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August 1980

Flat products of steel

Cold rolled strip of stainless steel and of heat resisting steels

Dimensions, permissible dimensional deviations, deviations of form and weight

DIN 59 381

Flachzeug aus Stahl; Kaltgewalztes Band aus nichtrostenden und aus hitzebeständigen Stählen; Masse, zulässige Mass-, Form- und Gewichtsabweichungen

As it is current practice in standards published by the International Organization for Standardization (ISO), the comma has been used throughout as a decimal marker.

Dimensions in mm

1 Scope

1.1 This Standard applies to cold rolled flat products ≤ 3 mm thick, and in particular to strip in rolling widths ≤ 650 mm and rods (strips) cut from this strip, made of the steels listed in clause 5.

1.2 For cold rolled flat products made of stainless steels in rolling widths > 650 mm DIN 59 382 applies.

2 Concepts

2.1 Flat products

See DIN 1623 Part 1.

2.2 Strip

See DIN 1623 Part 1. Strip is understood to include also rods (strips) of less than 600 mm in width, manufactured by cutting strip into sections.

2.3 Cold rolled

See DIN 1623 Part 1.

3 Designations

3.1 Standard designation

3.1.1 In the standard designation for products according to this Standard the following must be indicated in the given order:

term (strip),

DIN number of the dimensional standard,

code number or material number for the steel grade and any symbols identifying the surface finish and/or the required condition on delivery as given in the quality standards,

if necessary, DIN number of the quality standard for the steel grade, if the latter is not clearly identified by the code number or the material number,

thickness in mm (if necessary to 2 decimals)

3.1.2 The term "strip" may be replaced by the abbreviation "Bd" according to DIN 1353 Part 2.

3.1.3 Example for the standard designation

Designation of cold rolled strip according to this Standard, made of X 5 CrNi 18 9 steel (material number 1.4301), descaled (f), cold formed (K 80), no heat-treated, of 0,80 mm in thickness:

Strip DIN 59 381 – X 5 CrNi 18 9 f (K 80) – 0,80

or

Strip DIN 59 381 – 1.4301 f (K 80) – 0,80

3.2 Designation to be used on ordering

3.2.1 To facilitate the execution of an order for products according to this Standard, the standard designation in accordance with subclause 3.1 which in itself remains unchanged must be supplemented by the following data.

a) (to be indicated before the standard designation):

quantity ordered or numbers of items

b) (to be indicated after the standard designation):

code letter (F or P) where close or precision deviations for the thickness are required (see table 1 and subclause 6.1.2),

width in mm,

code letter (GK or SK) for the desired edge finish (see table 1 and subclauses 4.2.1 and 4.2.2),

code letter (F or P) where close or precision deviations for the width are required for products with cutted edges (see table 1 and subclause 6.2.2),

length in mm in the case of rods, if necessary, followed by the code letter (N, F or P) where normal, close or precision deviations for the length of rods of exact length are required (see subclauses 4.1 b and 6.4.2),

code letter S where close deviations from the straightness are required (see table 1 and subclause 6.5),

3.2.2 When ordering without any special requirements for the permissible dimensional deviations and/or deviations of form (this means, if delivery is required with a normal deviation) and in the case of rods of manufacturing length code letters must not be used in the designation.

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Explanations

The August 1975 edition of DIN 59 381 did expressly not apply to spring band of stainless steel according to DIN 17 224. When revising DIN 17 224 (at present March 1979 draft) it was proposed to mention DIN 59 381 as the dimensional standard to be applicable to these products.

Following this proposal, the scope of this revision was extended to cover spring band of stainless steels by a corresponding modification of clause 5 – materials –. Furthermore the obsolete text relating to the designation of the products (clause 3) was changed.

As to the remaining specifications the revised edition of DIN 59 381 corresponds to the August 1975 edition.

Table 1. **Deliverable sizes and dimensional features of cold rolled flat products**

Shape of product	Available sizes and dimensional features [1]												
	Shape of edge [2]	Thickness [3]			Width [4]			Length [5]				Straightness [6]	
									Exact length				
		Normal deviation	Close deviation	Precision deviation	Normal deviation	Close deviation	Precision deviation	Manufacturing length	Normal deviation	Close deviation	Precision deviation	Normal deviation	Close deviation
Strip	GK	×	F	P	×	F	P	–	–	–	–	×	S
	SK	×	F	P	[7]	[7]	[7]	–	–	–	–	×	S
Rod (Strips)	GK	×	F	P	×	F	P	×	N	F	P	×	S
	SK	×	F	P	[7]	[7]	[7]	×	N	F	P	×	S

[1] The normal deviations marked with a cross (X) are those which are usually delivered (see subclauses 3.1.1 and 4.3). If delivery with close or precision deviations or of rods in exact length is required the indicated code letters must be used in the designation (see subclause 3.1).

[2] See subclauses 4.2.1, 4.2.2 and 4.3

[3] See subclause 6.1 and table 2

[4] See subclause 6.2 and table 3

[5] See subclause 6.4

[6] See subclause 6.5 and table 4

[7] See subclause 6.2.4

3.2.3 Examples for the designation to be used on ordering

a) 10 t strip of steel with the standard designation according to subclause 3.1.3 with normal deviations for the nominal thickness, 500 mm in width, with cut edges (GK), with normal deviations for width and straightness:

50 t Strip DIN 59381 – X 5 CrNi 18 9 f (K 80) – 0,80 x 500 GK

or **50 t Strip DIN 59381 – 1.4301 f (K 80) – 0,80 x 500 GK**

b) 5 t strip of X 5 CrNi 18 9 steel (material number 1.4301), polished (p), of 1,60 mm in thickness with precision deviations (P) for the thickness, 450 mm in width, with cut edges (GK), close deviations (F) for the width, for rods of manufacturing length 3000 mm, with normal deviations for the straightness:

5 t Strip DIN 59381 – X 5 CrNi 18 9 p – 1,60 P x 450 GKF x 3000

or **5 t Strip DIN 59381 – 1.4301 p – 1,60 P x 450 GKF x 3000**

c) 5 t strip of X 5 CrNiMo 18 10 steel (material number 1.4401), polished (p), according to DIN 17440 of 1,20 mm thickness, with close deviations (F) for the thickness, 300 mm in width, with cut edges (GK), precision deviations (P) for the width, for rods of 4000 mm exact length, with close deviations (F) for the length and close deviations (S) for the straightness:

5 t Strip DIN 59381 – X 5 CrNiMo 18 10 p DIN 17440 1,20 F x 300 GKP x 4000 FS

or **5 t Strip DIN 59381 – 1.4401 p DIN 17440 1,20 F x 300 GKP x 4000 FS**

4 Deliverable sizes

4.1 Cold rolled flat products according to this Standard can be delivered as:

a) strip on reels (see subclause 6.3),

b) rods (strips), manufactured by cutting strip according to subclause 4.1a) into sections, in manufacturing lengths or in exact lengths with normal deviations (N), close deviations (F) or precision deviations (P) (see table 1 and subclause 6.4). When supplying exact lengths short lengths not exceeding a total weight of 10% of the quantity ordered may be delivered, these rods, however, must have a length of at least 50% of the lengths ordered.

4.2 For cold rolled flat products according to subclause 4.1 the sizes specified in table 1 (shape of edges, permissible dimensional deviations and deviations of form) apply.

4.2.1 Flat products with cut edges (GK) will have a burr caused by cutting. If special requirements are made for these edges, corresponding agreements will have to be made on ordering. In this case, the strip is deemed to be cut almost free of burr, if the height of the burr is $< 10\%$ of the product thickness.

4.2.2 By special agreement and dependent on the technical equipment of the supplier, flat products according to this Standard are deliverable having special edges (SK), e.g. deburred or rounded edges.

4.3 If no information is provided on the sizes and dimensional features flat products will be supplied with normal deviations and cut edges, in the case of rods in manufacturing lengths.

5 Material

Strip according to this Standard is manufactured from ferritic, martensitic and austenitic stainless steels (e.g. according to DIN 17224, DIN 17440 and Steel-Iron-Data Sheet 400) and from heat resisting steels (DIN Standard in course of preparation).

The required steel grade must be indicated in the designation.

Table 2. **Preferred nominal thicknesses and permissible thickness deviations**

Preferred nominal thicknesses 1)	for a nominal thickness d		Permissible thickness deviations for nominal widths 2)								
			< 125			≧ 125 < 250			≧ 250 ≦ 650		
	≧	<	Normal deviation	Close deviation (F)	Precision deviation (P)	Normal deviation	Close deviation (F)	Precision deviation (P)	Normal deviation	Close deviation (F)	Precision deviation (P)
		0,10	$\pm 0{,}1 \cdot d$	$\pm 0{,}05 \cdot d$	$\pm 0{,}04 \cdot d$	±0,010	$\pm 0{,}1 \cdot d$	$\pm 0{,}08 \cdot d$	±0,020	±0,010	±0,010
0,10; 0,12	0,10	0,15	±0,010	±0,008	±0,005	±0,015	±0,012	±0,008	±0,020	±0,015	±0,010
0,15	0,15	0,20	±0,015	±0,010	±0,008	±0,020	±0,012	±0,010	±0,025	±0,015	±0,012
0,20	0,20	0,25	±0,015	±0,012	±0,008	±0,020	±0,015	±0,010	±0,025	±0,020	±0,012
0,25	0,25	0,30	±0,020	±0,015	±0,010	±0,025	±0,015	±0,012	±0,030	±0,020	±0,015
0,30; 0,35	0,30	0,40	±0,020	±0,015	±0,010	±0,025	±0,020	±0,012	±0,030	±0,025	±0,015
0,40	0,40	0,50	±0,025	±0,020	±0,012	±0,030	±0,020	±0,015	±0,035	±0,025	±0,018
0,50	0,50	0,60	±0,030	±0,020	±0,012	±0,030	±0,025	±0,015	±0,040	±0,030	±0,020
0,60; 0,70	0,60	0,80	±0,030	±0,025	±0,015	±0,035	±0,030	±0,018	±0,040	±0,035	±0,025
0,80; 0,90	0,80	1,00	±0,030	±0,025	±0,015	±0,040	±0,030	±0,020	±0,050	±0,035	±0,025
1,00; 1,20	1,00	1,25	±0,035	±0,030	±0,020	±0,045	±0,035	±0,025	±0,050	±0,040	±0,030
	1,25	1,50	±0,040	±0,030	±0,020	±0,050	±0,035	±0,025	±0,060	±0,045	±0,030
1,50	1,50	2,00	±0,050	±0,035	±0,025	±0,060	±0,040	±0,030	±0,070	±0,050	±0,035
2,00	2,00	2,50	±0,050	±0,035	±0,025	±0,070	±0,045	±0,030	±0,080	±0,060	±0,040
2,50; 3,00	2,50	3,00 3)	±0,060	±0,045	±0,030	±0,070	±0,050	±0,035	±0,090	±0,070	±0,045

1) See subclause 6.1.1

2) See subclauses 8.1 and 8.1.1

3) Including 3,00 mm

6 Dimensions and permissible dimensional deviations and deviations of form

6.1 Thickness

6.1.1 The preferred nominal thicknesses are listed in table 2. All other thicknesses in the range ≦ 3 mm are also deliverable.

6.1.2 The permissible thickness deviations in the case of normal deviations, close deviations (F) and precision deviations (P) are given in table 2 (see also subclause 8.1).

6.2 Width

6.2.1 The preferred nominal widths are 3, 4, 5, 6, 8, 10, 12, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 70, 80, 90, 100, 110, 125, 140, 160, 180, 200, 220, 250, 280, 320, 360, 400, 450, 500, 550, 600 and 650 mm.

6.2.2 The values for the permissible oversize on nominal width in the case of normal deviations, close deviations (F) and precision deviations (P) for strip with cut edges (GK) are given in table 3. No undersize on nominal width is permitted (see subclause 6.2.3).

6.2.3 By special agreement, strip with cut edges with undersizes only permissible on nominal width can be supplied. Also in this cases, the values given in table 3 apply.

6.2.4 In the case of strip having special edges (SK) the values for permissible width deviations must be specially agreed.

6.3 Diameter of reels

According to the order, the inside diameter of the reels is: 300, 400, 500 or 600 mm for a strip thickness ≦ 2 mm, and 400, 500 or 600 mm for strip thicknesses > 2 mm.

6.4 Length (for rods)

6.4.1 Where manufacturing lengths are supplied, either according to the order or at the manufacturer's discretion, the dimensions are between 1000 and 4000 mm; smaller or greater lengths must be specially agreed. It is not possible to specify a permissible length deviation.

6.4.2 When ordering exact lengths, the following oversizes on nominal length are permissible:

normal deviations (N): 10 mm,
close deviations (F): 5 mm,
precision deviations (P): 2 mm,

No undersize on nominal length is permitted (see subclause 4.1 b)).

6.5 Straightness of longitudinal edges

For the permissible deviations from straightness of the longitudinal edges in the case of normal deviations and close deviations (S) the values in table 4 apply (see also subclause 8.2). In the case of work hardened strip (type of finish f according to DIN 17440) special agreements must be made on the permissible deviations from straightness.

Tabel 3. **Permissible oversize on nominal width**

Nominal thickness		Permissible oversize on nominal width [1], [2] for nominal widths											
		< 40			≧ 40 < 125			≧ 125 < 250			≧ 250 ≦ 650		
≧	<	Normal deviation	Close deviation (F)	Precision deviation (P)	Normal deviation	Close deviation (F)	Precision deviation (P)	Normal deviation	Close deviation (F)	Precision deviation (P)	Normal deviation	Close deviation (F)	Precision deviation (P)
	0,25	0,25	0,15	0,12	0,25	0,20	0,15	0,40	0,30	0,25	0,50	0,50	0,40
0,25	0,50	0,30	0,20	0,12	0,30	0,25	0,15	0,50	0,30	0,25	0,60	0,50	0,40
0,50	1,00	0,30	0,20	0,15	0,30	0,30	0,20	0,50	0,40	0,30	0,80	0,60	0,50
1,00	2,00	0,40	0,30	0,20	0,50	0,40	0,30	0,80	0,60	0,50	1,00	0,80	0,60
2,00	3,00 [3]	0,50	0,40	0,30	0,70	0,50	0,40	1,00	0,80	0,60	1,20	1,00	0,80

1) For preferred nominal widths, see subclause 6.2.1
2) Applicable to flat products with cut edges (see also subclauses 6.2.3 and 6.2.4)
3) Including 3,00 mm

Table 4. **Permissible deviations from straightness**

Permissible deviations from straightness [1] for a nominal width		Normal deviation	Close deviation (S)
≧	<		
10	25	4	1,5
25	40	3	1,25
40	125	2	1
125	650 [2]	1,5	0,75

1) Testing according to subclause 8.2
2) Including 650 mm

6.6 Evenness

6.6.1 In the case of strip in cold rerolled condition (types of finish m and n in accordance with DIN 17 440) the waviness of the edges e.g. the ratio of wave height to wave length, must not exceed 3 % (see also subclause 8.3). For work-hardened strip (type of finish f) special agreements must be reached on the permissible waviness. In the case of strip of types of finish g and h according to DIN 17 440, no special requirements can be stipulated.

6.6.2 In the case of rods, the permissible deviation from evenness is 10 mm (see also subclause 8.4).

The waviness of rods in the soft and cold rerolled condition (types of finish g, h, m and n according to DIN 17 440) must not exceed 1 %, with a maximum permissible wave height of 10 mm. In the case of work-hardened products (types of finish f) special agreements must be reached on the permissible waviness.

7 Weights and permissible weight deviations

7.1 The density values given in the quality standards must be used as a basis for determining the theoretical weight of the products.

7.2 If an average reel weight is agreed at the time of ordering, this must be maintained to within ± 15 %. If only a maximum reel weight is agreed, this weight is allowed to be undersized by a maximum of 30 %.

Reels weighing less than this, for reasons connected with the manufacturing process, must be accepted up to 10 % of the delivered weight, with however a minimum of one reel. However, the weight of such smaller reels must be at least 30 % of the agreed reel weight.

8 Testing of dimensional accuracy

8.1 The thickness may be measured at any arbitrarily chosen point on the product at a distance of at least 10 mm from the edges. For widths ≦ 20 mm, it must be measured in the centre of the product width.

8.1.1 When ordering close deviations (F) or precision deviations (P) it can be agreed that the permissible deviations from thickness shall be maintained over the whole width of the product.

8.2 The deviation from straightness is taken as the maximum distance between a longitudinal edge and a straight line joining both ends of the measured length. It must be measured on the concave side of the product. The measured length is 1000 mm. Testing is made at a distance of at least 3000 mm from the beginning or end of the strip.

8.3 For testing the waviness, the wave length is taken as the distance between two points at which the product touches a straight edge, and the wave height as the maximum distance between the product and the straight edge.

8.4 The deviation from evenness is taken as the maximum distance between the product and a flat horizontal surface on which it freely lies.