INTERNATIONAL STANDARD

ISO 22034-2

Second edition
2016-04-01

Steel wire and wire products —

Part 2: Tolerances on wire dimensions

Fil produits de fil en acier —

Partie 2: Tolérances sur les dimensions des fils

Reference number
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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

This second edition cancels and replaces the first edition (ISO 22034-2:2007), which has been technically revised.

ISO 22034 consists of the following parts, under the general title *Steel wire and wire products*:

— *Part 1: General test methods*

— *Part 2: Tolerances on wire dimensions*

Steel wire and wire products —

Part 2:
Tolerances on wire dimensions

1 Scope

This part of ISO 22034 specifies the tolerances on the diameter of round wire and, where applicable, on the length of round wire cut to length, for bright (i.e. uncoated) steel wire, metallic-coated steel wire and non-metallic-coated steel wire.

This part of ISO 22034 applies to round wires in the diameter range 0,050 mm to 25,00 mm.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6929, *Steel products — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6929 and the following apply.

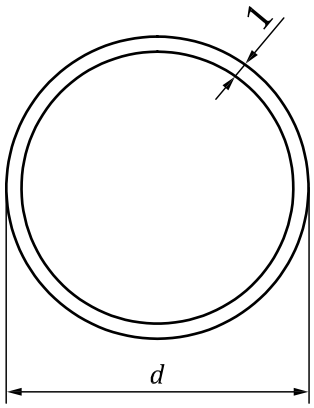
3.1
wire
product of constant cross section along its length, obtained by drawing a cold wire rod through a reducing die or passing it under pressure between rollers and rewinding the drawn product

Note 1 to entry: Wire can be supplied with a metallic or non-metallic coating, or with both, or without a coating.

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

4 Wire diameter tolerances

4.1 General



Key

1 metallic coating thickness in mm

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

Figure 1 — Sketch 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 part of ISO 22034.

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

NOTE 2 Diameter tolerances of classes T1 to T5 (see Table 1) 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 diameter measured, in millimetres.

4.2 Tolerances on diameter of uncoated and metallic-coated round steel wire

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

The diameter shall be within the relevant tolerance range given in Table 1.

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

Table 1 — Diameter tolerances

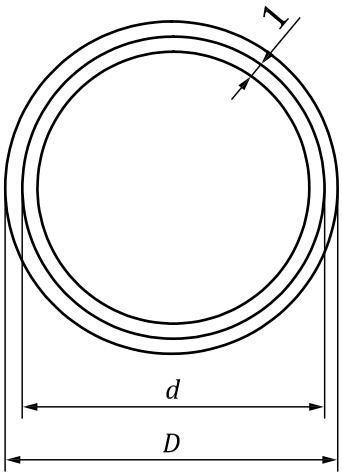
Range of wire diameter, d mm					Diameter tolerance mm
T1	**T2**	**T3**	**T4**	**T5**	
—	—	—	—	$0{,}05 \le d < 0{,}09$	±0,003
—	—	—	$0{,}05 \le d < 0{,}072$	$0{,}09 \le d < 0{,}17$	±0,004
—	—	—	$0{,}072 \le d < 0{,}12$	$0{,}17 \le d < 0{,}26$	±0,005
—	—	$0{,}05 \le d < 0{,}09$	$0{,}12 \le d < 0{,}17$	$0{,}26 \le d < 0{,}37$	±0,006
—	—	$0{,}09 \le d < 0{,}15$	$0{,}17 \le d < 0{,}29$	$0{,}37 \le d < 0{,}65$	±0,008
—	—	$0{,}15 \le d < 0{,}23$	$0{,}29 \le d < 0{,}45$	$0{,}65 \le d < 1{,}01$	±0,010
—	—	$0{,}23 \le d < 0{,}33$	$0{,}45 \le d < 0{,}65$	$1{,}01 \le d < 1{,}45$	±0,012
—	$0{,}20 \le d < 0{,}31$	$0{,}33 \le d < 0{,}52$	$0{,}65 \le d < 1{,}01$	$1{,}45 \le d < 2{,}26$	±0,015
—	$0{,}31 \le d < 0{,}55$	$0{,}52 \le d < 0{,}91$	$1{,}01 \le d < 1{,}78$	$2{,}26 \le d < 4{,}01$	±0,020
$0{,}30 \le d < 0{,}52$	$0{,}55 \le d < 0{,}86$	$0{,}91 \le d < 1{,}42$	$1{,}78 \le d < 2{,}78$	$4{,}01 \le d < 6{,}26$	±0,025
$0{,}52 \le d < 0{,}74$	$0{,}86 \le d < 1{,}24$	$1{,}42 \le d < 2{,}05$	$2{,}78 \le d < 4{,}01$	$6{,}26 \le d < 9{,}01$	±0,030
$0{,}74 \le d < 1{,}01$	$1{,}24 \le d < 1{,}69$	$2{,}05 \le d < 2{,}78$	$4{,}01 \le d < 5{,}45$	$9{,}01 \le d < 12{,}26$	±0,035
$1{,}01 \le d < 1{,}31$	$1{,}69 \le d < 2{,}20$	$2{,}78 \le d < 3{,}63$	$5{,}45 \le d < 7{,}12$	$12{,}26 \le d < 16{,}01$	±0,040
$1{,}31 \le d < 1{,}66$	$2{,}20 \le d < 2{,}78$	$3{,}63 \le d < 4{,}60$	$7{,}12 \le d < 9{,}01$	$16{,}01 \le d < 20{,}26$	±0,045
$1{,}66 \le d < 2{,}05$	$2{,}78 \le d < 3{,}43$	$4{,}60 \le d < 5{,}67$	$9{,}01 \le d < 11{,}12$	$20{,}26 \le d \le 25{,}00$	±0,050
$2{,}05 \le d < 2{,}94$	$3{,}43 \le d < 4{,}94$	$5{,}67 \le d < 8{,}17$	$11{,}12 \le d < 16{,}01$	—	±0,060
$2{,}94 \le d < 4{,}01$	$4{,}94 \le d < 6{,}73$	$8{,}17 \le d < 11{,}12$	$16{,}01 \le d < 21{,}77$	—	±0,070
$4{,}01 \le d < 5{,}23$	$6{,}73 \le d < 8{,}78$	$11{,}12 \le d < 14{,}52$	$21{,}77 \le d < 25{,}00$	—	±0,080
$5{,}23 \le d < 6{,}62$	$8{,}78 \le d < 11{,}12$	$14{,}52 \le d < 18{,}37$	—	—	±0,090
$6{,}62 \le d < 8{,}17$	$11{,}12 \le d < 13{,}72$	$18{,}37 \le d < 22{,}68$	—	—	±0,100
$8{,}17 \le d < 11{,}76$	$13{,}72 \le d < 19{,}76$	$22{,}68 \le d < 25{,}00$	—	—	±0,120
$11{,}76 \le d < 16{,}01$	$19{,}76 \le d < 25{,}00$	—	—	—	±0,140
$16{,}01 \le d < 20{,}90$	—	—	—	—	±0,160
$20{,}90 \le d < 25{,}00$	—	—	—	—	±0,180

4.3 Out-of-roundness (ovality)

The out-of-roundness is the difference between the maximum and the 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.

4.4 Tolerances on diameter of organic coated wire

4.4.1 General



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

4.4.2 Extruded organic coatings

The tolerances on the diameter of extruded-organic-coated wire shall be as given in Table 2.

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

4.4.3 Sintered organic coatings

The tolerances on the diameter of sintered-organic-coated wire shall be as 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

Diameter of organic-coated wire mm	Tolerances on overall diameter of organic coating mm	Minimum coating thickness mm		Minimum concentricity %	
		Extruded	Sintered	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 Tolerances on the diameter of zinc-coated or zinc-alloy-coated wire are T1 in Table 1.

NOTE 2 The concentricity is equal to 100 × the minimum radial thickness over the maximum radial thickness as specified in the coating standard.

NOTE 3 "Extruded" refers to non-bonded material.

NOTE 4 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 (d)].

5 Tolerance on cut lengths

5.1 Length tolerances

The length tolerances on cut lengths shall be as 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 — Length tolerances on cut lengths

Nominal length mm	Tolerance on length		
	Class 1	Class 2	Class 3
$L \leq 300$	±0,50 mm	±0,50 % for all lengths	±1,00 % for all lengths
$300 < L \leq 1000$	±1,00 mm		
$L > 1000$	±0,10 %		

5.2 Straightness tolerances

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

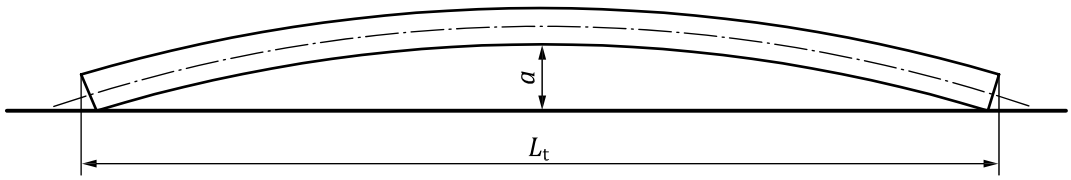
For classes 1 and 2, the cut lengths shall also meet the requirements of a rolling test which is performed on a smooth glass incline. Cut lengths are placed on the incline in a position which will allow them to roll freely down.

Table 4 — Maximum test lengths for measurement of out-of-straightness

Wire diameter, d mm	**Test length**, L_t mm
$2{,}00 \leq d \leq 6{,}00$	500
$6{,}00 < d \leq 13{,}00$	500 or 1 000
$13{,}00 < d \leq 25{,}00$	1 000
Wire of less than 2,00 mm in diameter has insufficient rigidity in length, making the measurement of the out-of-straightness a difficult. The measurement shall therefore be made as agreed between purchaser and supplier.	

Table 5 — Tolerances on straightness of cut lengths

Class	**L_t = 500 mm**	**L_t = 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		



Key

L_t test length, in mm

a out-of-straightness, 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 determined by weighing the coil and calculating the length from the mass thus obtained.

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