INTERNATIONAL STANDARD

ISO 7365

Second edition
2012-07-01

Shipbuilding and marine structures — Deck machinery — Towing winches for deep sea use

Construction navale et structures maritimes — Auxiliaires de pont — Treuils de remorque pour haute mer

Reference number
ISO 7365:2012(E)

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Published in Switzerland

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7365 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

This second edition cancels and replaces the first edition (ISO 7365:1983), which has been technically revised.

Shipbuilding and marine structures — Deck machinery — Towing winches for deep sea use

1 Scope

This International Standard specifies requirements for the design, operation, performance and acceptance tests of towing winches having electric, hydraulic, diesel or steam drive.

It is applicable to towing winches for deep sea use.

It does not consider fibre rope winches but does not exclude their use.

2 Normative references

The following referenced documents are indispensable for the application 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 2408, *Steel wire ropes for general purposes — Minimum requirements*

ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 6482, *Shipbuilding — Deck machinery — Warping end profiles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3828 and the following apply.

3.1 General terms

3.1.1
nominal speed
maximum speed of hauling and rendering ropes maintained by winches under drum load

3.1.2
rendering load
maximum rope tension at the drum exit when the drum just starts to rotate in the opposite direction to the applied driving torque, the prime mover being set for limited torque, with a first layer of the rope wound on the drum

3.2 Types of winches (see Figure 1)

3.2.1
right-hand winch
winch where the reduction gear or drive of the drum(s) is on the right-hand side of the drum(s), in relation to an observer situated on the side of the motor, power supply or local controller

3.2.2
left-hand winch
winch where the reduction gear or drive of the drum(s) is on the left-hand side of the drum, in relation to an observer situated on the side of the motor, power supply or local controller

3.2.3
central winch
winch where the reduction gear or drive of the drum(s) is in the middle of the two drums

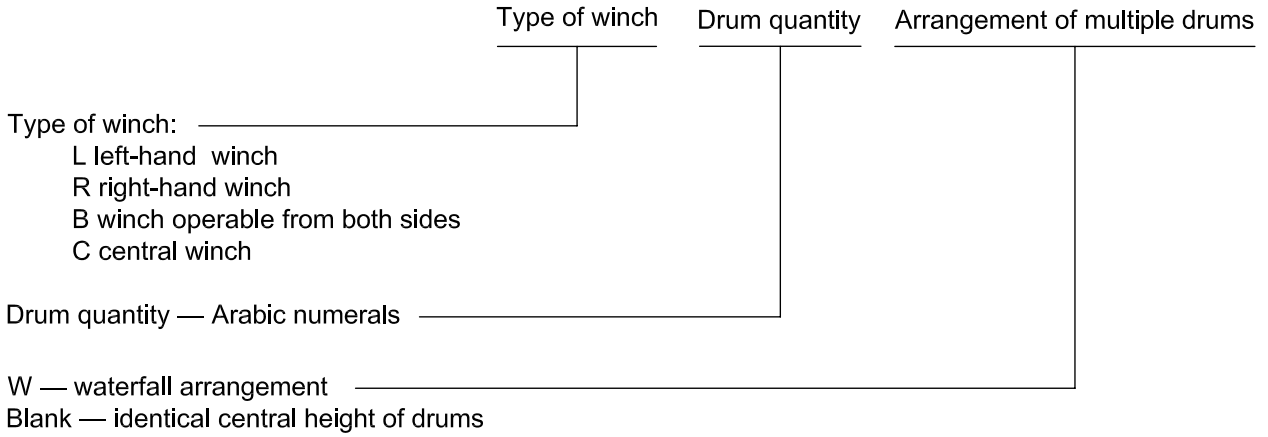
3.2.4
winch operable from both sides
winch where the reduction gear or drive of the drum(s) is on both sides of the drum

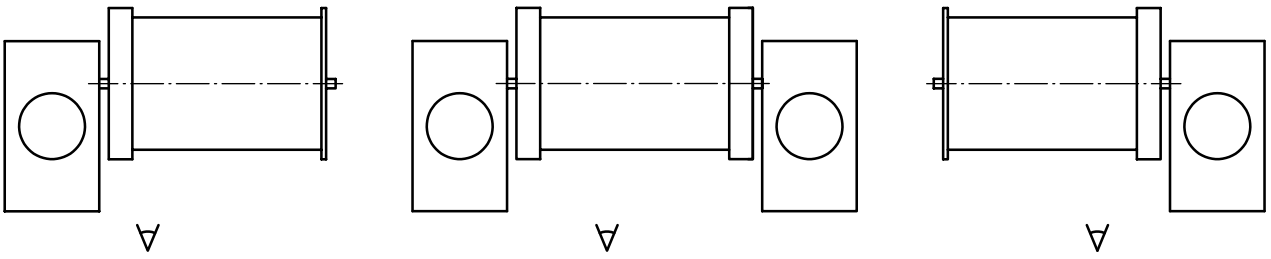
3.2.5
waterfall winch
winch where multiple drums are arranged from high to low

3.2.6
structural form of winches
code representing a winch related to the relative position of drums to power supply, drum quantity and height of drum center

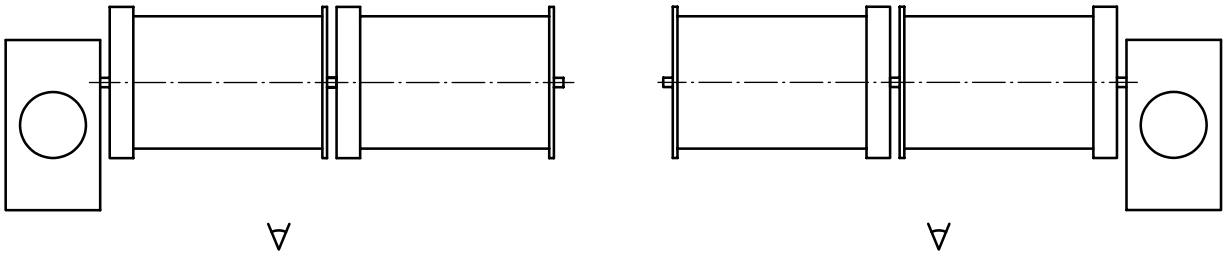
NOTE 1 Structural form codes appear in brackets next to the subheadings in Figure 1.

NOTE 2 The designation of structural form codes is shown in the diagram below.

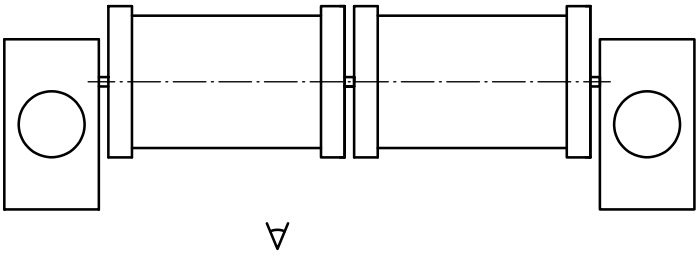




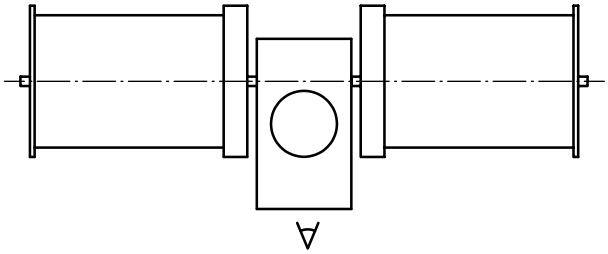
Single left-hand winch (L1) Single winch operable from both sides (B1) Single right-hand winch (R1)



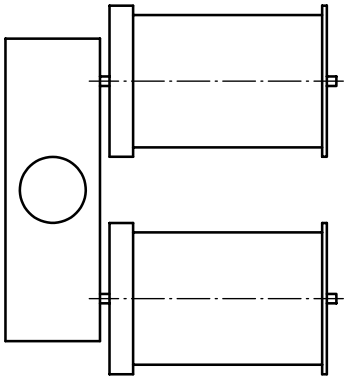
Double left-hand winch (L2) Double right-hand winch (R2)



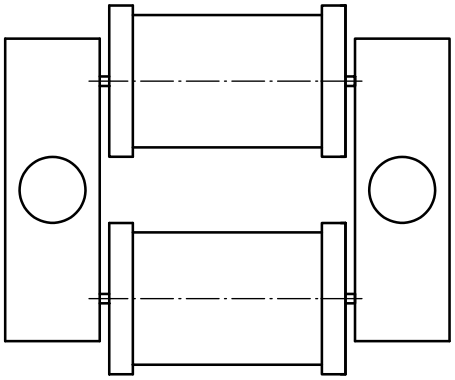
Double winch operable from both sides (B2)



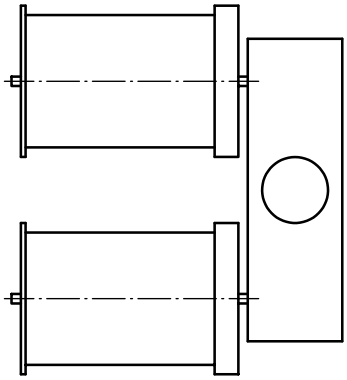
Double central winch (C2)



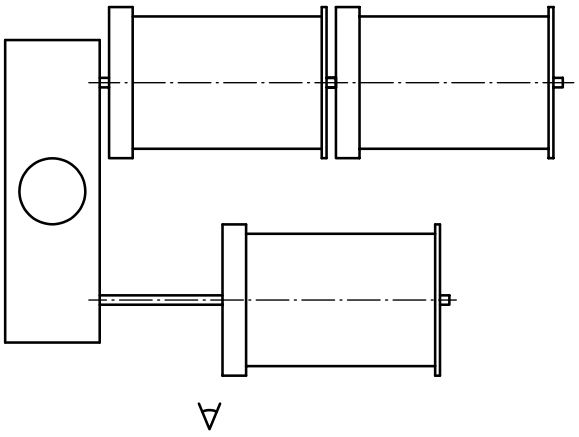
Double left-hand
waterfall winch (L2W)



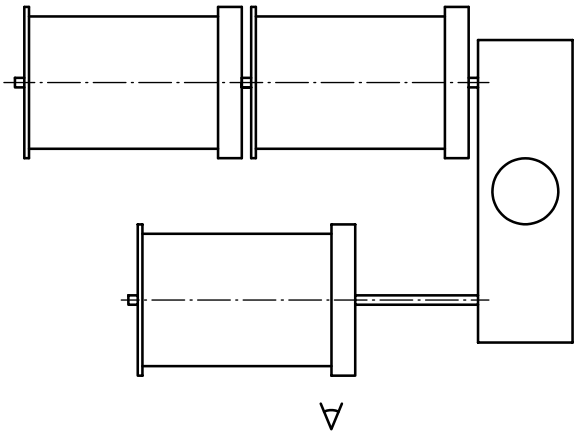
Double waterfall winch
operable from both sides (B2W)



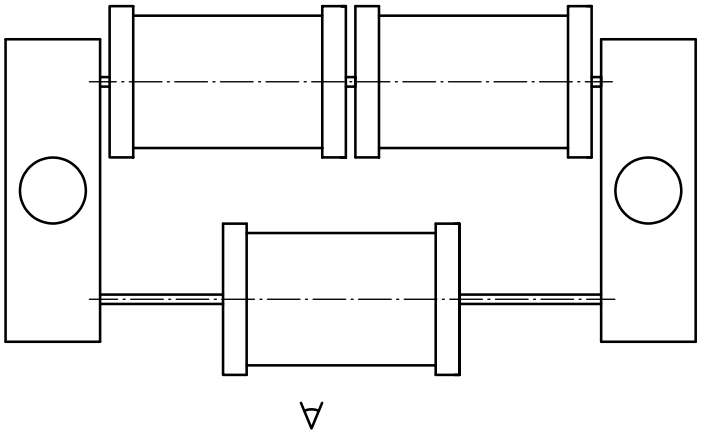
Double right-hand
waterfall winch (R2W)



Triple left-hand waterfall winch (L3W)



Triple right-hand waterfall winch (R3W)



Triple waterfall winch operable from both sides (B3W)

Figure 1 — Diagrams of winch types

4 Design and operation

4.1 Material stresses

The manufacturer of the winch shall be responsible for determining the strength requirements of the component parts of the winch to withstand all loads of the respective nominal sizes, as specified in Table 2.

4.2 Basic calculation

4.2.1 Stalling load of the winch

The allowable calculated stresses of any affected part of the winch, based on simple elastic theory, shall not be greater than 0,9 times the upper yield strength (R_{eH}), or 0,2 % of proof strength, of a non-proportional extension ($R_{P0.2}$) of the material.

4.2.2 Drum load of the winch

The allowable calculated stresses of any affected part of the winch, based on simple elastic theory, shall not be greater than 0,4 times the upper yield strength (R_{eH}), or 0,2 % of proof strength, of a non-proportional extension ($R_{P0.2}$) of the material.

4.2.3 Holding load of the winch

The allowable calculated stresses of any affected part of the winch, based on simple elastic theory, shall not be greater than 0,9 times the upper yield strength (R_{eH}), or 0,2 % of proof strength, of a non-proportional extension ($R_{P0.2}$) of the material.

4.3 Load alarm device

Provisions shall be made to incorporate an alarm device giving an alarm signal at 50 % of wire-breaking load.

4.4 Brakes

4.4.1 Electric winches shall be provided with an automatic braking system which operates when the controls are put in the stop or braking position, and also when there is no tension on the winch. The brake shall be capable of holding a load of 1,25 times the drum load, and of stopping the rotation of the drum from its maximum speed

without suffering damage. For other types of drive, a suitable braking system shall be agreed upon between the manufacturer and purchaser. Such a system shall be capable of holding a load of 1,25 times the drum load.

4.4.2 All winches shall be provided with a drum brake (towing brake) with the functions of a normal brake and emergency brake. The emergency brake shall not be less than 80 % of the breaking strength of the rope, without conventional power supply. For the holding load of a normal brake, see 5.1.1. If this brake is power operated, it shall also be capable of manual operation.

4.5 Drum design

4.5.1 Design basis rope

For design purposes, the drum shall be based on an eight-strand rope manufactured from 1 770 N/mm^2 or 1 960 N/mm^2 tensile grade steel rope in accordance with Table C.10 of ISO 2408.

NOTE The above requirement does not preclude the use of other types of rope in service.

Unless otherwise agreed between the purchaser and manufacturer, the breaking strength of ropes is selected according to Table 1.

Table 1 — Relationship between rope minimum breaking strength and drum load

Drum load T	Utilization coefficient K
$T \leq 200$ kN	$K = 2.5$
$T \geq 1\,000$ kN	$K = 2$
$T = 200$ approximately 1 000 kN	Linear Insertion
Breaking strength of ropes $Fmax = K \times T$	

4.5.2 Drum diameter

The drum diameter shall not be less than 14 times the diameter of the design-basis rope (see Table 2).

4.5.3 Drum capacity

For guidance, normal capacity is given in Table 2. Individual requirements may be specified by the purchaser.

The rules of the competent authorities of flag states shall apply.

4.5.4 Drum length

The drum shall be designed to accommodate at least 50 m of steel cable on the inner layer.

4.5.5 Drum flange height

When all the rope is reeled on a drum, the flange shall project at least 1,5 times the rope diameter above the outermost layer.

4.5.6 Connection strength of rope and drum

The breaking load of the rope attachment to the drum shall be at most 15 % of the breaking strength of the rope.

4.5.7 Drum clutch

The drum shall be declutchable from the drive; the power-operated clutch shall also be declutchable manually.

4.6 Auxiliary equipment

4.6.1 Control panel and arrangement

The main control panel shall be placed in the navigation bridge with a clear view of the deck area, winch and rope guides.

Control panels for emergency stop and emergency release shall be placed locally at the winch and at the navigation bridge.

Other requirements for control panels shall be agreed between the manufacturer and purchaser.

4.6.2 Warping ends

A winch may be specified with or without warping ends. If warping ends are fitted for manual handling of steel rope, the pull on these shall not exceed 100 kN. The profile of warping ends shall be in accordance with ISO 6482.

4.6.3 Load measuring device

Winches shall be provided with continuous load monitors, which can at any time measure the loads on the steel rope from the drum during hoisting, rendering or braking operations, which can record instantaneous pull, and which have an overload alarm.

The wheelhouse shall be provided with load displays and anti-overload devices. Whether load displays and anti-overload devices shall be located beside the winch is negotiated between the manufacturer and purchaser.

4.7 Speed control

4.7.1 Winch speed

The speed of the winch shall be adjustable between stop and maximum within each gear step. It shall be possible to adjust the speed while the winch is working.

4.7.2 Direction of motion of operating devices

The rope shall be hauled in by a clockwise movement of a hand-wheel or crank handle, or alternatively, by movement of a hand-lever towards the operator. All operating parts shall be marked with permanent signs of the operating direction.

4.7.3 Return to stop position

Unless agreed otherwise between the manufacturer and purchaser, whatever the type of motive power, the operating device shall be designed to return to the stop position automatically when the operator releases the control.

4.8 Emergency release

4.8.1 The winch shall be designed to allow drum release in an emergency when hauling or rendering, or when the drum brake is applied. A maximum delay of 10 s from the moment the release is actuated to the drum being disengaged is acceptable.

4.8.2 Emergency means of releasing the drums shall be provided in the wheelhouse, if agreed between the manufacturer and purchaser.

4.8.3 The emergency release shall be effected by the actuation of one identical control in all situations, even if the usual power sources fail. It shall always be possible to carry out the emergency release, even during a black-out.

4.8.4 After an emergency release, the drum brakes shall again function normally at once. The winch motor shall not re-engage automatically after an emergency release.

4.8.5 Control handles, buttons, etc. for emergency release shall be protected against unintentional operation.

NOTE Attention is drawn to the existence in certain countries of national safety regulations affecting emergency release.

5 Performance specifications

For performance specifications of towing winches, see Table 2.

NOTE Rope diameter and strength grade as well as drum capacity, as specified in Table 2, may be negotiated by the manufacturer and purchaser.

5.1 Load requirements

The winch shall be capable of exerting, hauling, holding, stalling and rendering loads according to its nominal size, as specified in Table 2.

5.1.1 Holding load

The holding load shall not be less than the breaking strength of the rope.

5.1.2 Rendering load

The rendering load shall not be more than 0,5 times the breaking strength of the rope.

5.2 Speeds

Speeds shall be in accordance with Table 2.

6 Acceptance tests

The following factory tests shall be carried out before acceptance by the purchaser.

NOTE 1 These tests may take place at the factory or on board, as agreed by the manufacturer and purchaser.

NOTE 2 Attention is drawn to the requirements of national authorities or classification societies.

6.1 Drum brake holding test

The drum shall not rotate when a torque on the drum equal to the stated brake-holding torque is applied.

The holding load may be verified based on theoretical calculation, with a coefficient of friction of max 0,3 for design calculation, if agreed between the manufacturer and purchaser. Prototype test data are acceptable.

6.2 Operation under load

The drum load of the winch shall be hauled and veered for 15 min continuously.

During the test, the following shall be checked:

a) measurement of actual speed;

b) temperature of bearings;

c) power consumption;

d) operation of controls;

e) abnormal vibration and noise;

f) proper operation of rope guide, if so equipped.

6.3 Control system utility test

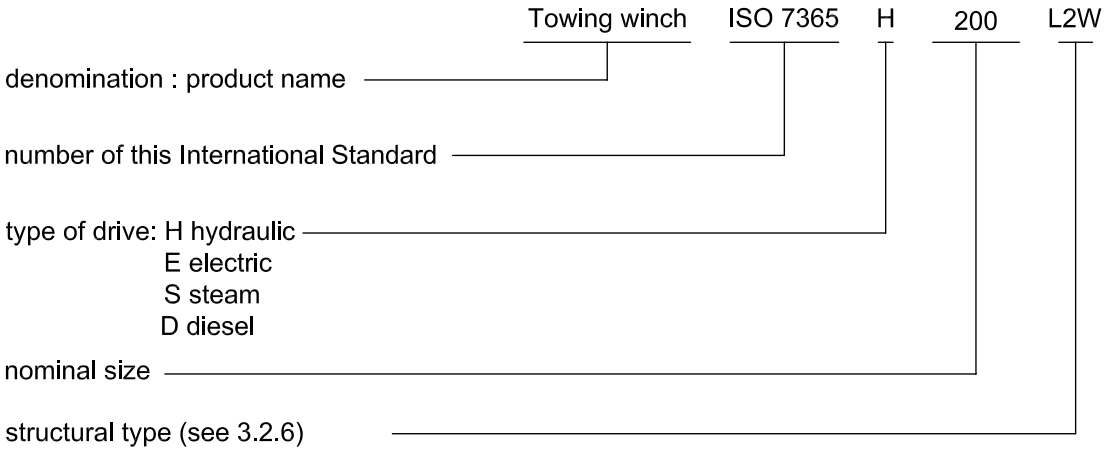
The proper operation of hauling or rendering, clutches, drum brakes, automatic braking system (if so equipped), alarm and measuring instruments besides the winch and control panel in the navigation bridge, shall be checked.

6.4 Emergency release test

The emergency release shall be tested when the winch is hauling or rendering without load or when the brake is applied.

7 Designation system

7.1 Designation of product models



EXAMPLE Designation of a towing winch according to ISO 7365, hydraulically powered, with drum load 2 000 (kN) and structural type L2W:

Towing winch ISO 7365-H-200-L2W

7.2 Nameplate

Towing winches shall be permanently mounted with the corrosion-resistant nameplate in a visible position with the following information:

a) product name;

b) product model;

c) drum load;

d) nominal speed;

e) holding load;

f) manufacturing number;

g) manufacturing date;

h) manufacturer name.

Table 2 — Performance specifications

1	2	3	4	5	6	7	8	9	10
Nominal size	**Drum load**	**Nominal speed** (min.)	**Light line speed** (min.)	**Creep speed** (max.)	**Design basis rope diameter**	**Design minimum breaking strength of rope**	**Holding load** (min.)	**Drum diameter** (min.)	**Drum capacity**
		see 3.1			see 4.5.1	see 4.5.1	see 5.1.1	see 4.5.2	see 4.5.3
	kN	m/s	m/s	m/s	mm	kN	kN	mm	m
10	100	0,125	0,25	0,05	20	252 [a]	252 [a]	280	450
16	160				26	426 [a]	426 [a]	364	500
20	200				28	547 [b]	547 [b]	392	500
25	250				32	645 [a]	645 [a]	448	550
32	320				36	817 [a]	817 [a]	504	600
40	400				40	1 010 [a]	1 010 [a]	560	750
56	560				44	1 350 [b]	1 350 [b]	616	750
63	630				45	1 410 [b]	1 410 [b]	630	850
80	800	0,08	0,16	0,04	52	1 700 [a]	1 700 [a]	728	1 000
100	1000				56	2 190 [b]	2 190 [b]	784	1 000
125	1250				60	2 510 [b]	2 510 [b]	840	1 200
160	1600				70	3 320 [c]	3 320 [c]	980	1 200
200	2000				78	4 130 [c]	4 130 [c]	1 092	1 500
250	2500				86	5 020 [c]	5 020 [c]	1 232	2 000
300	300				96	6 250 [c]	6 250 [c]	1 344	2 000
350	3500				102	7 060 [c]	7 060 [c]	1 428	2 500
400	4000				110	8 210 [c]	8 210 [c]	1 568	3 000
450	4500				116	9 130 [c]	9 130 [c]	1 652	3 000
500	5000				122	10 100 [c]	10 100 [c]	1 736	3 500
600	6000				134	12 200 [c]	12 200 [c]	1 904	3 500

[a] ISO 2408 rope grade 1 770 N/mm^2.

[b] ISO 2408 rope grade 1 960 N/mm^2.

[c] Not covered by ISO 2408 diameter series: rope grade 1 960N/mm^2.

ICS 47.020.50

Price based on 9 pages