

DRAFT INTERNATIONAL STANDARD

ISO/DIS 22034-2

ISO/TC 17/SC 17

Secretariat: SAC

Voting begins on:
2015-01-26

Voting terminates on:
2015-04-26

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

ICS: 77.140.65

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Reference number
ISO/DIS 22034-2:2014(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

ISO consists of the following parts, under the general title *Steel wire and wire products – General*

- *Part 1: General test methods*
- *Part 2: Tolerances on wire dimensions*

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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 0,050mm to 25,00 mm.

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.

ISO 6929, *Steel products — Vocabulary*

3 Terms and definitions

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

3.1

wire

See ISO 6929

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

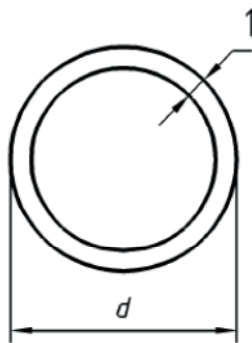
3.2

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

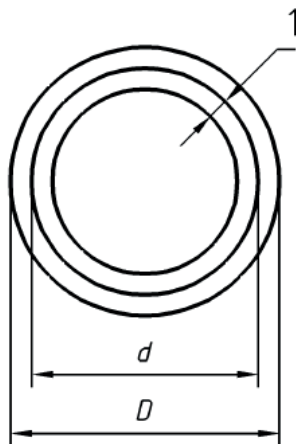
Diameter tolerance mm	Range of wire diameter, d mm				
	T1	T2	T3	T4	T5
±0,003	—	—	—	—	$0,05 \leq d < 0,09$
±0,004	—	—	—	$0,05 \leq d < 0,072$	$0,09 \leq d < 0,17$
±0,005	—	—	—	$0,072 \leq d < 0,12$	$0,17 \leq d < 0,26$
±0,006	—	—	$0,05 \leq d < 0,12$	$0,12 \leq d < 0,17$	$0,26 \leq d < 0,37$
±0,008	—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

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
$D \leq 1,00$	$\pm 0,10$	0,20	0,12	75	65
$1,00 < D \leq 2,00$	$\pm 0,10$	0,25	0,12	75	65
$2,00 < D \leq 3,15$	$\pm 0,15$	0,35	0,15	75	65
$3,15 < D \leq 6,00$	$\pm 0,20$	0,40	0,20	75	65
$6,00 < D \leq 13,00$	$\pm 0,25$	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 $100 \times$ 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
$L \leq 300$	$\pm 0,50$ mm	$\pm 0,50$ % for all lengths	$\pm 1,00$ % for all lengths
$300 < L \leq 1000$	$\pm 1,00$ mm		
$L > 1000$	$\pm 0,10$ %		

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.