

The rims and web of sheaves shall be manufactured from a single steel piece, with groove produced by hot rolling process.

#### 5.3.2 Welding and weld

**5.3.2.1** Welding materials used for sheaves shall match the strength of welded materials, in accordance with International Standards.

**5.3.2.2** The rims and hubs of sheaves shall be welded with groove weld, with double groove preferred. The types of weld shall be in accordance with the related provisions of ISO.

**5.3.2.3** The appearance shall have no quality defects such as steel pits, splashes, slag, undercuts, and surface cracks after welding.

5.3.2.4 After welding of rims and hubs, and before machining of sheaves, the sheave weld shall be adequately stabilized through thermal or vibratory stress relief, to ensure dimensional stability.

5.3.3 Surface treatment

5.3.3.1 The surface roughness of rope grooves shall not be less than 12,5; their surface hardness shall be HB260 minimum.

5.3.3.2 Machining positions of sheaves and open positions such as spacer sleeves shall be painted with antirust oil to prevent corrosion; non-machining positions shall be painted with antirust paint after the surface removal of rust.

5.4 Assembly requirements

5.4.1 Components can be assembled only after they pass tests.

5.4.2 Rolling bearings shall be cleaned before assembly, with clean, rustless, and burr-free contact surface.

5.4.3 The fit between outer rings of rolling bearings and hubs of sheaves is N7; the fit between inner rings and shafts is n6.

5.4.4 After assembly, sheaves can turn flexibly around the shaft without blocking, when manually moved.

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5.5 Accuracy requirements

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5.5.1 For the requirements on the limit deviation of outside diameter  $D_1$ , see [Table 2](#).

**Table 2 — Requirements on limit deviation of outside diameter  $D_1$**

Dimension in millimetres

Outside diameter $D_1$	Limit deviation $t_1$
≤250	-0,5
>250-500	-1,0
>500-1 000	-1,5
>1 000-1 200	-2,0
>1 200-1 500	-2,5
>1 500-1 800	-3,0
>1 800-2 000	-3,5

5.5.2 For the requirements on the limit deviation of groove minor diameter  $D$ , see [Table 3](#).



**Table 3 — Requirements on limit deviation of groove minor diameter  $D$** 

Dimension in millimetres

Groove minor diameter $D$	Limit deviation $t_2$
$\leq 250$	+2,5
>250–500	+3,0
>500–1 000	+4,0
>1 000–1 200	+5,0
>1 200–1 500	+6,0
>1 500–1 800	+7,0
>1 800–2 000	+8,0

5.5.3 For the requirements on the limit deviation of groove radius  $R$ , see [Table 4](#).

**Table 4 — Requirements on limit deviation of groove radius  $R$** 

Dimension in millimetres

Basic dimensions $R$	Limit deviation $t_3$
$\leq 15$	+1,0
>15–30	+1,5

5.5.4 For the limit deviation of rim width ( $W + 2$  m), see [Table 5](#).

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Dimension in millimetres

Rim width ( $W + 2$ m)	Limit deviation $t_4$
$\leq 50$	+2
$\leq 75$	+3
$\leq 108$	+4
$\leq 136$	+5

5.5.5 The lateral run-out tolerance of grooves (see [Figure 2](#)) shall comply with the requirements given in [Table 6](#).

**Table 6 — Lateral run-out tolerance of grooves**

Dimension in millimetres

Groove minor diameter $D$	Limit deviation $t_5$
$\leq 250$	2,0
>250–500	2,5
>500–1 000	3,0
>1 000–1 200	4,0
>1 200–1 500	5,0
>1 500–1 800	6,0

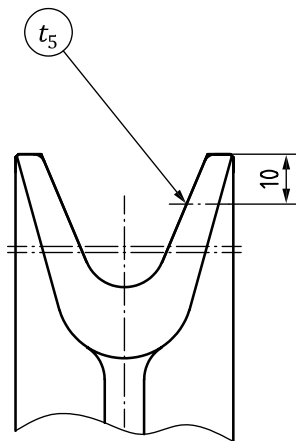


Figure 2 — Lateral run-out tolerance of grooves

5.5.6 Cycle run-out  $t_6$  at the minor diameter  $D$  of sheaves shall comply with Formula (1) (see also [Figure 3](#)):

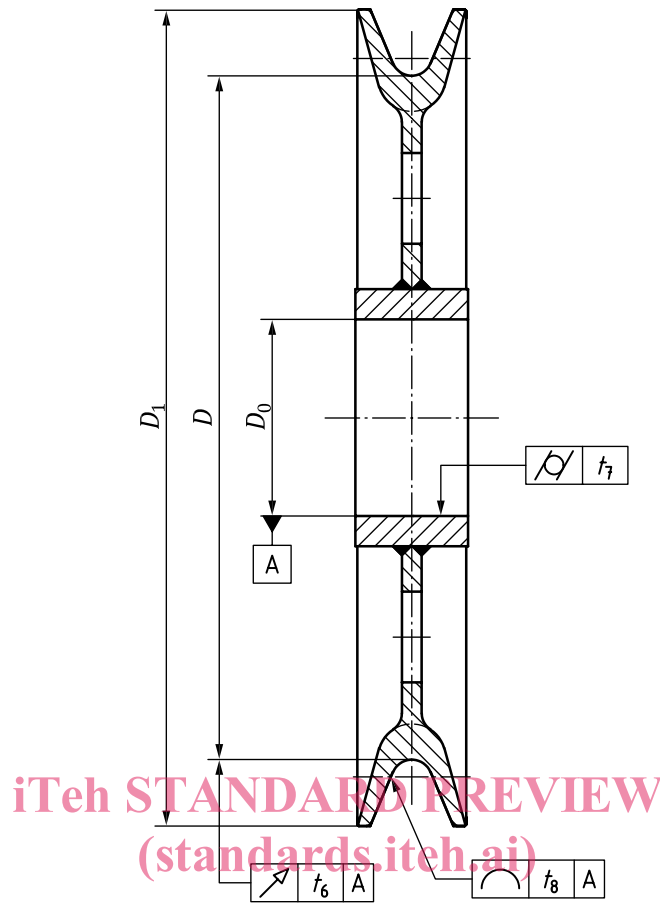
$$t_6 \leq \frac{2,5}{1000} \times D \quad (1)$$

5.5.7 Cylindricity tolerance  $t_7$  at the hub bore  $D_0$  shall comply with Formula (2) (see also [Figure 3](#)):

$$t_7 \leq \frac{\text{tolerance zone of } D_0}{2} \quad (2)$$

5.5.8 Profile tolerance  $t_8$  of a line within the tolerance zone of groove radius shall comply with Formula (3) (see also [Figure 3](#)):

$$t_8 \leq \text{limit deviation } t_3 \text{ of groove radius } R \quad (3)$$



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**Figure 3 — Cylindricity tolerance  $t_7$  at hub bore  $D_0$**

## 5.6 Special explanations

For other hot-rolled sheaves (different from that in 5.1, 5.2, 5.3, and 5.4 in terms of components, materials, process, assembly requirements, and accuracy requirements), strength shall be calculated during the design and the result shall meet the test requirements of Clause 6, and such sheaves can also be used in lifting appliances on ships, with the special consent of related organizations (such as classification societies) or as agreed on by the supplier and the purchaser.

## 6 Test requirements

Test requirements should be in accordance with the test requirements for blocks in ISO 16855.

## 7 Inspection rules

Sheaves shall be inspected and tested by the quality control department of the manufacturer according to the technical requirements and test methods of this International Standard. Inspection shall be made with the items listed in Table 8.