BS EN 10218-2:2012

BSI Standards Publication

Steel wire and wire products — General

Part 2: Wire dimensions and tolerances

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 10218-2:2012. It supersedes BS EN 10218-2:1997 which is withdrawn.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.

ISBN 978 0 580 62762 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 10218-2

January 2012

ICS 77.140.65

Supersedes EN 10218-2:1996

English Version

Steel wire and wire products - General - Part 2: Wire dimensions and tolerances

Fils et produits tréfilés en acier - Généralités - Partie 2 : Dimensions et tolérances des fils

Stahldraht und Drahterzeugnisse - Allgemeines - Teil 2: Drahtmaße und Toleranzen

This European Standard was approved by CEN on 3 September 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

This document (EN 10218-2:2012) 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 10218-2:1996.

The standard will comprise the following parts:

— *Part 1: Test methods*;

— *Part 2: Wire dimensions and tolerances*.

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 European Standard specifies the tolerances on diameter of round wire and, where applicable, on the length of round wire cut to length, for bright steel wire, (i.e. uncoated), metallic coated steel wire and non-metallic coated steel wire.

This European Standard should not be applied where other requirements for dimensions and tolerances are specified in a particular product standard.

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 10079:2007, *Definition of steel products*

3 Terms and definitions

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

3.1
wire
product of constant full cross section along its length, obtained by cold drawing rod through a reducing die or passing under pressure between rollers and rewinding the drawn product

NOTE 1 The cross section is generally round, though sometimes oval, rectangular, square, hexagonal, octagonal or other convex section.

NOTE 2 The manufacturing processes give close control of geometric (size, surface condition) and mechanical properties. Wire may be supplied uncoated (as drawn, annealed) or coated (e.g. with zinc, copper, nickel or plastic materials).

NOTE 3 Heat treatments and/or surface treatments may be carried out during the course of manufacture to improve the properties of wire.

[EN 10079:2007]

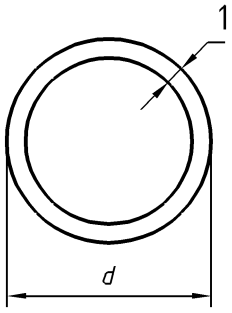
NOTE 4 As well as being supplied in the uncoated (bright) condition, wire can also be supplied with metallic or non-metallic coatings or both.The metallic coating can be as a finished coating or as a drawn finished coating.

3.2
cut length
straightened piece of wire cut to a specified length

4 Wire diameter tolerance

4.1 Tolerance on diameter of uncoated and metallic coated round steel wire

4.1.1 General



Key

1 metallic coating thickness in mm

d overall diameter in mm (including, where existing, the metallic coating)

Figure 1 — For Table 1

Diameter measurements shall be made at any cross-section and shall not differ from the tolerances specified in the relevant tables in this standard.

NOTE 1 Diameter tolerances may vary when cut lengths are supplied by a third party.

NOTE 2 Diameter tolerances are calculated as follows:

$T1 = 0{,}035\sqrt{d}$

$T2 = 0{,}027\sqrt{d}$

$T3 = 0{,}021\sqrt{d}$

$T4 = 0{,}015\sqrt{d}$

$T5 = 0{,}010\sqrt{d}$

where

d is the overall diameter measured in mm (including, where existing, the metallic coating)

The purchaser or the product standard shall indicate the tolerance range required from Table 1.

The overall diameter shall be within the relevant tolerance range given in Table 1; the producer will adapt processing parameters to ensure compliance with the required properties of the wire in the respective product standard, taking into account the influence of the coating thickness (if applicable).

NOTE 3 Unless otherwise specified on the order/enquiry or the product standard, tolerances class T1 would generally be used for heavy galvanised (A) wire, T2 would generally be used for other galvanised wire, and T3, T4 and T5 would generally be used for bright drawn wire in increasing order of precision required.

4.1.2 Out of roundness (ovality)

The out of roundness is the difference between maximum and minimum diameter of the wire at any cross-section and shall not be more than one half of the total tolerance given in Table 1.

For diameters d from 0,050 mm to 25,00 mm, the tolerances on diameter shall be as follows:

Table 1 — Diameter tolerances

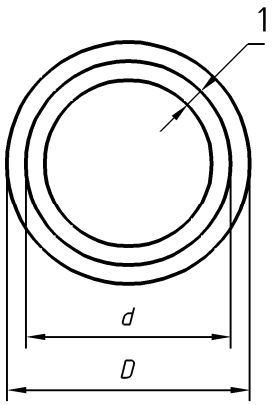
Dimensions in millimetres

Diameter tolerance	Wire diameter range mm d				
	T1	**T2**	**T3**	**T4**	**T5**
± 0,003	–	–	–	–	0,050 ≤ d < 0,091
± 0,004	–	–	–	0,05 ≤ d < 0,072	0,091 ≤ d < 0,17
± 0,005	–	–	–	0,072 ≤ d < 0,12	0,17 ≤ d < 0,26
± 0,006	–	–	0,05 ≤ d < 0,12	0,12 ≤ d < 0,17	0,26 ≤ d < 0,37
± 0,008	–	–	0,12 ≤ d < 0,15	0,17 ≤ d < 0,29	0,37 ≤ d < 0,65
± 0,010	–	–	0,15 ≤ d < 0,23	0,29 ≤ d < 0,45	0,65 ≤ d < 1,01
± 0,012	–	–	0,23 ≤ d < 0,33	0,45 ≤ d < 0,65	1,01 ≤ d < 1,45
± 0,015	–	0,20 ≤ d < 0,31	0,33 ≤ d < 0,52	0,65 ≤ d < 1,01	1,45 ≤ d < 2,26
± 0,020	–	0,31 ≤ d < 0,55	0,52 ≤ d < 0,91	1,01 ≤ d < 1,78	2,26 ≤ d < 4,01
± 0,025	0,30 ≤ d < 0,52	0,55 ≤ d < 0,86	0,91 ≤ d < 1,42	1,78 ≤ d < 2,78	4,01 ≤ d < 6,26
± 0,030	0,52 ≤ d < 0,74	0,86 ≤ d < 1,24	1,42 ≤ d < 2,05	2,78 ≤ d < 4,01	6,26 ≤ d < 9,01
± 0,035	0,74 ≤ d < 1,01	1,24 ≤ d < 1,69	2,05 ≤ d < 2,78	4,01 ≤ d < 5,45	9,01 ≤ d < 12,26
± 0,040	1,01 ≤ d < 1,31	1,69 ≤ d < 2,20	2,78 ≤ d < 3,63	5,45 ≤ d < 7,12	12,26 ≤ d < 16,01
± 0,045	1,31 ≤ d < 1,66	2,20 ≤ d < 2,78	3,63 ≤ d < 4,60	7,12 ≤ d < 9,01	16,01 ≤ d < 20,26
± 0,050	1,66 ≤ d < 2,05	2,78 ≤ d < 3,43	4,60 ≤ d < 5,67	9,01 ≤ d < 11,12	20,26 ≤ d ≤ 25,00
± 0,060	2,05 ≤ d < 2,94	3,43 ≤ d < 4,94	5,67 ≤ d < 8,17	11,12 ≤ d < 16,01	–
± 0,070	2,94 ≤ d < 4,01	4,94 ≤ d < 6,73	8,17 ≤ d < 11,12	16,01 ≤ d < 21,77	–
± 0,080	4,01 ≤ d < 5,23	6,73 ≤ d < 8,78	11,12 ≤ d < 14,52	21,77 ≤ d ≤ 25,00	–
± 0,090	5,23 ≤ d < 6,62	8,78 ≤ d < 11,12	14,52 ≤ d < 18,37	–	–
± 0,100	6,62 ≤ d < 8,17	11,12 ≤ d < 13,72	18,37 ≤ d < 22,68	–	–
± 0,120	8,17 ≤ d < 11,76	13,72 ≤ d < 19,76	22,68 ≤ d ≤ 25,00	–	–
± 0,140	11,76 ≤ d < 16,01	19,76 ≤ d ≤ 25,00	–	–	–
± 0,160	16,01 ≤ d < 20,90	–	–	–	–
± 0,180	20,90 ≤ d ≤ 25,00	–	–	–	–

4.2 Tolerances on diameter of organic coated wire

4.2.1 General

See Figure 2:



Key

1 metallic coating thickness in mm
d overall diameter in mm (including, where existing, the metallic coating)
D overall diameter in mm (including organic coating)

Figure 2 — Sketch for Table 2

4.2.2 Extruded organic coating

Tolerances on diameter of extruded organic coated wire are given in Table 2.

The core wire can be either bright or metallic coated (usually zinc).

4.2.3 Sintered organic coating

The tolerances on diameter of sintered organic coated wire are given in Table 2. Generally, the core wire is metallic coated (usually zinc coated).

Table 2 — Tolerances on diameter and coating thickness of sintered and extruded organic coated wire (see Figure 2)

Overall diameter of organic coated wire mm	Tolerance on overall diameter of organic coating mm	Minimum coating thickness		Minimum concentricity %	
		Extruded mm	Sintered mm	Extruded	Sintered
$D \leq 1{,}00$	± 0,10	0,20	0,12	75	65
$1{,}00 < D \leq 2{,}00$	± 0,10	0,25	0,12	75	65
$2{,}00 < D \leq 3{,}15$	± 0,15	0,35	0,15	75	65
$3{,}15 < D \leq 6{,}00$	± 0,20	0,40	0,20	75	65
$6{,}00 < D \leq 13{,}00$	± 0,25	0,50	–	75	65

NOTE 1 Concentricity is equal to 100 × minimum radial thickness over the maximum radial thickness as specified in the coating standard.

NOTE 2 Extruded refers to non-bonded material.

NOTE 3 It is the responsibility of the producer to adapt the processing parameters to ensure compliance with requirements on tolerances of overall wire diameter (D) and steel wire (possibly metallic coated) diameter (d).

5 Tolerance on cut lengths

5.1 Tolerance on length

The length tolerances on cut lengths shall be those given in Table 3.

There are three classes of length tolerance on cut lengths given in Table 3 dependent upon the nominal length. The purchaser shall select the appropriate class required.

Table 3 — Tolerance on length of cut lengths

Nominal length mm	Tolerance on length		
	Class 1	Class 2	Class 3
$L \leq 300$	± 0,50 mm	± 0,50 % for all the lengths	± 1,00 % for all the lengths
$300 < L \leq 1\,000$	± 1,00 mm		
$L > 1\,000$	± 0,10 %		

5.2 Tolerance and straightness

There are three classes of straightness of cut lengths given in Table 4 for wire diameters specified in Table 5. The purchaser shall select the appropriate class required. Figure 3 illustrates the measurement of out of straightness.

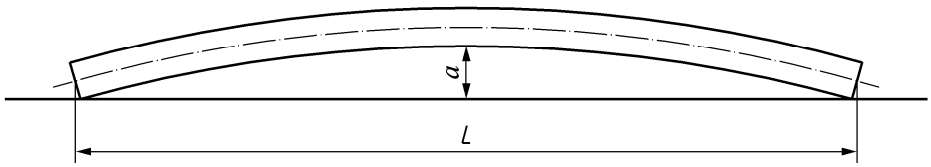
Table 4 — Tolerance of straightness of cut lengths

Class	L [a] = 500 mm	L [a] = 1 000 mm	Rolling test
1	a = 0,5 mm	a = 2 mm	will roll down an incline of 1 in 10
2	a = 1,0 mm	a = 4 mm	
3	No requirement		
[a] Test length.			

For classes 1 and 2, the cut lengths shall also meet the requirements of the rolling test which is performed on a smooth glass incline. Cut lengths are placed on the incline to allow free rolling.

Table 5 — Straightness test lengths

Wire diameter d mm	Test length L mm
$2{,}00 \leq d < 6{,}00$	500
$6{,}00 \leq d \leq 13{,}00$	500 or 1 000
NOTE Wire of less than 2,00 mm diameter has insufficient rigidity in length making the measurement a difficult. The test should be agreed between purchaser and supplier.	



Key

a Out of straightness in mm. This is measured at the mid point of the test sample length and a is the distance from the inside of the wire to the straight edge.

L Length in mm

Figure 3 — Measurement of out of straightness

6 Length of wire in coil

With a wire of known size and density, the length of the coil can be computed having weighed the mass of the coil.

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

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

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™