



BSI Standards Publication

# **Steel wire and wire products — Steel wire for ropes**

Part 2: Cold drawn non alloy steel wire  
for ropes for general applications

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

**National foreword**

This British Standard is the UK implementation of EN 10264-2:2012. It supersedes BS EN 10264-2:2002, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/106, Wire Rod and Wire.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2012

ISBN 978 0 580 62605 0

ICS 77.140.65

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2012.

**Amendments issued since publication**

| Date | Text affected |
|------|---------------|
|------|---------------|

---

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 10264-2**

January 2012

ICS 77.140.65

Supersedes EN 10264-2:2002

English Version

**Steel wire and wire products - Steel wire for ropes - Part 2: Cold drawn non alloy steel wire for ropes for general applications**

Fils et produits tréfilés en acier - Fils pour câbles - Partie 2:  
Fils écrouis à froid par tréfilage en acier non allié pour  
câbles d'usages courants

Stahldraht und Drahterzeugnisse - Stahldraht für Seile -  
Teil 2: Kaltgezogener Draht aus unlegiertem Stahl für Seile  
für allgemeine Verwendungszwecke

This European Standard was approved by CEN on 19 November 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

Page

|                                                       |    |
|-------------------------------------------------------|----|
| Foreword.....                                         | 3  |
| 1 Scope .....                                         | 4  |
| 2 Normative references .....                          | 4  |
| 3 Product designation .....                           | 5  |
| 4 General conditions of manufacture .....             | 5  |
| 5 Characteristics of wire .....                       | 5  |
| 5.1 Tensile strength grades .....                     | 5  |
| 5.2 Requirements for wire characteristics .....       | 6  |
| 6 Test methods.....                                   | 10 |
| 6.1 General.....                                      | 10 |
| 6.2 Measurement of diameter .....                     | 10 |
| 6.3 Tensile test .....                                | 10 |
| 6.4 Reverse bend test .....                           | 10 |
| 6.5 Torsion test .....                                | 10 |
| 6.6 Inspection of zinc or Zn95/Al5 alloy coating..... | 10 |

## Foreword

This document (EN 10264-2:2012) has been prepared by Technical Committee ECISS/TC 106 "Wire rod and wires", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10264-2:2002.

This European Standard for wire for ropes is made up of the following parts:

- *Part 1: General requirements*
- *Part 2: Cold drawn non alloy steel wire for ropes for general applications*
- *Part 3: Round and shaped non alloyed steel wire for high duty applications*
- *Part 4: Stainless steel wire*

This European Standard has been technically revised to incorporate the following changes:

- a) additional standards have been referenced for manufacturing the drawn wires (see Clause 4);
- b) the purity of the zinc coating of the drawn wire has been specified according the relevant EN 1179 (see Clause 4);
- c) other tensile strength grades than those given in Table 1, have been allowed subject to an agreement between supplier and user at the time of order (see 5.1);
- d) other wires than those given in Table 1, have been allowed subject to an agreement between the customer and the supplier at the time of order (see 5.2);
- e) new values have been given in Table 2 "Requirements for mechanical characteristics of wire".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This part of this European Standard defines cold drawn non alloy steel wire used for the manufacture of:

- ropes for general applications and lifts;
- ropes for applications for which there is no specific EN standard.

This part of this European Standard does not apply to steel wire taken from manufactured ropes.

This part of this European Standard specifies the following for cold drawn non alloy steel wire for ropes for general applications:

- dimensional tolerances;
- mechanical characteristics;
- requirements relating to the chemical composition of the steel wire;
- conditions to be satisfied by any coating.

In addition to the requirements of this part of this European Standard, the requirements of EN 10264-1 also apply.

## 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.

EN 1179, *Zinc and zinc alloys — Primary zinc*

EN 10218-1, *Steel wire and wire products — General — Part 1: Test methods*

EN 10244-2, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc alloy coatings*

EN 10264-1, *Steel wire and wire products — Steel wire for ropes — Part 1: General requirements*

EN ISO 16120-1:2011, *Non-alloy steel wire rod for conversion to wire - Part 1: General requirements (ISO 16120-1:2011)*

EN ISO 16120-2:2011, *Non-alloy steel wire rod for conversion to wire - Part 2: Specific requirements for general-purpose wire rod (ISO 16120-2:2011)*

EN ISO 16120-4:2011, *Non-alloy steel wire rod for conversion to wire - Part 4: Specific requirements for wire rod for special applications (ISO 16120-4:2011)*

### 3 Product designation

The designation of round wire for ropes, covered by this part of EN 10264, shall be based on the nominal diameter ( $d$ ), surface appearance and tensile strength classification. The abbreviation for the surface finish condition is:

- U (uncoated) for bright wire;
- A or B for zinc or zinc alloy coating depending on coating class.

A distinction is made between a zinc and a zinc alloy coating by the addition in brackets of “Zn/Al” for the zinc alloy.

EXAMPLE 1 Wire for rope for general applications with nominal diameter  $d = 1,5$  mm, surface appearance bright (U), tensile strength grade 1 770 MPa.

**Designation rope wire EN 10264-2 — 1,5 — U — 1 770**

EXAMPLE 2 Wire for rope for general applications with a nominal diameter  $d = 2,5$  mm, zinc coated class A, tensile strength grade 1 370 MPa.

**Designation rope wire EN 10264-2 — 2,5 — A — 1 370**

EXAMPLE 3 Wire for rope for general applications with a nominal diameter  $d = 1,8$  mm, coated with zinc alloy, class B, tensile strength grade 1 770 MPa.

**Designation rope wire EN 10264-2 — 1,8 — B(Zn/Al) — 1 770**

### 4 General conditions of manufacture

The drawn wire shall be manufactured using wire rod in accordance with either EN ISO 16120-1 and EN ISO 16120-2 or EN ISO 16120-1 and EN ISO 16120-4.

The finished wire shall show no surface defects or internal defects prejudicial to its use.

When specified, drawn wire shall be supplied with zinc coating or Zn95/Al5 coating. Unless otherwise specified, the zinc used for the zinc coating shall have a purity of 99,95 % according to EN 1179, Z3, other zinc alloys are subject to agreement.

NOTE If required by the purchaser, the quality of the zinc or zinc alloy used for the coating material should be certified by the manufacturer. Because of the reaction between the base material and coating material, which is inherent to the process, the composition of the coating on the wire is different to that of the coating bath.

### 5 Characteristics of wire

#### 5.1 Tensile strength grades

The values for tensile strength grades shall be as specified in Table 1.

Additional grades are possible by agreement between supplier and user at the time of order. Corresponding properties will be agreed between the parties.

**Table 1 — Tensile strength grades and ranges of nominal diameters**

| Tensile strength grade<br>MPa <sup>a</sup>                                                      | Range of nominal diameters<br>mm         |                               |
|-------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------|
|                                                                                                 | Bright and coated <sup>b</sup> – Class B | Coated <sup>b</sup> – Class A |
|                                                                                                 | Class B                                  | Zinc or Zn95/Al5<br>Class A   |
| 1 180                                                                                           | 0,20 to 1,80                             | —                             |
| 1 370                                                                                           | 0,20 to 7,00                             | 0,70 to 7,00                  |
| 1 570                                                                                           | 0,20 to 7,00                             | 0,70 to 7,00                  |
| 1 770                                                                                           | 0,20 to 6,00                             | 0,70 to 6,20                  |
| 1 960                                                                                           | 0,20 to 5,00                             | 0,70 to 4,20                  |
| 2 160                                                                                           | 0,20 to 4,00                             | —                             |
| <sup>a</sup> 1 MPa = 1 N/mm <sup>2</sup> .<br><sup>b</sup> Coated means zinc or Zn95/Al5 alloy. |                                          |                               |

## 5.2 Requirements for wire characteristics

The requirements for wire are specified in Table 2.

If required and agreed at the time of order between the customer and the supplier, wires not mentioned in the Table 1 can be introduced. Corresponding characteristics will be agreed upon by the customer and the supplier.

**Table 2 — Requirements for mechanical characteristics of wire <sup>c</sup>**

| Nominal diameter $d$ of wire | Diameter tolerances                      |                               | $R$  | Minimum number of reverse bends           |       |       |       |                               |       |       |       | Minimum number of torsions                |               |       |       |                               |       |       |       | Minimum mass of coating |       |         |         |
|------------------------------|------------------------------------------|-------------------------------|------|-------------------------------------------|-------|-------|-------|-------------------------------|-------|-------|-------|-------------------------------------------|---------------|-------|-------|-------------------------------|-------|-------|-------|-------------------------|-------|---------|---------|
|                              | Bright and coated <sup>a</sup> – Class B | Coated <sup>a</sup> – Class A |      | Bright and coated <sup>a</sup> – Class B  |       |       |       | Coated <sup>a</sup> – Class A |       |       |       | Bright and coated <sup>a</sup> – Class B  |               |       |       | Coated <sup>a</sup> – Class A |       |       |       | g/m <sup>2</sup>        |       |         |         |
|                              |                                          |                               |      | Tensile strength grade – MPa <sup>b</sup> |       |       |       |                               |       |       |       | Tensile strength grade – MPa <sup>b</sup> |               |       |       |                               |       |       |       |                         |       |         |         |
| mm                           | mm                                       |                               | mm   | 1 180 & 1 370                             | 1 570 | 1 770 | 1 960 | 2 160                         | 1 370 | 1 570 | 1 770 | 1 960                                     | 1 180 & 1 370 | 1 570 | 1 770 | 1 960                         | 2 160 | 1 370 | 1 570 | 1 770                   | 1 960 | Class B | Class A |
| $0,20 \leq d < 0,25$         | ± 0,008                                  | —                             |      |                                           |       |       |       |                               |       |       |       |                                           |               |       |       |                               |       |       |       |                         |       | 20      | 85      |
| $0,25 \leq d < 0,30$         | ± 0,008                                  | —                             |      |                                           |       |       |       |                               |       |       |       |                                           |               |       |       |                               |       |       |       |                         |       | 30      |         |
| $0,30 \leq d < 0,40$         | ± 0,01                                   | ± 0,025                       |      |                                           |       |       |       |                               |       |       |       |                                           |               |       |       |                               |       |       |       |                         |       | 30      |         |
| $0,40 \leq d < 0,50$         | ± 0,01                                   | ± 0,025                       |      |                                           |       |       |       |                               |       |       |       |                                           |               |       |       |                               |       |       |       |                         |       | 40      |         |
| $0,50 \leq d < 0,55$         | ± 0,015                                  | ± 0,03                        | 1,75 | 16                                        | 15    | 14    | 13    | 12                            |       |       |       |                                           | 34            | 30    | 28    | 25                            | 23    |       |       |                         |       | 50      |         |
| $0,55 \leq d < 0,60$         | ± 0,015                                  | ± 0,03                        | 1,75 | 14                                        | 14    | 13    | 12    | 11                            |       |       |       |                                           | 34            | 30    | 28    | 25                            | 23    |       |       |                         |       | 50      | 100     |
| $0,60 \leq d < 0,65$         | ± 0,015                                  | ± 0,03                        | 1,75 | 13                                        | 12    | 11    | 10    | 9                             |       |       |       |                                           | 34            | 30    | 28    | 25                            | 23    |       |       |                         |       | 60      | 115     |
| $0,65 \leq d < 0,70$         | ± 0,015                                  | ± 0,03                        | 1,75 | 12                                        | 11    | 10    | 9     | 8                             |       |       |       |                                           | 34            | 30    | 28    | 25                            | 23    |       |       |                         |       | 60      | 115     |
| $0,70 \leq d < 0,75$         | ± 0,015                                  | ± 0,03                        | 2,5  | 19                                        | 17    | 16    | 15    | 14                            |       | 13    | 12    | 11                                        | 34            | 30    | 28    | 25                            | 23    |       | 21    | 19                      | 17    | 60      | 130     |
| $0,75 \leq d < 0,80$         | ± 0,015                                  | ± 0,03                        | 2,5  | 18                                        | 16    | 15    | 14    | 13                            |       | 12    | 11    | 10                                        | 34            | 30    | 28    | 25                            | 22    |       | 21    | 19                      | 17    | 60      | 130     |
| $0,80 \leq d < 0,85$         | ± 0,015                                  | ± 0,03                        | 2,5  | 16                                        | 14    | 13    | 12    | 11                            |       | 11    | 10    | 9                                         | 34            | 30    | 28    | 25                            | 22    |       | 21    | 19                      | 17    | 70      | 145     |
| $0,85 \leq d < 0,90$         | ± 0,015                                  | ± 0,03                        | 2,5  | 15                                        | 13    | 12    | 11    | 10                            |       | 10    | 9     | 8                                         | 34            | 30    | 28    | 25                            | 22    |       | 21    | 19                      | 17    | 70      | 145     |
| $0,90 \leq d < 0,95$         | ± 0,015                                  | ± 0,03                        | 2,5  | 14                                        | 12    | 11    | 10    | 9                             |       | 9     | 8     | 7                                         | 34            | 30    | 28    | 25                            | 22    |       | 21    | 19                      | 17    | 70      | 155     |
| $0,95 \leq d < 1,00$         | ± 0,015                                  | ± 0,03                        | 2,5  | 13                                        | 11    | 10    | 9     | 8                             |       | 8     | 7     | 6                                         | 34            | 30    | 28    | 25                            | 22    |       | 21    | 19                      | 17    | 70      | 155     |
| $1,00 \leq d < 1,10$         | ± 0,02                                   | ± 0,04                        | 3,75 | 20                                        | 18    | 17    | 16    | 14                            |       | 15    | 14    | 12                                        | 33            | 29    | 26    | 23                            | 21    |       | 20    | 18                      | 13    | 80      | 165     |
| $1,10 \leq d < 1,20$         | ± 0,02                                   | ± 0,04                        | 3,75 | 19                                        | 17    | 16    | 15    | 13                            |       | 14    | 13    | 11                                        | 33            | 29    | 26    | 23                            | 21    |       | 20    | 18                      | 13    | 80      | 165     |
| $1,20 \leq d < 1,30$         | ± 0,02                                   | ± 0,04                        | 3,75 | 18                                        | 16    | 15    | 14    | 12                            |       | 12    | 11    | 9                                         | 33            | 28    | 25    | 22                            | 20    |       | 18    | 15                      | 10    | 90      | 180     |
| $1,30 \leq d < 1,40$         | ± 0,02                                   | ± 0,04                        | 3,75 | 16                                        | 14    | 13    | 12    | 10                            |       | 10    | 8     | 7                                         | 33            | 28    | 25    | 22                            | 19    |       | 18    | 15                      | 10    | 90      | 180     |
| $1,40 \leq d < 1,50$         | ± 0,02                                   | ± 0,04                        | 3,75 | 14                                        | 12    | 11    | 10    | 9                             |       | 8     | 7     | 6                                         | 33            | 28    | 25    | 22                            | 19    |       | 18    | 15                      | 10    | 100     | 195     |
| $1,50 \leq d < 1,60$         | ± 0,02                                   | ± 0,04                        | 5    | 16                                        | 15    | 14    | 13    | 12                            |       | 11    | 10    | 9                                         | 33            | 28    | 25    | 22                            | 19    |       | 18    | 15                      | 10    | 100     | 195     |
| (to be continued)            |                                          |                               |      |                                           |       |       |       |                               |       |       |       |                                           |               |       |       |                               |       |       |       |                         |       |         |         |

(to be continued)

**Table 2 — Requirements for mechanical characteristics of wire <sup>c</sup> (continued)**

| Nominal diameter $d$ of wire | Diameter tolerances                      |                               | $R$ | Minimum number of reverse bends           |       |       |       |       |                               |       |       |       | Minimum number of torsions                |       |       |       |       |                               |       |       |       | Minimum mass of coating |         |
|------------------------------|------------------------------------------|-------------------------------|-----|-------------------------------------------|-------|-------|-------|-------|-------------------------------|-------|-------|-------|-------------------------------------------|-------|-------|-------|-------|-------------------------------|-------|-------|-------|-------------------------|---------|
|                              | Bright and coated <sup>a</sup> – Class B | Coated <sup>a</sup> – Class A |     | Bright and coated <sup>a</sup> – Class B  |       |       |       |       | Coated <sup>a</sup> – Class A |       |       |       | Bright and coated <sup>a</sup> – Class B  |       |       |       |       | Coated <sup>a</sup> – Class A |       |       |       |                         |         |
|                              |                                          |                               |     | Tensile strength grade – MPa <sup>b</sup> |       |       |       |       |                               |       |       |       | Tensile strength grade – MPa <sup>b</sup> |       |       |       |       |                               |       |       |       | g/m <sup>2</sup>        |         |
| mm                           | mm                                       |                               | mm  | 1 180 & 1 370                             | 1 570 | 1 770 | 1 960 | 2 160 | 1 370                         | 1 570 | 1 770 | 1 960 | 1 180 & 1 370                             | 1 570 | 1 770 | 1 960 | 2 160 | 1 370                         | 1 570 | 1 770 | 1 960 | Class B                 | Class A |
| $1,60 \leq d < 1,65$         | $\pm 0,02$                               | $\pm 0,04$                    | 5   | 15                                        | 14    | 13    | 12    | 11    |                               | 10    | 9     | 8     | 33                                        | 28    | 25    | 22    | 19    |                               | 18    | 15    | 10    | 100                     | 195     |
| $1,65 \leq d < 1,70$         | $\pm 0,02$                               | $\pm 0,04$                    | 5   | 15                                        | 14    | 13    | 12    | 11    |                               | 10    | 9     | 8     | 33                                        | 28    | 25    | 22    | 19    |                               | 18    | 15    | 10    | 100                     | 205     |
| $1,70 \leq d < 1,80$         | $\pm 0,02$                               | $\pm 0,05$                    | 5   | 14                                        | 12    | 11    | 11    | 10    |                               | 9     | 8     | 7     | 33                                        | 28    | 25    | 22    | 19    |                               | 18    | 15    | 10    | 100                     | 205     |
| $1,80 \leq d < 1,85$         | $\pm 0,025$                              | $\pm 0,05$                    | 5   | 13                                        | 11    | 10    | 10    | 8     |                               | 8     | 7     | 6     | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 100                     | 205     |
| $1,85 \leq d < 1,90$         | $\pm 0,025$                              | $\pm 0,05$                    | 5   | 13                                        | 11    | 10    | 10    | 8     |                               | 8     | 7     | 6     | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 115                     | 215     |
| $1,90 \leq d < 2,00$         | $\pm 0,025$                              | $\pm 0,05$                    | 5   | 12                                        | 10    | 9     | 9     | 7     |                               | 7     | 6     | 5     | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 115                     | 215     |
| $2,00 \leq d < 2,10$         | $\pm 0,025$                              | $\pm 0,05$                    | 7,5 | 17                                        | 16    | 15    | 14    | 12    |                               | 13    | 12    | 11    | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 115                     | 215     |
| $2,10 \leq d < 2,15$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 16                                        | 15    | 14    | 13    | 11    |                               | 12    | 11    | 10    | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 115                     | 215     |
| $2,15 \leq d < 2,20$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 16                                        | 15    | 14    | 13    | 11    |                               | 12    | 11    | 10    | 32                                        | 27    | 24    | 21    | 18    |                               | 17    | 14    | 9     | 125                     | 230     |
| $2,20 \leq d < 2,30$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 15                                        | 14    | 13    | 12    | 10    | 12                            | 11    | 10    | 9     | 31                                        | 27    | 24    | 21    | 18    | 20                            | 17    | 14    | 9     | 125                     | 230     |
| $2,30 \leq d < 2,40$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 15                                        | 14    | 13    | 12    | 10    | 12                            | 11    | 10    | 9     | 30                                        | 27    | 24    | 21    | 18    | 20                            | 17    | 14    | 9     | 125                     | 230     |
| $2,40 \leq d < 2,50$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 15                                        | 13    | 12    | 11    | 9     | 11                            | 10    | 9     | 8     | 29                                        | 26    | 23    | 20    | 18    | 19                            | 15    | 12    | 7     | 125                     | 230     |
| $2,50 \leq d < 2,60$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 14                                        | 12    | 11    | 10    | 8     | 10                            | 9     | 8     | 7     | 29                                        | 26    | 23    | 20    | 18    | 19                            | 15    | 12    | 7     | 125                     | 245     |
| $2,60 \leq d < 2,70$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 12                                        | 11    | 10    | 9     | 7     | 9                             | 8     | 7     | 6     | 29                                        | 26    | 23    | 20    | 18    | 19                            | 15    | 12    | 7     | 125                     | 245     |
| $2,70 \leq d < 2,80$         | $\pm 0,025$                              | $\pm 0,06$                    | 7,5 | 11                                        | 10    | 9     | 8     | 6     | 8                             | 7     | 6     | 5     | 29                                        | 26    | 23    | 20    | 18    | 19                            | 15    | 12    | 7     | 125                     | 245     |
| $2,80 \leq d < 2,90$         | $\pm 0,03$                               | $\pm 0,07$                    | 7,5 | 11                                        | 10    | 9     | 8     | 6     | 8                             | 7     | 6     | 5     | 28                                        | 26    | 23    | 20    | 18    | 18                            | 15    | 12    | 7     | 135                     | 255     |
| $2,90 \leq d < 3,00$         | $\pm 0,03$                               | $\pm 0,07$                    | 7,5 | 10                                        | 9     | 8     | 7     | 6     | 7                             | 6     | 5     | 4     | 28                                        | 26    | 23    | 20    | 18    | 18                            | 15    | 12    | 7     | 135                     | 255     |
| $3,00 \leq d < 3,10$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 15                                        | 14    | 13    | 12    | 10    | 11                            | 10    | 9     | 8     | 27                                        | 25    | 21    | 18    | 16    | 18                            | 12    | 8     | 5     | 135                     | 255     |
| $3,10 \leq d < 3,20$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 14                                        | 13    | 12    | 11    | 9     | 10                            | 9     | 8     | 7     | 27                                        | 25    | 21    | 18    | 16    | 13                            | 12    | 8     | 5     | 135                     | 255     |
| $3,20 \leq d < 3,30$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 13                                        | 12    | 11    | 10    | 8     | 9                             | 8     | 7     | 6     | 27                                        | 25    | 21    | 18    | 16    | 13                            | 12    | 8     | 5     | 135                     | 265     |
| $3,30 \leq d < 3,40$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 12                                        | 11    | 10    | 9     | 7     | 9                             | 8     | 7     | 6     | 27                                        | 25    | 21    | 18    | 16    | 13                            | 12    | 8     | 5     | 135                     | 265     |
| $3,40 \leq d < 3,50$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 11                                        | 10    | 9     | 8     | 6     | 8                             | 7     | 6     | 5     | 27                                        | 25    | 21    | 18    | 16    | 13                            | 12    | 8     | 5     | 135                     | 265     |
| $3,50 \leq d < 3,60$         | $\pm 0,03$                               | $\pm 0,07$                    | 10  | 10                                        | 9     | 8     | 7     | 5     | 7                             | 6     | 5     | 4     | 26                                        | 24    | 20    | 16    | 14    | 11                            | 10    | 6     | 5     | 135                     | 265     |
| (to be continued)            |                                          |                               |     |                                           |       |       |       |       |                               |       |       |       |                                           |       |       |       |       |                               |       |       |       |                         |         |

(to be continued)

Tableau 2 — Requirements for mechanical characteristics of wire <sup>c</sup> (continued)

| Nominal diameter $d$ of wire                                                                                                     | Diameter tolerances                      |                               | $R$           | Minimum number of reverse bends           |       |       |       |       |                               |       |       |               | Minimum number of torsions                |       |       |       |       |                               |       |       |         | Minimum mass of coating |     |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------|---------------|-------------------------------------------|-------|-------|-------|-------|-------------------------------|-------|-------|---------------|-------------------------------------------|-------|-------|-------|-------|-------------------------------|-------|-------|---------|-------------------------|-----|
|                                                                                                                                  | Bright and coated <sup>a</sup> – Class B | Coated <sup>a</sup> – Class A |               | Bright and coated <sup>a</sup> – Class B  |       |       |       |       | Coated <sup>a</sup> – Class A |       |       |               | Bright and coated <sup>a</sup> – Class B  |       |       |       |       | Coated <sup>a</sup> – Class A |       |       |         |                         |     |
|                                                                                                                                  |                                          |                               |               | Tensile strength grade – MPa <sup>b</sup> |       |       |       |       |                               |       |       |               | Tensile strength grade – MPa <sup>b</sup> |       |       |       |       |                               |       |       |         | g/m <sup>2</sup>        |     |
| mm                                                                                                                               | mm                                       | mm                            | 1 180 & 1 370 | 1 570                                     | 1 770 | 1 960 | 2 160 | 1 370 | 1 570                         | 1 770 | 1 960 | 1 180 & 1 370 | 1 570                                     | 1 770 | 1 960 | 2 160 | 1 370 | 1 570                         | 1 770 | 1 960 | Class B | Class A                 |     |
| $3,60 \leq d < 3,70$                                                                                                             | $\pm 0,03$                               | $\pm 0,07$                    | 10            | 9                                         | 8     | 7     | 6     | 5     | 6                             | 5     | 4     | 3             | 26                                        | 24    | 20    | 16    | 14    | 11                            | 10    | 6     | 5       | 135                     | 265 |
| $3,70 \leq d < 3,80$                                                                                                             | $\pm 0,03$                               | $\pm 0,07$                    | 10            | 8                                         | 7     | 6     | 5     | 4     | 5                             | 4     | 3     | 3             | 25                                        | 23    | 19    | 15    | 13    | 11                            | 8     | 6     | 5       | 135                     | 265 |
| $3,80 \leq d < 3,90$                                                                                                             | $\pm 0,03$                               | $\pm 0,07$                    | 10            | 8                                         | 7     | 6     | 5     | 4     | 5                             | 4     | 3     | 3             | 24                                        | 22    | 18    | 14    | 12    | 11                            | 7     | 6     | 4       | 135                     | 275 |
| $3,90 \leq d < 4,00$                                                                                                             | $\pm 0,03$                               | $\pm 0,07$                    | 10            | 7                                         | 6     | 5     | 4     | 3     | 5                             | 4     | 3     | 3             | 24                                        | 22    | 18    | 14    | 12    | 10                            | 7     | 6     | 4       | 135                     | 275 |
| $4,00 \leq d < 4,20$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 12                                        | 11    | 10    | 9     | 8     | 8                             | 7     | 6     | 5             | 23                                        | 21    | 17    | 13    | 11    | 9                             | 6     | 6     | 4       | 135                     | 275 |
| $4,20 \leq d < 4,40$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 11                                        | 10    | 9     | 8     |       | 7                             | 6     | 5     | 4             | 21                                        | 19    | 15    | 11    |       | 8                             | 6     | 5     | 4       | 135                     | 275 |
| $4,40 \leq d < 4,60$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 10                                        | 9     | 8     | 7     |       | 6                             | 5     | 5     |               | 20                                        | 18    | 14    | 10    |       | 7                             | 6     | 5     |         | 150                     | 280 |
| $4,60 \leq d < 4,80$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 9                                         | 8     | 8     | 6     |       | 6                             | 5     | 4     |               | 18                                        | 16    | 12    | 8     |       | 6                             | 5     | 4     |         | 150                     | 280 |
| $4,80 \leq d < 5,00$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 8                                         | 7     | 7     | 5     |       | 5                             | 4     | 4     |               | 17                                        | 14    | 11    | 7     |       | 5                             | 4     | 3     |         | 150                     | 280 |
| $5,00 \leq d < 5,20$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 7                                         | 6     | 6     | 4     |       | 4                             | 3     | 3     |               | 17                                        | 14    | 11    | 7     |       | 5                             | 4     | 3     |         | 150                     | 280 |
| $5,20 \leq d < 5,40$                                                                                                             | $\pm 0,03$                               | $\pm 0,08$                    | 15            | 6                                         | 5     | 5     |       |       | 4                             | 3     | 3     |               | 14                                        | 12    | 10    |       |       | 5                             | 4     | 3     |         | 160                     | 290 |
| $5,40 \leq d < 5,60$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 15            | 5                                         | 4     | 4     |       |       | 3                             | 2     | 2     |               | 12                                        | 10    | 8     |       |       | 4                             | 3     | 2     |         | 160                     | 290 |
| $5,60 \leq d < 5,80$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 15            | 5                                         | 4     | 4     |       |       | 3                             | 2     | 2     |               | 10                                        | 8     | 6     |       |       | 3                             | 2     | 2     |         | 160                     | 290 |
| $5,80 \leq d < 6,00$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 15            | 4                                         | 3     | 3     |       |       | 3                             | 2     | 2     |               | 8                                         | 6     | 6     |       |       | 3                             | 2     | 2     |         | 160                     | 290 |
| $6,00 \leq d < 6,25$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 20            | 9                                         | 8     | 6     |       |       | 5                             | 4     | 3     |               | 8                                         | 6     | 6     |       |       | 3                             | 2     | 2     |         | 160                     | 290 |
| $6,25 \leq d < 6,50$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 20            | 7                                         | 6     |       |       |       | 4                             | 3     |       |               | 7                                         | 6     | 5     |       |       | 2                             | 2     |       |         | 160                     | 290 |
| $6,50 \leq d < 6,75$                                                                                                             | $\pm 0,04$                               | $\pm 0,09$                    | 20            | 6                                         | 5     |       |       |       | 3                             | 2     |       |               | 6                                         | 5     | 4     |       |       | 2                             | 2     |       |         | 160                     | 290 |
| $6,75 \leq d \leq 7,00$                                                                                                          | $\pm 0,04$                               | $\pm 0,10$                    | 20            | 4                                         | 3     |       |       |       | 3                             | 2     |       |               | 6                                         | 5     | 4     |       |       | 2                             | 2     |       |         | 160                     | 290 |
| <sup>a</sup> Coated means zinc or Zn95/Al5 alloy.                                                                                |                                          |                               |               |                                           |       |       |       |       |                               |       |       |               |                                           |       |       |       |       |                               |       |       |         |                         |     |
| <sup>b</sup> MPa = 1 N/mm <sup>2</sup> .                                                                                         |                                          |                               |               |                                           |       |       |       |       |                               |       |       |               |                                           |       |       |       |       |                               |       |       |         |                         |     |
| <sup>c</sup> If necessary, values to be agreed between supplier and user at the time of order for blank positions in this table. |                                          |                               |               |                                           |       |       |       |       |                               |       |       |               |                                           |       |       |       |       |                               |       |       |         |                         |     |

## **6 Test methods**

### **6.1 General**

The characteristics specified in Table 2 shall be determined in accordance with EN 10218-1 with the following observations.

### **6.2 Measurement of diameter**

The diameter shall be measured using a micrometer with an accuracy of minimum 0,01 mm for all diameters above 0,50 mm. However up to and including this diameter, an accuracy of minimum 0,001 mm is required.

### **6.3 Tensile test**

The tensile test shall be carried out in accordance with EN 10264-1.

### **6.4 Reverse bend test**

The reverse bend test shall be carried out in accordance with EN 10218-1 by bending the wire around a mandrel with a radius of curvature  $R$  as specified in Table 2.

### **6.5 Torsion test**

The torsion test shall be carried out in accordance with EN 10218-1 with the number of twists specified in Table 2.

A length of  $100d$ , with a maximum of 500 mm between anchorage heads is recommended for the test sample.

If this length cannot be used, another length shall be chosen at the discretion of the wire manufacturer. In this case, the minimum number of twists that the wire shall withstand shall be proportional to the number specified in Table 2 for a test length of  $100d$  or 500 mm for diameters above 5 mm.

### **6.6 Inspection of zinc or Zn95/Al5 alloy coating**

The mass of coating shall be determined in accordance with EN 10244-2. For class A zinc and Zn95/Al5 alloy coatings, a coiling test shall be carried out in accordance with EN 10218-1.



# British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards and other standards-related publications, information and services. It presents the UK view on standards in Europe and at the international level.

BSI is incorporated by Royal Charter. British Standards and other standardisation products are published by BSI Standards Limited.

## Revisions

British Standards and PASs are periodically updated by amendment or revision. Users of British Standards and PASs should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using British Standards would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Similar for PASs, please notify BSI Customer Services.

**Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001**

BSI offers BSI Subscribing Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of British Standards and PASs.

**Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001**

**Email: [plus@bsigroup.com](mailto:plus@bsigroup.com)**

## Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website [www.bsigroup.com/shop](http://www.bsigroup.com/shop). In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

**Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001**

**Email: [orders@bsigroup.com](mailto:orders@bsigroup.com)**

In response to orders for international standards, BSI will supply the British Standard implementation of the relevant international standard, unless otherwise requested.

## Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

**Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005**

**Email: [knowledgecentre@bsigroup.com](mailto:knowledgecentre@bsigroup.com)**

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

**Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001**

**Email: [membership@bsigroup.com](mailto:membership@bsigroup.com)**

Information regarding online access to British Standards and PASs via British Standards Online can be found at [www.bsigroup.com/BSOL](http://www.bsigroup.com/BSOL)

Further information about British Standards is available on the BSI website at [www.bsi-group.com/standards](http://www.bsi-group.com/standards)

## Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that own copyright in the information used (such as the international standardisation bodies) has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained. Details and advice can be obtained from the Copyright & Licensing Department.

**Tel: +44 (0)20 8996 7070**

**Email: [copyright@bsigroup.com](mailto:copyright@bsigroup.com)**

## BSI

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001

Fax +44 (0)20 8996 7001

[www.bsigroup.com/standards](http://www.bsigroup.com/standards)