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Steel wire and wire products —

Part 2: Tolerances on wire dimensions

Fil et produits de fil en acier —

Partie 2: Tolérances sur les dimensions des fils

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Foreword

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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 22034-2 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 17, *Steel wire rod and wire products*.

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.

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 — Definitions and classification*

3 Terms and definitions

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

3.1
wire
See ISO 6929.

NOTE 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

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 zinc-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	—	—	—	—	0,050 ⩽ 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	—	—	—	—

4.3 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 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).

4.4.2 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
$d \leqslant 1,00$	± 0,10	0,20	0,12	75	65
$1,00 < d \leqslant 2,00$	± 0,10	0,25	0,12	75	65
$2,00 < d \leqslant 3,15$	± 0,15	0,35	0,15	75	65
$3,15 < d \leqslant 6,00$	± 0,20	0,40	0,20	75	65
$6,00 < d \leqslant 13,00$	± 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.

5 Tolerances 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		
Over	Up to and including	Class 1	Class 2	Class 3
—	300	± 0,50 mm	± 0,50 % for all lengths	± 1,00 % for all lengths
300	1 000	± 1,0 mm		
1 000	—	± 0,10 %		

5.2 Straightness tolerances

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 1 illustrates the measurement of out-of-straightness.

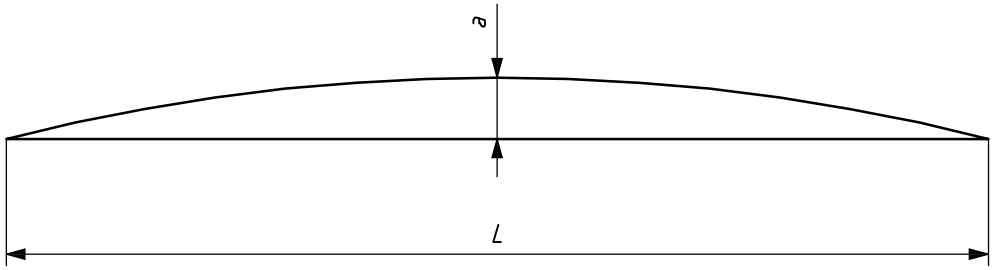
For classes 1 and 2, the cut lengths shall also meet the requirements of a rolling test which is performed on a smooth glass incline. Cut lengths are placed on the incline in a position which will allow them to roll freely down.

Table 4 — Tolerances on straightness of cut lengths

Class	L = 500 mm	L = 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		

Table 5 — Test lengths for measurement of out-of-straightness

Wire diameter, d mm	Test length, L mm
$2{,}00 \leqslant d \leqslant 6{,}00$	500
$6{,}00 < d \leqslant 13{,}00$	500 or 1 000
$13{,}00 < d \leqslant 20{,}00$	1 000
NOTE 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.	



Key

L test length

a out-of-straightness

Figure 1 — 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.