BS EN 10264-3:2012

BSI Standards Publication

Steel wire and wire products — Steel wire for ropes

Part 3: Round and shaped non alloyed steel wire for high duty applications

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National foreword

This British Standard is the UK implementation of EN 10264-3:2012. It supersedes BS EN 10264-3:2002, which is withdrawn.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.

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

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Foreword

This document (EN 10264-3:2012) 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.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 10264-3:2002.

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) heavy duty applications have been explained in the new last sentence of the scope;

b) the purity of the zinc coating of the drawn wire has been specified according the relevant EN 1179 (see Clause 4);

c) a footnote c) has been added in Table 1 in order to precise the meaning of coated;

d) the values of the Z and H profiles have been updated in Table 2;

e) a note has been added to allow other wire diameters higher than those given in Table 3 "Dimensional tolerances on round wire diameter" subject to an agreement between supplier and user at the time of order;

f) modifications have been made on values concerning "Coated – Class A" given in Table 4 "Dimensional tolerances for shaped wire";

g) modifications have been made in Table 5 "Minimum number of reverse bends for shaped wire for static applications" concerning the values of Z profile for the height of profile upper to 5 mm;

h) a second quality of zinc coating has been added for dynamic applications (see 5.3.4);

i) three additional ranges for Nominal dimensions of round wire (from 0,50 mm to 0,80 mm) have been added (see Table 11 "Minimum mass of coating").

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 specifies round and shaped non alloyed steel wire for use in the manufacture of ropes for mine hoisting, man-riding haulage, cableways for the transportation of passengers and other high duty applications. Heavy duty refers to situations where the stresses applied to the rope are either high or vary by a large amount during service.

This part of this European Standard refers to round wires and three types of shaped wire: full lock (Z), half lock (H) and trapezoidal (T).

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

It does not apply to steel wire taken from manufactured ropes.

This part of this European Standard specifies the following for cold drawn non alloyed steel wire for ropes for high duty applications:

— dimensional tolerances;

— mechanical characteristics;

— requirements relating to the chemical composition of the steel wire;

— conditions to be satisfied by any coating.

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 10264-1:2011, *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 Designation of the product

The designation of wire for ropes manufactured in accordance with this European Standard shall be based on the nominal dimension, surface appearance and tensile strength.

The indicator of dimension for round wire is the nominal diameter; for shaped wire it is the value of the height (h), followed by a letter specifying the profile. In the case of H profiles, this indicator shall be followed by the value of the narrowing.

The surface appearance shall be indicated as defined in EN 10264-1 with U for uncoated or bright wire, with a letter indicating the class of coating (A, B, …) and in the case of zinc alloy coatings, indicating in brackets (Zn/Al).

EXAMPLE 1 2,0 mm wire for rope with thick zinc layer, class A, tensile strength grade 1 570 MPa, in accordance with EN 10264-3.

Designation: wire for rope EN 10264-3 – 2,0 - A – 1 570

EXAMPLE 2 Wire for rope, trapezoidal profile, h = 3,5 mm, class B zinc coated, tensile strength grade 1 770 MPa, in accordance with EN 10264-3.

Designation: wire for rope EN 10264-3 - T3,5 - B – 1 770

EXAMPLE 3 H shaped wire for rope h = 3,0 mm, w = 1,8 mm, coated with class A zinc alloy, tensile strength grade 1 370 MPa, in accordance with EN 10264-3.

Designation: wire for rope EN 10264-3 - H – 3,0 × 1,8 - A (Zn/Al) – 1 370

4 General conditions of manufacture

The drawn wire shall be manufactured from rod in accordance with EN ISO 16120-1 and EN ISO 16120-2 for ropes for static applications, and in accordance with EN ISO 16120-1 and EN ISO 16120-4 for ropes for dynamic applications.

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

When specified, the drawn wire shall be supplied with a coating applied by a hot dipping or electrolytic method. The coatings commonly used are zinc or Zn95/Al5.

Unless otherwise specified, the zinc used for coating shall have a purity of 99,95 % according to EN 1179, Z3, other zinc alloys may be agreed at the time of enquiry and order.

NOTE If required by the purchaser, the quality of the zinc or zinc alloy used for the coating material (zinc or zinc alloy) 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 used in the coating bath.

5 Characteristics of the wire

5.1 Tensile strength grades

The tensile strength grades are defined in Table 1.

NOTE The nominal values are the minimum tensile strength limits. The upper limits (maximum) are equal to these minimum values increased with the tolerances specified in EN 10264-1:2011, Table 1.

Table 1 — Tensile strength grade

Quality of wire [c]		Nominal tensile strength grade MPa [a]							
Round	Bright or coated Class B	—	—	—	1 570	—	1 770	1 960	2 160
	Zinc or Zn95/Al5 - Class A	—	—	—	1 570	—	1 770	—	—
Shaped	Bright or coated Class B or class D [b]	—	1 370	—	1 570	—	1 770	—	—
		1 270	1 370	1 470	1 570	1 670	1 770	—	—
	Zinc or Zn95/Al5 - Class A	—	1 370	—	1 570	—	—	—	—

NOTE Subject to agreement between the manufacturer and the purchaser, other tensile strength grades can be used.

[a] 1 MPa = 1 N/mm^2.

[b] Mass of coatings for static and dynamic applications are specified in Table 11.

[c] Coated means zinc or Zn95/Al5 alloy.

5.2 Profiles

5.2.1 Definition of shaped wire

For shaped wire, the characteristic sections of the wire are shown in Figure 1 for full lock Z, half lock H and trapezoidal T wires.

The nominal dimensions and tolerances shall be agreed between the supplier and the purchaser at the time of ordering. The conventional characteristic values are as follows:

h height: difference between the radii of the 2 concentric boundary circles;

b width: maximum width of upper part perpendicular to a radial line passing through the centre of the width (as shown in Figure 1);

w minimum narrowing: smallest width of the profile;

e distance taken diagonally across the transverse section of the profile (essentially T or Z profiles).

The designation of a full lock wire is established using the letter Z and the height (h), that of a half lock wire by H followed by the height (h) and the minimum narrowing (w) ($h \times w$) and that of a trapezoidal wire by the letter T followed by the height (h).

Table 2 gives the design criteria for the shaped wire shown in Figure 1. These are the relation between the height of the shaped wires and the other major characteristic dimensions.

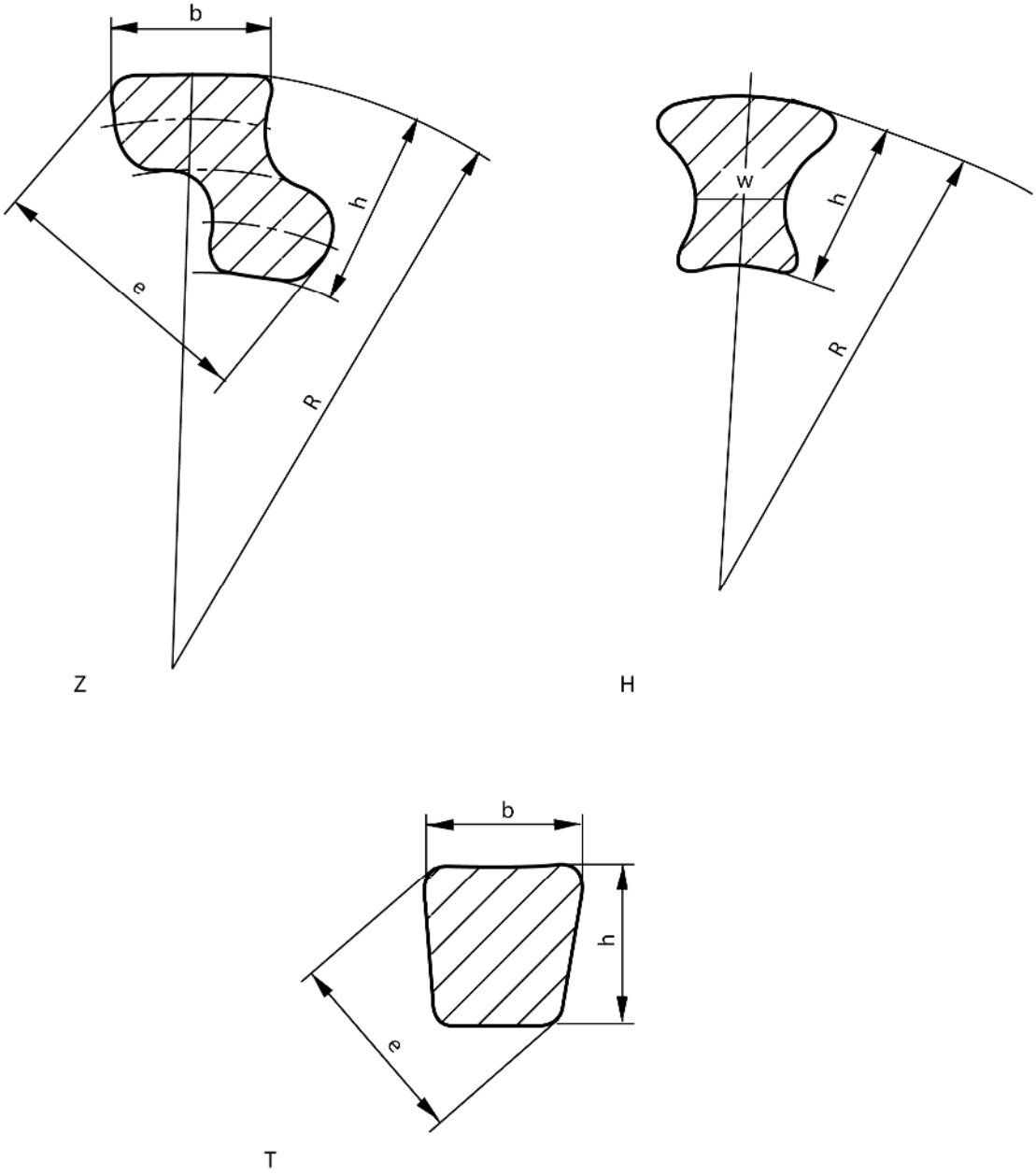


Figure 1 — Shaped wire sections

Table 2 — Design criteria for shaped wire

Ratio	Z profile	H profile	Trapezoidal profile T
$h : b$	0,9 to 1,55	-	1,0 to 1,3
$h : e$	0,55 to 0,80	-	0,75 to 0,90
$h : w$	-	0,8 to 2,3	

5.2.2 Equivalent diameter

The definition of the equivalent diameter of shaped wire is as follows.

The diameter of the equivalent transverse circular section (ø*a*) is the diameter of a circle with the same transverse section surface area as the shaped wire.

The diameter of the equivalent circular circumference (ø*c*) is the diameter of the circle with the same perimeter as the shaped wire.

Nominal values may be measured by planimetry on the drawing of the shaped wire.

If the surface area of the transverse section of the shaped wire is A and the perimeter C, the equivalent values are calculated as follows:

$$\text{equivalent } \phi a = \sqrt{\frac{A}{\pi/4}} = 2\sqrt{\frac{A}{\pi}}$$

$$\text{equivalent } \phi c = \sqrt{\frac{C}{\pi}}$$

5.3 Minimum requirements for wire characteristics

5.3.1 Dimension – measured values

The measured values for the round wire shall satisfy the requirements of Table 3.

Ovality shall not be greater than half the tolerance specified in Table 3.

Table 3 — Dimensional tolerances on round wire diameter

Dimensions in millimetres

Nominal diameter of wire d	Tolerance on diameter (±)	
	Bright and coated [a] – Class B	Coated [a] – Class A
$0{,}50 \le d < 1{,}00$	± 0,015	± 0,030
$1{,}00 \le d < 1{,}65$	± 0,020	± 0,040
$1{,}65 \le d < 1{,}80$	± 0,020	± 0,050
$1{,}80 \le d < 2{,}05$	± 0,025	± 0,050
$2{,}05 \le d < 2{,}80$	± 0,025	± 0,060
$2{,}80 \le d \le 4{,}00$	± 0,030	± 0,070

[a] Coated means zinc or Zn95/Al5 alloy.

NOTE Wire diameters higher than those currently mentioned are possible with an agreement between the supplier and the user during the order. This agreement should specified the corresponding characteristics.

In the case of shaped wire, the measured values for the characteristic "h" shall satisfy the tolerance requirements in Table 4.

The other dimensions shall be agreed at the time of enquiry and order.

Table 4 — Dimensional tolerances for shaped wire

Profile of wire	Nominal dimension (height of profile) h	Dimensional tolerance	
		Bright or coated – Class B or D	Coated – Class A
Z Profile	$2,0 \leq h < 3,0$	± 0,08	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
	$3,0 \leq h < 5,0$	± 0,10	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
	$5,0 \leq h \leq 8,0$	± 0,12	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
H Profile	$1,5 \leq h < 3,0$	± 0,08	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
	$3,0 \leq h < 5,0$	± 0,10	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
	$5,0 \leq h \leq 8,0$	± 0,12	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
T Profile	$3,0 \leq h \leq 5,0$	± 0,10	Waist: + 0,25 - 0,05 Height, head, heel: + 0,15 0
NOTE In the case of the finished coated wire, variations in diameter exceeding the above limits on short lengths can be tolerated if they do not adversely affect rope manufacture.			

5.3.2 Reverse bend test

The wire shall withstand, without breaking, the minimum number of reverse bends specified in Tables 5, 6 and 7 for the appropriate dimension. The radius of curvature of the mandrel for the various wire diameters is also specified in these tables.

For minimum number of reverse bends for round wire, see EN 10264-2:2011, Table 2.

Table 5 — Minimum number of reverse bends for shaped wire for static applications [e]

Type of profile		Radius of curvature of mandrel	Bright and coated [a] Class B					Coated [a] Class A	
			Nominal tensile strength – MPa [b]						
Type	Height of profile h mm	R mm	1 370		1 570		1 770	1 180 and 1 370	1 570
Z profile	$2,0 \leq h < 2,5$	5	11		10		7	-	-
	$2,5 \leq h < 3,0$	5	8		7		5	-	-
	$3,0 \leq h < 3,5$	7,5	12		10		7	9	7
	$3,5 \leq h < 4,0$	7,5	9		7		5	7	5
	$4,0 \leq h < 4,5$	10	9		7		6	7	6
	$4,5 \leq h < 5,0$	10	8		6		5	7	5
	$5,0 \leq h < 5,5$	15	12		10		8	10	8
	$5,5 \leq h < 6,0$	15	11		9		8	9	7
	$6,0 \leq h < 6,5$	15	10		7		-	7	5
	$6,5 \leq h < 7,0$	15	9		6		-	6	5
	$7,0 \leq h < 7,5$	15	8		5		-	6	5
	$7,5 \leq h < 8,0$	20	10		7		-	7	5
	$8,0 \leq h \leq 8,5$	20	9		6		-	6	4
			N [c]	B [d]	N [c]	B [d]			
H profile	$1,2 \leq h < 1,5$	5	13	11	12	10	-	-	-
	$1,5 \leq h < 2,0$	5	12	9	10	9	-	-	-
	$2,0 \leq h < 2,5$	5	8	6	7	6	-	-	-
	$2,5 \leq h < 3,0$	5	7	6	6	5	-	-	-
	$3,0 \leq h < 3,5$	7,5	8	6	7	5	-	4	3
	$3,5 \leq h < 4,0$	7,5	6	5	5	4	-	3	2
	$4,0 \leq h < 4,5$	10	6	5	5	4	-	3	2
	$4,5 \leq h < 5,0$	10	5	4	4	3	-	3	2
	$5,0 \leq h < 5,5$	15	6	5	5	4	-	3	2
	$5,5 \leq h < 6,0$	15	6	4	5	3	-	3	2
	$6,0 \leq h < 6,5$	15	5	4	4	3	-	3	2
	$6,5 \leq h < 7,0$	15	4	3	3	2	-	2	2
	$7,0 \leq h < 7,5$	15	3	2	3	2	-	2	2
	$7,5 \leq h < 8,0$	20	4	3	3	2	-	2	2
	$8,0 \leq h \leq 8,5$	20	3	2	3	2	-	2	2
T profile	$3,0 \leq h < 3,5$	7,5	9		8		6	7	4
	$3,5 \leq h < 4,0$	7,5	8		7		5	6	4
	$4,0 \leq h < 4,5$	10	9		8		6	7	4
	$4,5 \leq h < 5,0$	10	7		6		-	5	-
	$5,0 \leq h \leq 5,5$	15	9		8		-	6	-

[a] Coated means zinc or Zn95/Al5 alloy.

[b] 1 MPa = 1 N/mm^2.

[c] Narrow section.

[d] Broad section.

[e] Values for blank positions can be agreed at the time of order.

Table 6 — Minimum number of reverse bends for shaped wire for dynamic application for bright wire

Type of profile		Radius of mandrel	Tensile strength grade – MPa [a]					
			up to 1 370		1 570		1 770	
Type	Height h mm	R mm						
Z profile	$2{,}00 \leq h < 2{,}25$	5,0	15		13		11	
	$2{,}25 \leq h < 2{,}50$	5,0	13		11		9	
	$2{,}50 \leq h < 2{,}80$	5,0	10		9		7	
	$2{,}80 \leq h < 3{,}00$	7,5	18		16		14	
	$3{,}00 \leq h < 3{,}30$	7,5	16		14		12	
	$3{,}30 \leq h < 3{,}55$	7,5	12		10		8	
	$3{,}55 \leq h < 3{,}80$	7,5	10		8		6	
	$3{,}80 \leq h < 4{,}05$	10,0	11		10		9	
	$4{,}05 \leq h < 4{,}30$	10,0	10		9		8	
	$4{,}30 \leq h \leq 4{,}70$	10,0	9		8		7	
			N [b]	B [c]	N [b]	B [c]	N [b]	B [c]
H profile	$1{,}25 \leq h < 1{,}50$	5,0	18	15	17	14	15	12
	$1{,}50 \leq h < 1{,}75$	5,0	16	13	14	12	12	10
	$1{,}75 \leq h < 2{,}00$	5,0	14	12	13	11	11	9
	$2{,}00 \leq h < 2{,}25$	5,0	11	9	10	8	8	6
	$2{,}25 \leq h < 2{,}50$	5,0	10	8	9	7	7	5
	$2{,}50 \leq h < 2{,}80$	7,5	13	9	11	8	9	6
	$2{,}80 \leq h < 3{,}00$	7,5	12	9	10	8	9	6
	$3{,}00 \leq h < 3{,}30$	7,5	11	8	10	7	8	5
	$3{,}30 \leq h \leq 3{,}56$	7,5	10	8	9	7	7	5

[a] 1 MPa = 1 N/mm^2.

[b] Narrow section.

[c] Broad section.

Table 7 — Minimum number of reverse bends for shaped wire for dynamic application for coated [a] wire class D

Type of profile		Radius of mandrel	Tensile strength grade – MPa [b]					
			up to 1 370		1 570		1 770	
Type	Height h mm	R mm						
Z profile	$2{,}00 \leq h < 2{,}25$	5,0	13		11		9	
	$2{,}25 \leq h < 2{,}50$	5,0	11		10		8	
	$2{,}50 \leq h < 2{,}80$	5,0	9		8		6	
	$2{,}80 \leq h < 3{,}00$	7,5	16		14		12	
	$3{,}00 \leq h < 3{,}30$	7,5	14		12		10	
	$3{,}30 \leq h < 3{,}55$	7,5	11		9		7	
	$3{,}55 \leq h < 3{,}80$	7,5	9		7		5	
	$3{,}80 \leq h < 4{,}05$	10,0	10		9		7	
	$4{,}05 \leq h < 4{,}30$	10,0	9		8		6	
	$4{,}30 \leq h \leq 4{,}70$	10,0	8		7		5	
H profile			N [c]	B [d]	N [c]	B [d]	N [c]	B [d]
	$1{,}25 \leq h < 1{,}50$	5,0	16	13	15	12	13	10
	$1{,}50 \leq h < 1{,}75$	5,0	14	11	12	10	10	8
	$1{,}75 \leq h < 2{,}00$	5,0	12	10	11	9	9	8
	$2{,}00 \leq h < 2{,}25$	5,0	10	8	9	7	7	5
	$2{,}25 \leq h < 2{,}50$	5,0	9	7	8	6	6	4
	$2{,}50 \leq h < 2{,}80$	7,5	12	8	10	7	8	5
	$2{,}80 \leq h < 3{,}00$	7,5	11	8	10	7	8	5
	$3{,}00 \leq h < 3{,}30$	7,5	10	7	9	6	7	4
	$3{,}30 \leq h \leq 3{,}56$	7,5	9	7	8	6	6	3

[a] Coated means zinc or Zn95/Al5 alloy.

[b] 1 MPa = 1 N/mm^2.

[c] Narrow section.

[d] Broad section.

5.3.3 Torsion test

The wire shall withstand, without breaking, the minimum number of torsions specified in Table 8 for round wire and Tables 9 and 10 for shaped wire, for a given nominal diameter, tensile strength grade and surface condition.

Table 8 — Minimum number of torsions for round wire

Nominal diameter of wire d mm	Minimum number of torsions					
	Bright or coated [a] Class B				Coated [a] Class A	
	Tensile strength grade – MPa [b]					
	1 570	1 770	1 960	2 160	1 570	1 770
$0,5 \leq d < 1,0$	35	33	27	25	23	21
$1,0 \leq d < 1,3$	33	31	26	24	21	19
$1,3 \leq d < 1,8$	32	29	25	23	20	18
$1,8 \leq d < 2,3$	30	28	23	21	19	16
$2,3 \leq d < 3,0$	28	25	21	20	16	13
$3,0 \leq d < 3,4$	26	23	20	19	13	10
$3,4 \leq d < 3,7$	24	21	18	18	13	9
$3,7 \leq d \leq 4,0$	23	20	17	16	12	8

[a] Coated means zinc or Zn95/Al5 alloy.

[b] 1 MPa = 1 N/mm^2.

Table 9 — Minimum number of torsions for shaped wire for static applications

Type of profile	Nominal dimension h mm	Test length mm	Minimum number of torsions				
			Bright or coated [a] Class B			Coated [a] Class A	
			Tensile strength grade – MPa [b]				
			1 370	1 570	1 770	1 370	1 570
Z profile	$2,00 \leq h < 4,00$	$100 \times h$	22	19	16	15	12
	$4,00 \leq h < 5,05$	$100 \times h$	21	18	15	14	11
	$5,05 \leq h < 5,60$	500	18	14	[c]	13	10
	$5,60 \leq h < 6,10$	500	16	12	[c]	12	9
	$6,10 \leq h < 6,60$	500	14	10	-	10	7
	$6,60 \leq h < 7,10$	500	13	9	-	9	6
	$7,10 \leq h < 7,60$	500	12	8	-	8	5
	$7,60 \leq h \leq 8,00$	500	11	7	-	7	4
H profile	$2,00 \leq h < 3,00$	$100 \times h$	20	18	-	13	12
	$3,00 \leq h < 5,05$	$100 \times h$	18	16	-	12	11
	$5,05 \leq h < 5,60$	500	14	13	-	10	9
	$5,60 \leq h < 6,10$	500	12	11	-	8	7
	$6,10 \leq h < 6,60$	500	10	9	-	7	6
	$6,60 \leq h < 7,10$	500	9	8	-	6	5
	$7,10 \leq h < 7,60$	500	8	7	-	5	4
	$7,60 \leq h \leq 8,00$	500	7	6	-	5	4
T profile	$2,00 \leq h < 3,00$	$100 \times h$	22	20	18	14	13
	$3,00 \leq h < 4,00$	$100 \times h$	20	18	16	13	12
	$4,00 \leq h < 5,00$	$100 \times h$	18	16	14	12	11
	$5,00 \leq h \leq 6,00$	500	16	14	-	11	10

[a] Coated means zinc or Zn95/Al5 alloy.

[b] 1 MPa = 1 N/mm^2.

[c] The required number of torsions shall be agreed at the time of enquiry and order.

Table 10 — Minimum number of torsions for shaped wire intended for dynamic applications

Type of shape	Nominal dimension mm	Bright			Coated [a]		
		Tensile strength grade MPa [b]					
		up to 1 370	1 570	1 770	1 370	1 570	1 770
Z and T shaped wire	$h < 3,55$	28	26	22	25	23	19
	$3,55 \leq h \leq 4,70$	26	24	20	23	22	17
H shaped wire	$h < 2,75$	27	25	21	24	22	18
	$2,75 \leq h \leq 3,56$	25	23	19	22	20	16

[a] Coated means zinc or Zn95/Al5 alloy.
[b] 1 Mpa = 1 N/mm^2.

5.3.4 Zinc and Zn95/Al5 coatings

- For static applications, two qualities of zinc and Zn95/Al5 coatings are specified: Class B and Class A.

- For dynamic applications two qualities of zinc and Zn95/Al5 coatings are specified: Class D and Class B.

The method of coating is not specified.

The coating quality is defined by the minimum mass of coating per unit of surface area, expressed in grams per square metre (g/m^2), as specified in Table 11.

Inspection of the coating shall be in accordance with EN 10244-2.

Table 11 — Minimum mass of coating

Nominal dimension [a] mm	Minimum mass of coating [b] g/m^2		
	Class B	Class A	Class D
Round wire (*d*)			
$0,50 \leq d < 0,60$	50	100	20
$0,60 \leq d < 0,70$	60	115	20
$0,70 \leq d < 0,80$	60	130	20
$0,80 \leq d < 0,90$	70	145	20
$0,90 \leq d < 1,00$	70	155	25
$1,00 \leq d < 1,20$	80	165	25
$1,20 \leq d < 1,40$	90	180	25
$1,40 \leq d < 1,65$	100	195	30
$1,65 \leq d < 1,85$	100	205	30
$1,85 \leq d < 2,15$	115	215	40
$2,15 \leq d < 2,50$	125	230	45
$2,50 \leq d < 2,80$	125	245	45
$2,80 \leq d < 3,20$	135	255	50
$3,20 \leq d < 3,80$	135	265	60
$3,80 \leq d \leq 4,00$	135	275	70
Shaped wire (*h*)			
$2,0 \leq d < 2,5$	115	215	45
$2,5 \leq d < 3,2$	125	245	50
$3,2 \leq d < 4,0$	135	265	60
$4,0 \leq d < 5,0$	135	275	70
$5,0 \leq d \leq 8,0$	150	290	80

[a] Dimension of coated wire before removal of the coating.
[b] Coated means zinc or Zn95/Al5 alloy.

6 Test methods

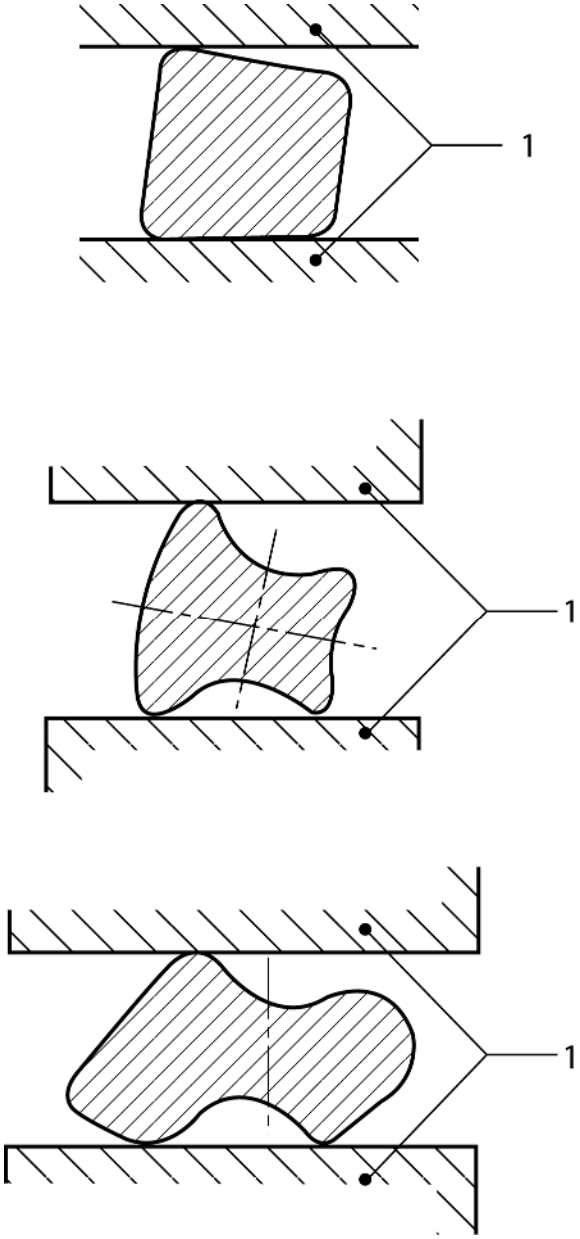
6.1 General

The tests shall be carried out in accordance with EN 10218-1 and EN 10244-2.

6.2 Reverse bend test

The reverse bend test on shaped wire shall be carried out in accordance with EN 10218-1.

The positioning of the shaped wire in the jaws shall be as shown in Figure 2.



Key

1 jaws

Figure 2 — Position of shaped wire for reverse bend test

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