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# International Standard



# 8369

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Large diameter steel wire ropes

*Câbles en acier de gros diamètres*

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**Descriptors** : metal products, wire rope, specifications, dimensions.

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8369 was prepared by Technical Committee ISO/TC 105, *Steel wire ropes*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

# Large diameter steel wire ropes

## 1 Scope and field of application

This International Standard specifies a range of steel wire ropes having a nominal diameter,  $d$ , between 64 and 205 mm.

NOTE — Steel wire ropes having a nominal diameter less than or equal to 60 mm are covered by ISO 2408.

Unless a specific request is made by the purchaser, the choice of construction within a group shall be left to the supplier's discretion.

Ropes for mine winding and aerial transportation purposes are not dealt with in this International Standard.

## 2 References

ISO 2232, *Drawn wire for general purpose non-alloy steel wire ropes — Specifications*.

ISO 2408, *Steel wire ropes for general purposes — Characteristics*.

ISO 3108, *Steel wire ropes for general purposes — Determination of actual breaking load*.

ISO 3178, *Steel wire ropes for general purposes — Terms of acceptance*.

ISO 3578, *Steel wire ropes — Standard designations*.

ISO 4346, *Steel wire ropes for general purposes — Lubricants — Basic requirements*.

## 3 Constructions and sizes of wire ropes

Ropes can be manufactured in right- and left-hand, ordinary or Langs lay. The construction and sizes of wire ropes are given in table 1.

Table 1

| Group  | Description                                                                                                                                                    | Range of nominal diameters<br>mm |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 6 × 19 | Six strands, 8 to 12 outer wires in a strand, two or three layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> . Wires equal laid (one operation).     | 64 ≤ $d$ ≤ 77                    |
| 8 × 19 | Eight strands, 8 to 12 outer wires in a strand, two or three layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> . Wires equal laid (one operation).   | 64 ≤ $d$ ≤ 96                    |
| 6 × 37 | Six strands, 14 to 18 outer wires in a strand, three or four layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> . Wires equal laid (one operation).   | 64 ≤ $d$ ≤ 115                   |
| 8 × 37 | Eight strands, 14 to 18 outer wires in a strand, three or four layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> . Wires equal laid (one operation). | 64 ≤ $d$ ≤ 140                   |
| 6 × 61 | Six strands, 20 to 24 outer wires in a strand, four to six layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> .                                       | 90 ≤ $d$ ≤ 140                   |
| 8 × 61 | Eight strands, 20 to 24 outer wires in a strand, four to six layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> .                                     | 115 ≤ $d$ ≤ 180                  |
| 6 × 91 | Six strands, 26 to 30 outer wires in a strand, six or more layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> .                                       | 103 ≤ $d$ ≤ 205                  |
| 8 × 91 | Eight strands, 26 to 30 outer wires in a strand, six or more layers of wire <sup>1)</sup> over a king wire <sup>2)</sup> .                                     | 140 ≤ $d$ ≤ 205                  |

1) Filler wires do not constitute a separate wire layer.

2) See 5.1.1. The king wire may be replaced by a multi-wire strand. If the king wire is replaced by a strand, it is considered as a single wire and the rope group remains unchanged.

## 4 Materials

### 4.1 Wire

All wires, except king and IWRC<sup>1)</sup> wires, shall comply with the requirements laid down in ISO 2232 except for the bend requirements.

The nominal tensile strength of the wires shall be given by the rope manufacturer.

The surface finish of the wire shall be bright or galvanized; the ropes, if galvanized, shall be quality B galvanized in accordance with ISO 2232.

### 4.2 Lubricants

Lubricants shall comply with ISO 4346.

## 5 Rope characteristics

### 5.1 Strand

**5.1.1** For the  $6 \times 19$ ,  $8 \times 19$ ,  $6 \times 37$  and  $8 \times 37$  groups, all wires shall be stranded in one operation. For the  $6 \times 61$ ,  $8 \times 61$ ,  $6 \times 91$  and  $8 \times 91$  groups, two stranding operations may be used.

**5.1.2** For all constructions, if the king wire in the strand becomes so large that it is considered undesirable, it is allowed, at the manufacturer's discretion, to replace it with a multi-wire strand manufactured in a separate stranding operation.

**5.1.3** If a king wire is replaced by a strand, it is considered as a single wire and the rope classification remains unchanged.

### 5.2 Rope

**5.2.1** All strands shall be of the same construction.

**5.2.2** The core shall be of steel wires.

**5.2.3** In galvanized ropes, all the wires shall be galvanized.

**5.2.4** Wire shall be joined by brazing or welding.

### 5.3 Rope lubrication

Unless a specific request is made by the purchaser, the choice of the type of lubrication shall be left to the supplier's discretion.

## 5.4 Rope diameter

### 5.4.1 Nominal diameter, $d$

The nominal rope diameter, expressed in millimetres, shall be that by which the rope is designated.

### 5.4.2 Measured (actual) diameter

The measured (actual) rope diameter shall be that obtained by measuring the rope using the method described in ISO 3178.

### 5.4.3 Tolerances

The measured (actual) rope diameter shall be within  $\pm 4\%$  of the nominal diameter.

## 5.5 Length

The length of rope supplied, expressed in metres, shall be that given on the order subject to the following tolerances :

- $\leq 400$  m :  $+\frac{5}{0}\%$
- $> 400$  m :  $+\frac{20}{0}$  m for each 1 000 m or part thereof

The rope length shall be measured under no load. Ropes required with smaller tolerance, e.g. ropes fitted with a terminal at each end, shall be the subject of a special agreement between the purchaser and the manufacturer.

For the length of test pieces, see ISO 3108.

## 5.6 Mass, $M$

The approximate rope mass, expressed in kilograms per 100 m, is calculated as follows :

$$M = Kd^2$$

where

$M$  is the approximate mass per unit length of the rope, in kilograms per 100 m;

$d$  is the nominal diameter of the rope, in millimetres;

$K$  is the empirical factor for the mass per unit length for a given rope construction, in kilograms per 100 metre square millimetres [ $\text{kg}/(100 \text{ m} \cdot \text{mm}^2)$ ].

For all ropes specified in this International Standard,  $K$  is taken as 0,415.

Approximate masses are given in table 2.

1) See ISO 3578.

Table 2

| Nominal diameter, <i>d</i> | Approximate rope mass |
|----------------------------|-----------------------|
| mm                         | kg/100 m              |
| 64                         | 1 700                 |
| 67                         | 1 860                 |
| 71                         | 2 090                 |
| 74                         | 2 270                 |
| 77                         | 2 460                 |
| 80                         | 2 660                 |
| 83                         | 2 860                 |
| 87                         | 3 140                 |
| 90                         | 3 360                 |
| 96                         | 3 820                 |
| 103                        | 4 400                 |
| 109                        | 4 930                 |
| 115                        | 5 490                 |
| 122                        | 6 180                 |
| 128                        | 6 800                 |
| 135                        | 7 560                 |
| 141                        | 8 250                 |
| 148                        | 9 090                 |
| 154                        | 9 840                 |
| 167                        | 11 570                |
| 180                        | 13 450                |
| 192                        | 15 300                |
| 205                        | 17 440                |

### 5.7 Minimum breaking force, $F_0$

The minimum breaking force, expressed in kilonewtons, is the load which shall be reached in the tensile test to destruction specified in ISO 3108.

$$F_0 = K_3 d^2$$

where

$F_0$  is the minimum breaking force, in kilonewtons;

$d$  is the nominal diameter of the rope, in millimetres;

$K_3$  is the empirical factor depending on the size of the rope as follows :

$$64 < d < 103 : K_3 = 0,726 - 0,001\,08\,d$$

$$109 < d < 154 : K_3 = 0,686 - 0,000\,78\,d$$

$$167 < d < 205 : K_3 = 0,652 - 0,000\,75\,d$$

Minimum breaking forces are given in table 3.

Table 3

| Nominal diameter, <i>d</i> | Minimum breaking force | Minimum breaking load <sup>1)</sup> |
|----------------------------|------------------------|-------------------------------------|
| mm                         | kN                     | t                                   |
| 64                         | 2 690                  | 274                                 |
| 67                         | 2 930                  | 299                                 |
| 71                         | 3 270                  | 333                                 |
| 74                         | 3 540                  | 361                                 |
| 77                         | 3 810                  | 389                                 |
| 80                         | 4 090                  | 417                                 |
| 83                         | 4 380                  | 447                                 |
| 87                         | 4 780                  | 487                                 |
| 90                         | 5 090                  | 519                                 |
| 96                         | 5 740                  | 585                                 |
| 103                        | 6 520                  | 665                                 |
| 109                        | 7 140                  | 728                                 |
| 115                        | 7 890                  | 805                                 |
| 122                        | 8 790                  | 896                                 |
| 128                        | 9 600                  | 979                                 |
| 135                        | 10 580                 | 1 079                               |
| 141                        | 11 450                 | 1 168                               |
| 148                        | 12 500                 | 1 275                               |
| 154                        | 13 420                 | 1 368                               |
| 167                        | 14 690                 | 1 498                               |
| 180                        | 16 750                 | 1 708                               |
| 192                        | 18 730                 | 1 910                               |
| 205                        | 20 940                 | 2 135                               |

1) In case of dispute, the values in kilonewtons shall take precedence.

$$\text{Conversion : } 1\,t = \frac{1}{9,806\,65}\,kN$$

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