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Inland navigation vessels — Manually- and power-operated coupling devices for rope connections of pushing units and coupled vessels — Safety requirements and main dimensions

Bateaux de navigation intérieure — Treuils d'accouplement manoeuvrés à la main ou motorisés pour les liaisons de câbles des convois poussés et les formations à couple — Exigences de sécurité et dimensions principales

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Foreword

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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).

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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 7, *Inland navigation vessels*.

This fourth edition cancels and replaces the third edition (ISO 6218:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— the limitation of the rope speed has been deleted (former Clause 4.3);

— the minimum drum diameter has been changed to be 12 times the maximum rope diameter;

— “wire rope” has been replaced with "rope", because the use of wire- or textile-ropes is not relevant in this document;

— editorial corrections have been made and the figures have been improved.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Inland navigation vessels — Manually- and power-operated coupling devices for rope connections of pushing units and coupled vessels — Safety requirements and main dimensions

1 Scope

This document specifies dimensions and safety requirements for manually operated and power-operated coupling devices used for assembling inland navigation vessels as push tows or for coupling vessels alongside by means of rope connections. The coupling device secures the stable positioning of the coupled vessels.

Safety requirements to protect operators from accidents during the creation, operation, and separation of the rope connections of push tows and vessels coupled alongside are specified in this document.

It also gives rules for designation and testing.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 3730, *Shipbuilding and marine structures — Mooring winches*

ISO 4014, *Hexagon head bolts — Product grades A and B*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
manually operated coupling device
device in which a rope is tightened by turning a hand wheel

3.2
power-operated coupling device
device in which a rope is tightened by a power-driven equipment

3.3
tensioning device
ratchet spanner
tool used to increase the tension of the taut rope

3.4
straining force
force applied to the rope when either a specific tangential force is applied to the hand wheel, or when a specific force by a power-operated mechanism is applied to the gear

3.5
minimum breaking load
load at which the rope will break at the earliest

4 Safety requirements

4.1 General

4.1.1 Components

Manually operated coupling devices consist of a handwheel, a gear, a rope drum with rope fastening, a footbrake, an arresting device, and a winch plate, see Figure 1.

Manually operated coupling devices may have the following additional components (not illustrated in Figure 1):

— a tensioning device;

— a change gear.

Power-operated coupling devices consist of a power unit (e.g. electric motor, hydraulic power pack) with controls and gearing, a rope drum with rope fastening, an arresting device, and a winch plate, see Figure 2.

Electrical drives and control equipment shall meet the requirements in ISO 3730.

Accessory components for manually operated and power-operated coupling devices are the following (see Figures 1 and 2):

— a foundation;

— a guide track for the rope.

4.1.2 General requirements

The coupling device shall be constructed such that even under the most severe expected conditions, resulting, for example, from the size of the coupled vessels, the actuating power, the meteorological conditions, the wave height, etc., there is no danger to crew members, for example from breaking ropes, or crushing or shearing parts. The strength requirements according to ISO 3730 shall be fulfilled.

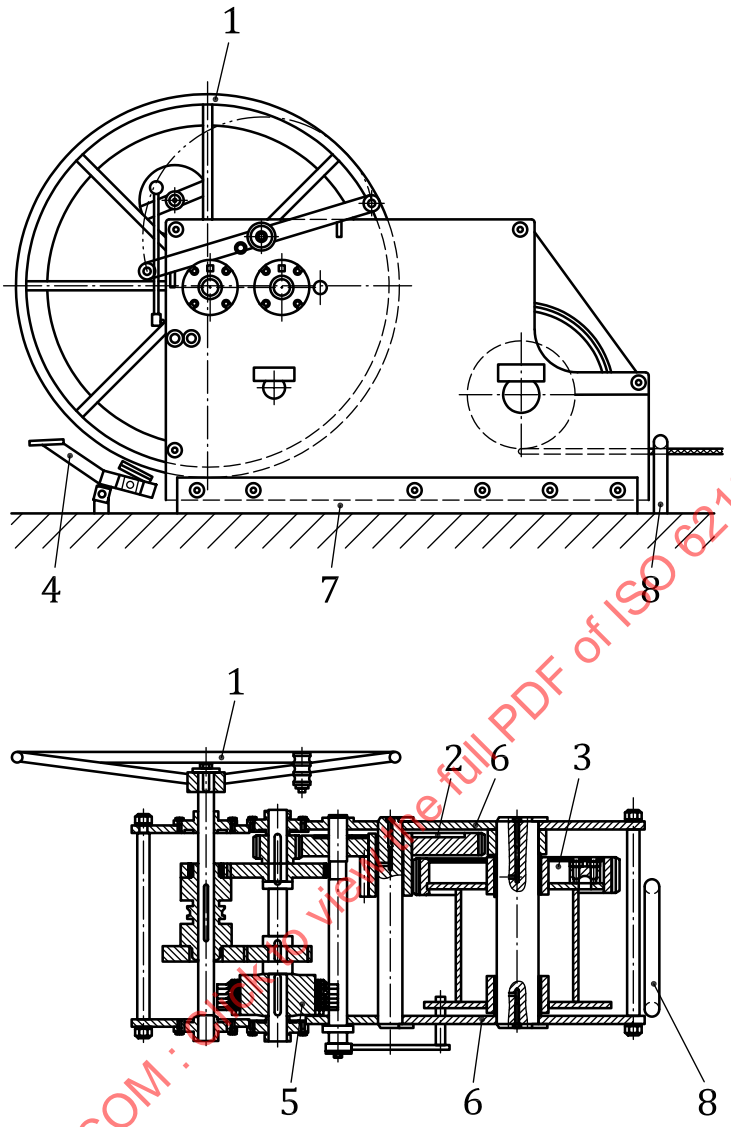
Combined coupling devices shall comply with the requirements for both manually- and power- operated coupling devices.

4.2 Limitation of the actuating power for power-operated coupling devices

The motor shall be equipped with a control device to the effect that the actuating power is limited to the maximum allowed power.

The motor power shall reduce automatically when the actual straining force has reached the intended straining force given in Table 1 so that the straining force cannot be exceeded by more than 10 %.

The loading test is specified in A.3.3 a).



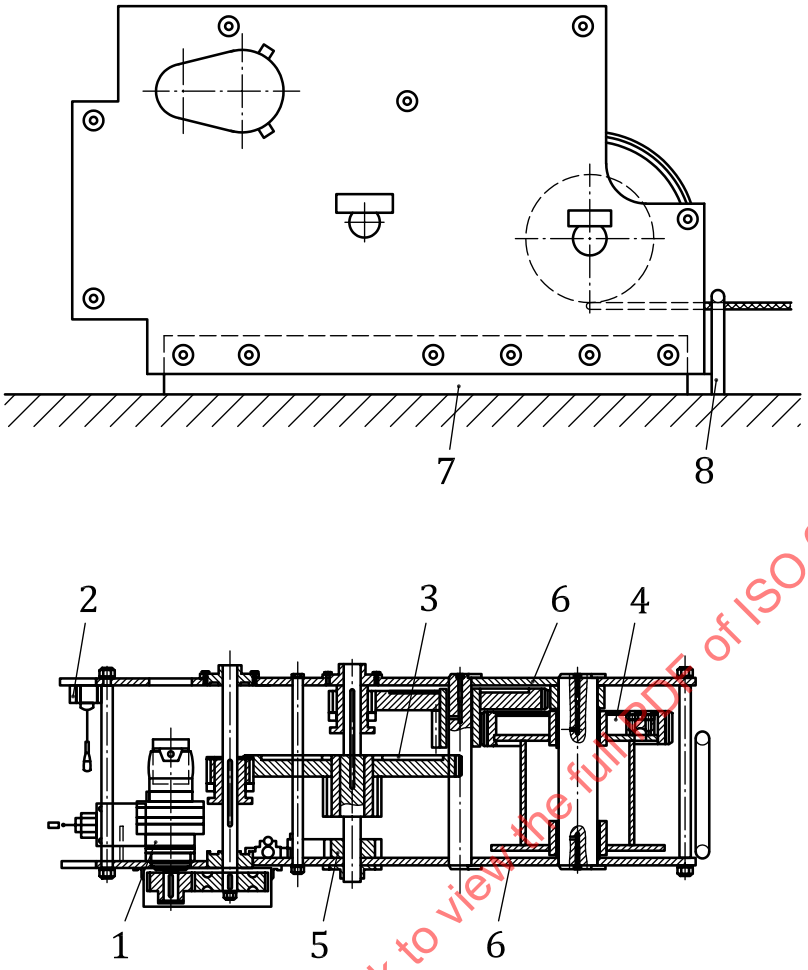
Key

1 handwheel
2 gear
3 rope drum with rope fastening
4 footbrake (only shown in side view)
5 arresting device
6 winch plate

Accessory parts:

7 foundation
8 guide track

Figure 1 — Components of manually operated coupling device — Example: M – R - 25



Key

1 power unit (e.g. electric motor, hydraulic motor)
2 controls
3 gear
4 rope drum with rope fastening
5 arresting device
6 winch plate

Accessory parts:

7 foundation
8 guide track

Figure 2 — Components of power-operated coupling device — Example: P – R - 25

4.3 Strength requirements

All parts of the coupling devices shall be designed and secured to withstand the minimum breaking load of the rope according to Table 1.

The loading test is specified in A.3.2 c) (manually operated coupling devices) and A.3.3 c) (power-operated).

5 Models

5.1 Operation

A distinction is made between

— manually operated (M), or

— power-operated (P), or

— combined (M/P)

coupling devices.

5.2 Position of handwheel/motor

A distinction is made between

— a left hand model (L) coupling device, with the hand wheel or the power-operated equipment and the drum on the left hand side of the gearing, and

— a right-hand model (R) coupling device, with the hand wheel or the power-operated equipment and the drum on the right hand side of the gearing,

when looking in the direction in which the rope is paid out. See Figure 3.

a) Left hand model **b) Right hand model**

Key

1 rope
2 handwheel/power-operated equipment
3 direction of view

Figure 3 — Models of coupling devices based on the position of the handwheel/motor

5.3 With or without tensioning device

For manually operated coupling devices, a further distinction is made between

— without tensioning device (Type NT), and

— with tensioning device (Type T).

6 Design

6.1 Rope drum

6.1.1 Drum capacity

Rope drums shall be dimensioned and constructed to prevent the ropes from running off at the side, e.g. by means of flanges that project above the top layer of the rope by at least 1,5 times the rope diameter.

6.1.2 Drum diameter

The drum diameter shall be not less than 12 times the maximum rope diameter.

6.1.3 Rope fastening

Ropes shall be fastened to the rope drum without kinking so that they do not slip off when being paid out.

6.2 Handwheel

6.2.1 Clearances

The vertical clearance between the outside diameter of the handwheel and the deck shall be at least 75 mm.

The horizontal clearance between the winch plate and the outer surface of the handwheel shall not exceed 200 mm, and the horizontal clearance between the winch plate and the inner surface of the handwheel shall be at least 75 mm.

Clearances are shown in Figure 4.

6.2.2 Construction

The handwheel shall be constructed so that when the coupling device is released there is no risk of jamming with rapid rotation of the handwheel as a result of the rope being paid out.

The handwheel shall be constructed so that it is not possible to reach through with the arm or to step in with the foot.

The clearance between the collars and the inner lining shall be at least 60 mm and shall not exceed 75 mm.

6.2.3 Handhold

Handwheels may be provided with a handhold. It shall be countersunk and shall not project beyond the outer plane of the handwheel. It shall be fitted with a rotatable grip.

6.3 Power-operated equipment

The operating shall function automatically (dead man's switch) on-site, and an emergency switch off shall be available. In addition, a lead-out for a permanently installed remote control in the wheelhouse may be provided.

When releasing the coupling device, there shall be no danger for the operator. The release of the coupling device shall be controlled with a gentle start-up.

6.4 Combined operating modes

The operating modes of combined coupling devices shall be interlocked against each other in such a way that the motor cannot actuate the hand wheel.

6.5 Arresting device

6.5.1 General

Coupling devices shall be equipped with a reliable arresting device which operates automatically to prevent uncontrolled unwinding of the rope under load during operation.

6.5.2 Arresting devices for manually operated coupling devices

The arresting device shall be designed, constructed and arranged to be released safely and without any danger by one person operating the footbrake without any further tensioning of the rope by operating the handwheel.

6.5.3 Arresting devices for power-operated coupling devices

The arresting device shall be designed, constructed and arranged to be released without any danger, i.e. to prevent the uncontrolled unwinding of the rope under load.

6.6 Protective device

The danger areas on the coupling devices (e.g. gearwheels) shall be fitted with a cover to prevent accidental contact. The cover shall be made of sufficiently resistant material and shall be attached in a way that it is not removable without the use of a tool.

6.7 Footbrakes for manually operated coupling devices

Manually operated coupling devices shall be equipped with a footbrake that prevents the rope from being paid out under load when the arresting device is released. The footbrake shall operate smoothly and steplessly.

It shall be capable of holding a load of 1,5 times the tension force as given in Table 1.

The loading test is specified in A.3.2 b).

6.8 Brakes for power-operated coupling devices

Power-operated coupling devices shall be equipped with a brake that prevents the rope from being paid out under load when the arresting device is released. The brake system shall

— be actuated manually,

— operate smoothly, and

— be steplessly releasable.

The brake shall be able to hold a load of at least 1,5 times the tension force given in Table 1. The braking device and the arresting device may be one component.

The loading test is specified in A.3.3 b).

6.9 Gears

Coupling devices shall be equipped with gears with which it is possible to apply the straining force to the rope as specified in Table 1. For manually operated coupling devices, the force applied to the handwheel to obtain the specified straining force shall not exceed 500 N.

The loading test is specified in A.3.2 a).

6.10 Tensioning device for manually operated coupling systems

If a manually operated coupling device is equipped with a gear, which for constructional reasons cannot fulfil the requirements according to 6.9, this device shall additionally be equipped with a secondary tensioning device. This secondary tensioning device shall be designed so that with a force of maximum 500 N the tension force required in Table 1 can be applied to the rope. If the handle of the secondary tensioning device is not permanently fixed to the coupling device, it shall not be possible that it unintentionally becomes loose during operation by itself.

6.11 Change gear for manually operated coupling devices

Manually operated coupling devices may be equipped with a change gear.

NOTE A change gear is used for handwheels with a high gear transmission ratio to enable the operation in different speeds for powerful tensioning and quick winding.

6.12 Foundation

As accessory part serves a foundation (F) consisting of two flat steel bars and fastening bolts, see Figure 6 and Table 4.

6.13 Guide track

As further accessory part serves a guide track (C) consisting of a round bar, see Figure 1 and Figure 2.

7 Dimensions and characteristic values

7.1 General

For general tolerances, ISO 2768-1, c, shall apply.

Coupling devices need not comply with the design illustrated here; however, the dimensions shall be adhered to.

7.2 Characteristic values

Table 1 lays down the straining force of the coupling device and the minimum breaking load of the rope that is required for each nominal size.

The loading test for manually operated coupling devices is specified in A.3.2 a), and for power-operated coupling devices in A.3.3 a).

Table 1 — Characteristic values – Manually and power-operated coupling devices

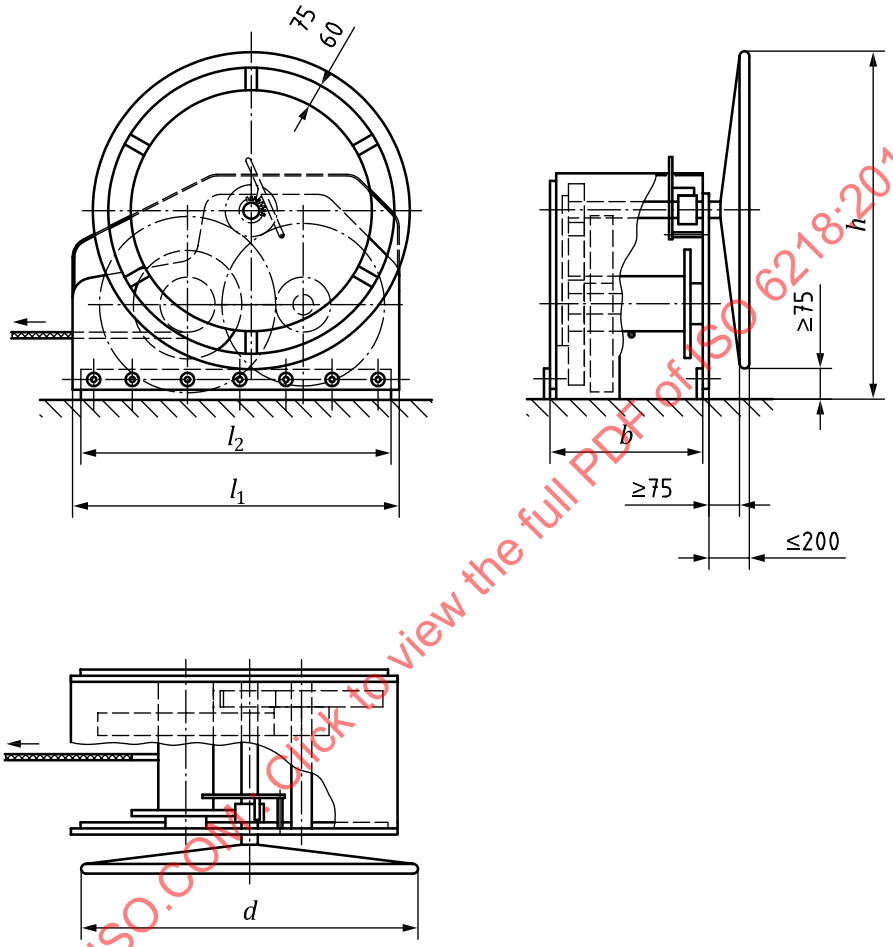
Nominal size	Straining force kN	Minimum breaking load of the rop shall be not higher than kN
10	18	100
25	40	250
40	45	400
60	65	600

7.3 Main dimensions of the coupling device

7.3.1 Manually operated coupling device

The main dimensions are shown in Figure 4 and Table 2. Dimensions for d_2, e, l_2, and p_1 to p_4 as well as the number n are given in Table 4.

Dimensions in millimetres



Key

b width (distance from the outside of one winch plate to the inside of the other winch plate)
d diameter of the handwheel
h overall height
l_1 overall length
l_2 connecting length of the foundation bar to the deck

Figure 4 — Manually operated coupling device, main dimensions — Example: M – L - 25 (model with partially braced handwheel; protective device and footbrake not shown)

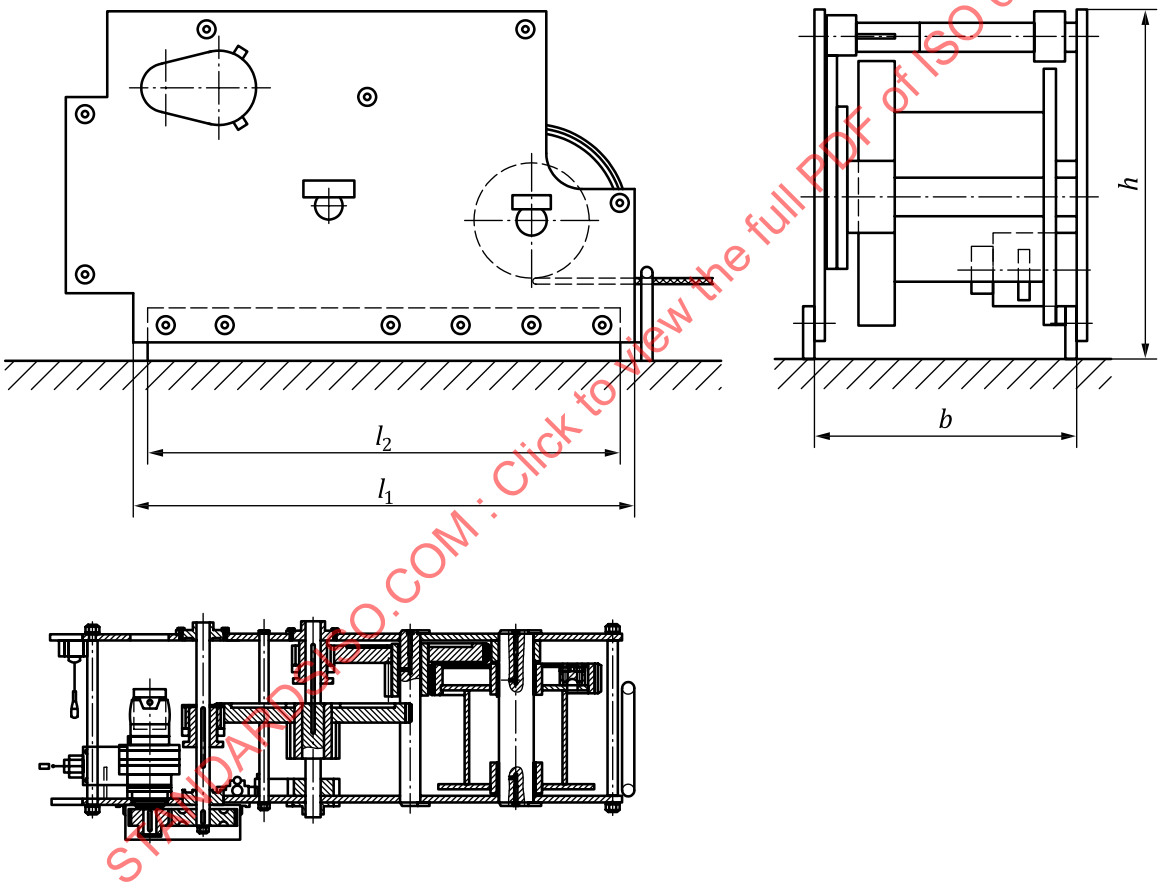
Table 2 — Main dimensions of manually operated coupling devices

Dimensions in millimetres

Nominal size	Main dimensions				
	b	d max.	h max.	l_1 max.	l_2
10	247	At the choice of the manufacturer			535
25	374	825	900	850	800
40	492	1 175	1 250	1 250	1 000
60	492	1 300	1 375	1 300	1 200

7.3.2 Power-operated coupling devices

The main dimensions are shown in Figure 5 and Table 3. Dimensions for d_2, e, l_2, and p_1 to p_4 as well as the number n are given in Table 4, see Figure 6.



Key

b width (distance from the outside of one winch plate to the inside of the other winch plate)

h overall height

l_1 overall length

l_2 connecting length of the foundation bar to the deck

Figure 5 — Power-operated coupling device, main dimensions — Example of P – R - 25

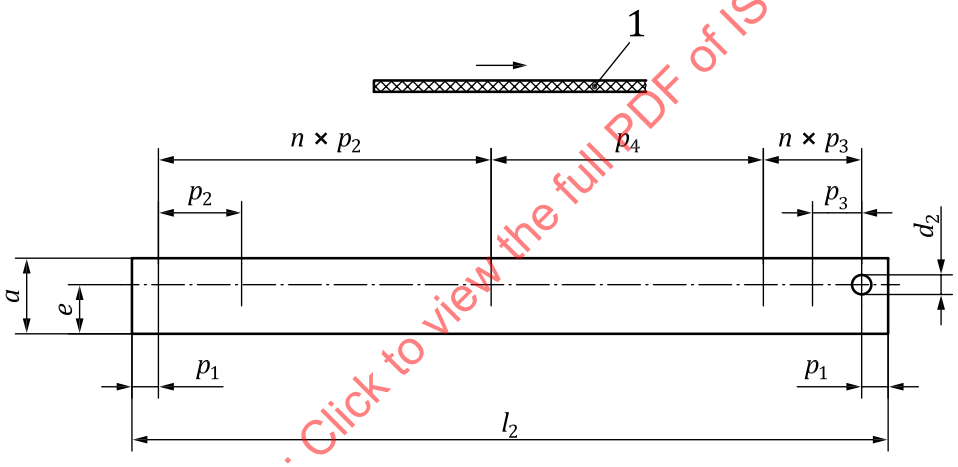
Table 3 — Main dimensions of power-operated coupling devices

Dimensions in millimetres

Nominal size	Main dimensions			
	b	h max.	l_1 max.	l_2
10	247	400		535
25	374	600	850	800
40	492	800	1 250	1 000
60	492	1 000	1 300	1 200

7.4 Foundation

See Figures 6 and 7, and Table 4.

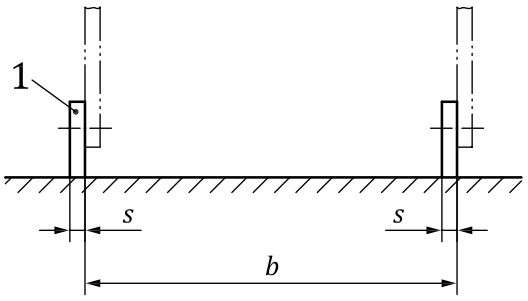


Key

1 direction of pull of the rope

Figure 6 — Foundation bar

Dimensions in millimetres



Key

1 foundation bar

Figure 7 — Location of the foundation bars