BS EN 10051:2024

BSI Standards Publication

Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels — Tolerances on dimensions and shape

bsi.

National foreword

This British Standard is the UK implementation of EN 10051:2024. It supersedes BS EN 10051:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/103, Structural Steels Other Than Reinforcements.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Continuously hot-rolled strip and plate/sheet cut from wide strip of non-alloy and alloy steels - Tolerances on dimensions and shape

Bandes laminées à chaud en coupons et tôles issues de larges bandes en aciers alliés et non alliés - Tolérances sur les dimensions et la forme

Kontinuierlich warmgewalztes Band und Blech abgelängt aus Warmbreitband aus unlegierten und legierten Stählen - Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 27 February 2024.

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European foreword

This document (EN 10051:2024) has been prepared by Technical Committee CEN/TC 459/SC 3 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by October 2024, and conflicting national standards shall be withdrawn at the latest by January 2026.

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

This document supersedes EN 10051:2010.

In comparison with the previous edition EN 10051:2010, the following technical modifications have been made:

— tolerances on flatness were revised;

— options were revised, a new option for only positive thickness tolerances was introduced and the options were moved from Annex B to 4.2;

— thickness tolerances for strip and sheet/plate with minimum yield strength > 960 MPa must be agreed;

— flatness measurement revised;

— change regarding the tolerances of cropped coils;

— editorial revisions.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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1 Scope

This document specifies tolerances on dimensions and shape for continuously hot-rolled uncoated plate/sheet and strip with a maximum width of 2 200 mm and a maximum thickness of 25 mm of non-alloy and alloy steels in accordance with Table 1 (see also Annex B). This document also applies to hot-rolled strip for cold rolling.

Table 1 — Field of application

Product	Thickness mm	Steel grades according to: (but not limited to)	
• wide strip (width: 600 mm ≤ w ≤ 2 200 mm), • sheet/plate cut from wide strip, • strip (width: w < 600 mm slit from wide strip)	≤ 25 mm	EN 10025-2 to −6	Structural steels
		EN 10028-2 to −6	Steels for pressure purposes
		EN ISO 683-1 and 683-2	Steels for quenching and tempering
		EN ISO 683-3	Case hardening steels
		EN ISO 683-5	Nitriding steels
		EN 10111	Low carbon steel sheet and strip for cold forming
		EN 10120	Steel sheet and strip for welded gas cylinders
		EN 10149-2 and −3	High yield strength steels for cold forming
		EN 10207	Steels for simple pressure vessels
		EN 10225-1	Plates for fixed offshore structures
		EN 10338	Non-coated products of multiphase steels for cold forming
		EN ISO 4957	Tool steels

This document does not apply to:

— hot-rolled strip rolled in widths w < 600 mm (see EN 10048);

— hot-rolled patterned steel strip and plate/sheet cut from wide strip (see EN 10363);

— uncoated or electrolytically coated cold rolled sheet and strip (see EN 10131);

— hot-dip coated steel sheet and strip (EN 10143);

— stainless steels.

This document can also be used for steels from other standards, e.g. steels for shipbuilding.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 10020, *Definition and classification of grades of steel*

EN 10079, *Definition of steel products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020, EN 10079 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
non-alloy and alloy steels
steels, alloy and non-alloy, which follow the information and requirements outlined in EN 10020

3.2
wide strip and sheet/plate
steels in wide strip, sheet or plate format, which follow the information, requirements and test methods outlined in EN 10079

3.3
crown
difference in thickness between one of the edges and the centre of a rolled product

4 Information to be supplied by the purchaser

4.1 General

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) the quantity to be delivered;

b) designation of the product (wide strip, sheet/plate cut from wide strip, strip slit from wide strip);

c) number of this dimensional standard (EN 10051);

d) nominal thickness and width in mm;

e) nominal length in mm (for sheet and plate);

f) upper width tolerances for sheet/plate with thickness > 15 mm (see 6.3);

g) tolerances on flatness for sheet/plate of thickness ≤ 3 mm of category D (see 6.4 and Table 9);

h) edge camber requirements for strip < 600 mm wide, which was slit from wide strip (see 7.4).

4.2 Options

A number of options are specified in this document and listed below. If the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification of this document (see 4.1 and 5.1):

1) whether trimmed edges (T) or mill edges (M) are required, otherwise the edge condition is at the discretion of the manufacturer (see 5.1);

2) whether coils may be delivered with welded seams (see 5.2);

3) whether the minimum thickness of the product shall be the nominal thickness and the full range of the thickness tolerance from Tables 3 to 6 (disposition of tolerances) shall be valid only as a positive tolerance (see 6.1.2 and Annex A);

4) whether thickness and/or flatness tolerances of steel grades with a minimum specified yield strength > 960 MPa need to be agreed (see 6.1.2);

5) whether for sheet/plate special tolerances on flatness are required (see 6.5 and Table 9);

6) whether for sheet/plate the tolerances on out-of-squareness and edge camber shall be replaced by a requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed into the sheets delivered (see 6.7);

7) whether for hot-rolled strip for cold rolling, maximum values for crown according to Table 10 and permissible thickness differences within one coil according to Table 11 are required (see 7.2.2);

8) whether for hot-rolled strip for cold rolling more severe tolerances on thickness and crown are required (see 7.2.3).

4.3 Designation

EXAMPLE 1 20 sheets according to EN 10051 with nominal thickness of 2,0 mm, nominal width 1 200 mm, with trimmed edges (T), nominal length 2 500 mm of steel 34Cr4 (1.7033) as specified in EN ISO 683-2:

20 sheets EN 10051 – 2,0 × 1 200T × 2 500

steel EN ISO 683-2 – 34Cr4

EXAMPLE 2 5 t of strip according to EN 10051 with nominal thickness of 4,5 mm, nominal width 1 500 mm, with mill edges (M) of steel S235JR (1.0038), as specified in EN 10025-2:

5 t strip EN 10051 – 4,5 × 1 500M

steel EN 10025-2 – S235JR

5 Form of supply

5.1 Sheet/plate and strip shall be supplied with mill edges (M) or with trimmed edges (T), as agreed at the time of enquiry and order (see option 1). In the absence of information on the form of supply, sheet/plate and strip shall be supplied with one of both edge conditions at the discretion of the manufacturer.

5.2 The possibility of delivering coils with welding seams can be agreed at the time of enquiry and order. The indication of the location of the weld can be agreed at the same time (see option 2).

5.3 Where no specific choice is made by the purchaser concerning points 4.1 f), g), and h), the choice of the values is at the discretion of the manufacturer.

6 Tolerances for sheet/plate

6.1 Thickness

6.1.1 The tolerances on thickness for continuously hot-rolled low carbon steel sheet/plate for cold forming according to EN 10111 are given in Table 2.

Table 2 — Tolerances on thickness for hot-rolled low carbon steel sheet/plate and strip for cold forming

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w			
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$
$t \leq 2{,}00$	±0,13	±0,14	±0,16	–
$2{,}00 < t \leq 2{,}50$	±0,14	±0,16	±0,17	±0,19
$2{,}50 < t \leq 3{,}00$	±0,15	±0,17	±0,18	±0,20
$3{,}00 < t \leq 4{,}00$	±0,17	±0,18	±0,20	±0,20
$4{,}00 < t \leq 5{,}00$	±0,18	±0,20	±0,21	±0,22
$5{,}00 < t \leq 6{,}00$	±0,20	±0,21	±0,22	±0,23
$6{,}00 < t \leq 8{,}00$	±0,22	±0,23	±0,23	±0,26
$8{,}00 < t \leq 11{,}00$	±0,24	±0,25	±0,25	±0,28

6.1.2 The tolerances on thickness for steels, not covered by 6.1.1, are given in Tables 3 to 6. These tolerances are indicated as categories A, B, C, D. The dimensional tolerances of steel grades which do not have a specified minimum yield strength are the ones of category D.

Thickness tolerances with only positive tolerances, by keeping the full range of the tolerance from Tables 3 to 6 (disposition of tolerances), can be agreed at the time of enquiry and order (see Option 3 and Annex A).

Table 3 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength $R_e \leq 300$ MPa (category A)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w			
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$
$t \leq 2{,}00$	±0,17	±0,19	±0,21	–
$2{,}00 < t \leq 2{,}50$	±0,18	±0,21	±0,23	±0,25
$2{,}50 < t \leq 3{,}00$	±0,20	±0,22	±0,24	±0,26
$3{,}00 < t \leq 4{,}00$	±0,22	±0,24	±0,26	±0,27
$4{,}00 < t \leq 5{,}00$	±0,24	±0,26	±0,28	±0,29
$5{,}00 < t \leq 6{,}00$	±0,26	±0,28	±0,29	±0,31
$6{,}00 < t \leq 8{,}00$	±0,29	±0,30	±0,31	±0,35
$8{,}00 < t \leq 10{,}00$	±0,32	±0,33	±0,34	±0,40
$10{,}00 < t \leq 12{,}50$	±0,35	±0,36	±0,37	±0,43
$12{,}50 < t \leq 15{,}00$	±0,37	±0,38	±0,40	±0,46
$15{,}00 < t \leq 25{,}00$	±0,40	±0,42	±0,45	±0,50

Table 4 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 300 MPa < R_e ≤ 360 MPa (category B)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w			
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$
$t \leq 2{,}00$	±0,20	±0,22	±0,24	–
$2{,}00 < t \leq 2{,}50$	±0,21	±0,24	±0,26	±0,29
$2{,}50 < t \leq 3{,}00$	±0,23	±0,25	±0,28	±0,30
$3{,}00 < t \leq 4{,}00$	±0,25	±0,28	±0,30	±0,31
$4{,}00 < t \leq 5{,}00$	±0,28	±0,30	±0,32	±0,33
$5{,}00 < t \leq 6{,}00$	±0,30	±0,32	±0,33	±0,36
$6{,}00 < t \leq 8{,}00$	±0,33	±0,35	±0,36	±0,40
$8{,}00 < t \leq 10{,}00$	±0,37	±0,38	±0,39	±0,46
$10{,}00 < t \leq 12{,}50$	±0,40	±0,41	±0,43	±0,49
$12{,}50 < t \leq 15{,}00$	±0,43	±0,44	±0,46	±0,53
$15{,}00 < t \leq 25{,}00$	±0,46	±0,48	±0,52	±0,58

Table 5 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 360 MPa < R_e ≤ 420 MPa (category C)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w			
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$
$t \leq 2{,}00$	±0,22	±0,25	±0,27	–
$2{,}00 < t \leq 2{,}50$	±0,23	±0,27	±0,30	±0,33
$2{,}50 < t \leq 3{,}00$	±0,26	±0,29	±0,31	±0,34
$3{,}00 < t \leq 4{,}00$	±0,29	±0,31	±0,34	±0,35
$4{,}00 < t \leq 5{,}00$	±0,31	±0,34	±0,36	±0,38
$5{,}00 < t \leq 6{,}00$	±0,34	±0,36	±0,38	±0,40
$6{,}00 < t \leq 8{,}00$	±0,38	±0,39	±0,40	±0,46
$8{,}00 < t \leq 10{,}00$	±0,42	±0,43	±0,44	±0,52
$10{,}00 < t \leq 12{,}50$	±0,46	±0,47	±0,48	±0,56
$12{,}50 < t \leq 15{,}00$	±0,48	±0,49	±0,52	±0,60
$15{,}00 < t \leq 25{,}00$	±0,52	±0,55	±0,59	±0,65

Table 6 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 420 MPa < R_e ≤ 960 MPa (category D)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w			
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$
$t \leq 2{,}00$	±0,24	±0,27	±0,29	–
$2{,}00 < t \leq 2{,}50$	±0,25	±0,29	±0,32	±0,35
$2{,}50 < t \leq 3{,}00$	±0,28	±0,31	±0,34	±0,36
$3{,}00 < t \leq 4{,}00$	±0,31	±0,34	±0,36	±0,38
$4{,}00 < t \leq 5{,}00$	±0,34	±0,36	±0,39	±0,41
$5{,}00 < t \leq 6{,}00$	±0,36	±0,39	±0,41	±0,43
$6{,}00 < t \leq 8{,}00$	±0,41	±0,42	±0,43	±0,49
$8{,}00 < t \leq 10{,}00$	±0,45	±0,46	±0,48	±0,56
$10{,}00 < t \leq 12{,}50$	±0,49	±0,50	±0,52	±0,60
$12{,}50 < t \leq 15{,}00$	±0,52	±0,53	±0,56	±0,64
$15{,}00 < t \leq 25{,}00$	±0,56	±0,59	±0,63	±0,70

Thickness tolerances of steel grades with a minimum specified yield strength > 960 MPa need to be agreed at the time of enquiry and order (see Option 4). If no agreement is made, the thickness tolerances of such products are at the discretion of the manufacturer.

6.2 Length

The tolerances on length for sheet/plate shall be as given in Table 7.

Table 7 — Tolerances on length for sheet/plate

Dimensions in millimetres

Nominal length	Tolerances	
l	Lower	Upper
$l \leq 2\,000$	0	+10
$2\,000 < l \leq 8\,000$	0	+0,005 x l
$l > 8\,000$	0	+40

6.3 Width

The tolerances on width for sheet/plate shall be as given in Table 8.

Table 8 — Tolerances on width for sheet/plate

Dimensions in millimetres

Nominal width *w*	**Tolerances**			
	Mill edges		Trimmed edges[a]	
	Lower	Upper	Lower	Upper
$w \leq 1\,200$	0	+20	0	+3
$1\,200 < w \leq 1\,850$	0	+20	0	+5
$w > 1\,850$	0	+25	0	+6

[a] Tolerances for trimmed edges apply to products with nominal thickness $t \leq 15$ mm; for nominal thickness $t > 15$ mm the upper tolerances shall be agreed at the time of enquiry and order.

6.4 Flatness

For continuously hot-rolled sheet/plate the deviation from flatness shall not exceed the tolerances given in Table 9. Special flatness tolerances shall be agreed at the time of enquiry and order (see option 5).

The categories A, B, C and D for the flatness tolerances are the same as the ones which have been defined for the thickness tolerances, see 6.1.2.

Flatness tolerances for continuously hot-rolled low carbon steel sheet/plate according to EN 10111, see 6.1.1, are the same as the ones of steel grades of category A, B, C in Table 9. Flatness tolerances of steel grades with a minimum specified yield strength > 960 MPa need to be agreed at the time of enquiry and order. If no agreement is made, the flatness tolerances of such products are at the discretion of the manufacturer.

Other flatness tolerances may be agreed at the time of enquiry and order.

6.5 Edge camber

The edge camber shall not exceed 0,5 % of the actual length of the sheet/plate for a nominal length $l < 5\,000$ mm.

For sheet/plate with a nominal length $l \geq 5\,000$ mm and widths $w \geq 600$ mm, the edge camber shall not exceed 20 mm for any length of 5 000 mm in the case of sheet/plate with mill edges and 15 mm in the case of sheet with trimmed edges.

6.6 Out-of-squareness

The out-of-squareness *u* measured in accordance with 8.7 shall not exceed 1,0 % of the actual width of the sheet/plate.

6.7 Superimposement of dimensions

By agreement at the time of enquiry and order the upper tolerances on out-of-squareness and edge camber may be replaced by a requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed into the sheets delivered (see option 6). In this case, the upper tolerances on width and length shall be agreed at the time of enquiry and order.

Table 9 — Tolerances on flatness

Dimensions in millimetres

Nominal width *w*	Nominal thickness *t*	Normal flatness tolerances		Special flatness tolerances	
		Low carbon steel, categories A, B and C	Category D	Low carbon steel, categories A, B and C	Category D
		Measuring length 1 000 mm		Measuring length 1 000 mm	
w ≤ 1 200	*t* ≤ 2,00	18	To be agreed with the customer	18	To be agreed with the customer
	2,00 < *t* ≤ 2,50	15		14	
	2,50 < *t* ≤ 3,00			11	
	3,00 < *t* ≤ 5,00		18	9	12
	5,00 < *t* ≤ 8,00	13	16	8	11
	8,00 < *t* ≤ 15,00		16	7	10
	15,00 < *t* ≤ 25,00		16	7	10
1200 < *w* ≤ 1 500	*t* ≤ 2,00	21	To be agreed with the customer	21	To be agreed with the customer
	2,00 < *t* ≤ 2,50	18		17	
	2,50 < *t* ≤ 3,00			14	
	3,00 < *t* ≤ 5,00		21	12	15
	5,00 < *t* ≤ 8,00	16	19	11	14
	8,00 < *t* ≤ 15,00		19	10	13
	15,00 < *t* ≤ 25,00		19	10	13
w > 1 500	*t* ≤ 2,00	26	To be agreed with the customer	26	To be agreed with the customer
	2,00 < *t* ≤ 2,50	22		22	
	2,50 < *t* ≤ 3,00			19	
	3,00 < *t* ≤ 5,00		25	17	20
	5,00 < *t* ≤ 8,00	19	22	16	19
	8,00 < *t* ≤ 15,00		22	15	18
	15,00 < *t* ≤ 25,00		22	15	18

7 Tolerances for wide strip and strip slit from wide strip

7.1 General

The specified values for all tolerances shall not apply to the ends of the coil for a total length *l,* which is calculated using the formula.

$$l\,(\mathrm{m}) = \frac{90}{nominal\ thickness\left(mm\right)}$$

provided that the result does not exceed 20 m.

7.2 Thickness

7.2.1 The tolerances on thickness shall be the same as those for sheet/plate (see 6.1).

7.2.2 Maximum values for crown as given in Table 10 and permissible thickness differences within one coil as given in Table 11 shall apply for hot-rolled strip for cold rolling, if agreed at the time of enquiry and order (see option 7). The thickness (within one coil) shall change gradually and the changes shall not be discontinuous.

For coils not slit in longitudinal direction the crown should be aimed to be as constant and symmetrical from the middle of the coil as possible.

7.2.3 More severe tolerances on thickness and crown may be agreed at the time of enquiry and order (see option 8).

Table 10 — Maximum values for crown for hot-rolled strip for cold rolling

Dimensions in millimetres

Nominal width w	Permissible crown for steel category [a]			
	A	B	C	D
$w \leq 1\,200$	0,10	0,12	0,13	0,14
$1\,200 < w \leq 1\,500$	0,13	0,15	0,17	0,18
$1\,500 < w \leq 1\,800$	0,16	0,18	0,21	0,22
$1\,800 < w \leq 2\,200$	0,20	0,23	0,26	0,28

[a] The values for permissible crown shall be lowered by 20 % for hot-rolled strip slit from wide strip meant for cold rolling.

Table 11 — Permissible thickness differences within one coil of hot-rolled strip for cold rolling

Dimensions in millimetres

Nominal thickness t	Permissible thickness differences for nominal width of strip		
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 2\,200$
$0,8 \leq t \leq 2,0$	0,20	0,24	0,28
$2,0 < t \leq 3,0$	0,22	0,27	0,33
$3,0 < t \leq 4,0$	0,28	0,32	0,40
$4,0 < t \leq 8,0$	0,28	0,32	0,40

7.3 Width

The tolerances on width for strip shall be the same as for sheet/plate (see 6.3).

7.4 Edge camber

For strip $w \geq 600$ mm, the edge camber shall not exceed 20 mm for any length of 5 000 mm in the case of strip with mill edges and 15 mm in the case of strip with trimmed edges.

For strip $w < 600$ mm slit from wide strip, the tolerances on edge camber shall be agreed at the time of enquiry and order.

8 Measurement

8.1 General

Measurements listed in 8.2 to 8.7 shall be used in case of dispute and be carried out at ambient temperature.

8.2 Thickness

8.2.1 The thickness shall be measured at any point situated at least 40 mm from the edges for products with mill edges and at least 25 mm from the edges for products with trimmed/slit edges. For the end of coils, 7.1 shall be considered.

8.2.2 The crown shall be measured as the thickness difference between the centre line of the product and a measuring point at 40 mm from any edge of the product in case of mill edges and at 25 mm in case of trimmed/slit edges.

8.2.3 The difference in thickness within one coil shall be measured at a line with an invariable distance from the longitudinal edges (minimum distance from the edges in accordance with 8.2.1).

8.3 Length of sheet/plate

The length of the sheet/plate is the length of the shorter of both longitudinal edges.

8.4 Width

The width shall be measured at right angles to the longitudinal axis of the product.

8.5 Flatness for sheet/plate

To measure the flatness, the sheet/plate shall be placed on a flat surface.

Deviation from flatness shall be determined by measuring the deviation in distance between the plate and a straight edge length of 1 000 mm (see Table 9), which may be placed in any direction.

Deviations from flatness ≤ 2 mm shall not be considered as a wave and not be taken into account.

Only the part situated between the points of contact between the straight edge and the plate shall be taken into consideration. Deviations shall be measured at any point at least 25 mm from the longitudinal edges and at a distance *a* from the end of the sheet/plate, depending on whether the normal tolerances or special tolerances apply respectively (see Figure 1).

NOTE It is pointed out that bad handling and storage can adversely affect the flatness of the product.

Key

a distance from end of sheet/plate, 200 mm for normal and 100 mm for special flatness tolerances

Figure 1 — Measurement of flatness for sheet/plate

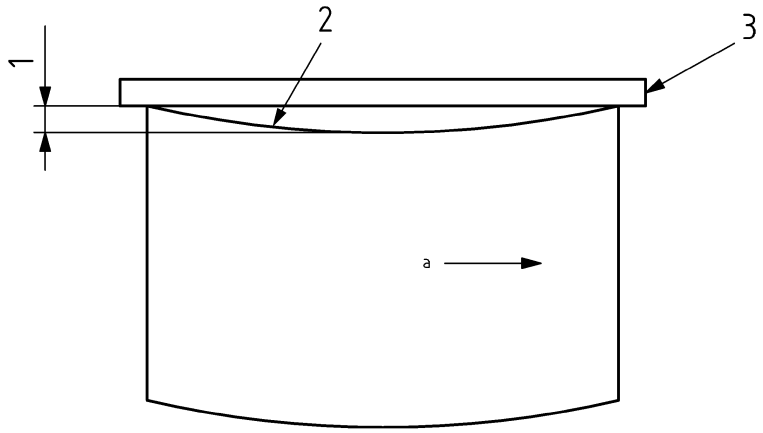
8.6 Edge camber

The edge camber is the maximum deviation of a longitudinal edge from a straight edge measuring base applied to it.

The camber is measured on the concave edge (see Figure 2).

For sheet/plate measuring base shall be the length of the product for a nominal length l < 5 000 mm.

For strip and sheet/plate with a nominal length l ≥ 5 000 mm, the measuring base shall be 5 000 mm, taken anywhere along the edge but excluding the ends.



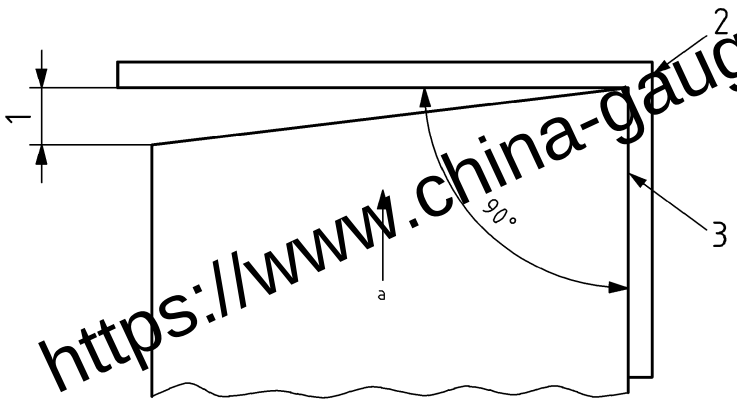
Key

1 edge camber
2 side edge (concave side)
3 straight edge
a rolling direction

Figure 2 — Measurement of edge camber

8.7 Out-of-squareness for sheet/plate

The out-of-squareness *u* for sheet/plate is the orthogonal projection of a transverse edge over a longitudinal edge (see Figure 3).



Key

1 out-of-squareness *u*
2 square
3 side edge
a rolling direction

Figure 3 — Measurement of out-of-squareness

Annex A
(normative)

Thickness tolerances with only positive tolerances according to Option 3

If option 3 is agreed between manufacturer and purchaser only positive thickness tolerances apply. These thickness tolerances are given in Tables A.1 to A.4.

Table A.1 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength $R_e \leq 300$ MPa (category A)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w							
	$w \leq 1\,200$		$1\,200 < w \leq 1\,500$		$1\,500 < w \leq 1\,800$		$w > 1\,800$	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
$t \leq 2{,}00$	0	+0,34	0	+0,38	0	+0,42	-	-
$2{,}00 < t \leq 2{,}50$	0	+0,36	0	+0,42	0	+0,46	0	+0,50
$2{,}50 < t \leq 3{,}00$	0	+0,40	0	+0,44	0	+0,48	0	+0,52
$3{,}00 < t \leq 4{,}00$	0	+0,44	0	+0,48	0	+0,52	0	+0,54
$4{,}00 < t \leq 5{,}00$	0	+0,48	0	+0,52	0	+0,56	0	+0,58
$5{,}00 < t \leq 6{,}00$	0	+0,52	0	+0,56	0	+0,58	0	+0,62
$6{,}00 < t \leq 8{,}00$	0	+0,58	0	+0,60	0	+0,62	0	+0,70
$8{,}00 < t \leq 10{,}00$	0	+0,64	0	+0,66	0	+0,68	0	+0,80
$10{,}00 < t \leq 12{,}50$	0	+0,70	0	+0,72	0	+0,74	0	+0,86
$12{,}50 < t \leq 15{,}00$	0	+0,74	0	+0,76	0	+0,80	0	+0,92
$15{,}00 < t \leq 25{,}00$	0	+0,80	0	+0,84	0	+0,90	0	+1,00

Table A.2 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 300 MPa < R_e ≤ 360 MPa (category B)

Dimensions in millimetres

Nominal thickness *t*	Tolerances for a nominal width *w*							
	w ≤ 1 200		1 200 < *w* ≤ 1 500		1 500 < *w* ≤ 1 800		*w* > 1 800	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
t ≤ 2,00	0	+0,40	0	+0,44	0	+0,48	-	-
2,00 < *t* ≤ 2,50	0	+0,42	0	+0,48	0	+0,52	0	+0,58
2,50 < *t* ≤ 3,00	0	+0,46	0	+0,50	0	+0,56	0	+0,60
3,00 < *t* ≤ 4,00	0	+0,50	0	+0,56	0	+0,60	0	+0,62
4,00 < *t* ≤ 5,00	0	+0,56	0	+0,60	0	+0,64	0	+0,66
5,00 < *t* ≤ 6,00	0	+0,60	0	+0,64	0	+0,66	0	+0,72
6,00 < *t* ≤ 8,00	0	+0,66	0	+0,70	0	+0,72	0	+0,80
8,00 < *t* ≤ 10,00	0	+0,74	0	+0,76	0	+0,78	0	+0,92
10,00 < *t* ≤ 12,50	0	+0,80	0	+0,82	0	+0,86	0	+0,98
12,50 < t ≤ 15,00	0	+0,86	0	+0,88	0	+0,92	0	+1,06
15,00 < t ≤ 25,00	0	+0,92	0	+0,96	0	+1,04	0	+1,16

Table A.3 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 360 MPa < R_e ≤ 420 MPa (category C)

Dimensions in millimetres

Nominal thickness *t*	Tolerances for a nominal width *w*							
	w ≤ 1 200		1 200 < *w* ≤ 1 500		1 500 < *w* ≤ 1 800		*w* > 1 800	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
t ≤ 2,00	0	+0,44	0	+0,50	0	+0,54	-	-
2,00 < *t* ≤ 2,50	0	+0,46	0	+0,54	0	+0,60	0	+0,66
2,50 < *t* ≤ 3,00	0	+0,52	0	+0,58	0	+0,62	0	+0,68
3,00 < *t* ≤ 4,00	0	+0,58	0	+0,62	0	+0,68	0	+0,70
4,00 < *t* ≤ 5,00	0	+0,62	0	+0,68	0	+0,72	0	+0,76
5,00 < *t* ≤ 6,00	0	+0,68	0	+0,72	0	+0,76	0	+0,80
6,00 < *t* ≤ 8,00	0	+0,72	0	+0,78	0	+0,80	0	+0,92
8,00 < *t* ≤ 10,00	0	+0,84	0	+0,86	0	+0,88	0	+1,04
10,00 < *t* ≤ 12,50	0	+0,92	0	+0,94	0	+0,96	0	+1,12
12,50 < *t* ≤ 15,00	0	+0,96	0	+0,98	0	+1,04	0	+1,20
15,00 < *t* ≤ 25,00	0	+1,04	0	+1,10	0	+1,18	0	+1,30

Table A.4 — Tolerances on thickness for strip and sheet/plate of steels with a specified minimum yield strength 420 MPa < R_e ≤ 960 MPa (category D)

Dimensions in millimetres

Nominal thickness t	Tolerances for a nominal width w							
	$w \leq 1\,200$		$1\,200 < w \leq 1\,500$		$1\,500 < w \leq 1\,800$		$w > 1\,800$	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
$t \leq 2{,}00$	0	+0,48	0	+0,54	0	+0,60	-	-
$2{,}00 < t \leq 2{,}50$	0	+0,50	0	+0,58	0	+0,64	0	+0,70
$2{,}50 < t \leq 3{,}00$	0	+0,56	0	+0,62	0	+0,68	0	+0,72
$3{,}00 < t \leq 4{,}00$	0	+0,62	0	+0,68	0	+0,72	0	+0,76
$4{,}00 < t \leq 5{,}00$	0	+0,68	0	+0,72	0	+0,78	0	+0,82
$5{,}00 < t \leq 6{,}00$	0	+0,72	0	+0,78	0	+0,82	0	+0,86
$6{,}00 < t \leq 8{,}00$	0	+0,82	0	+0,84	0	+0,86	0	+0,98
$8{,}00 < t \leq 10{,}00$	0	+0,90	0	+0,92	0	+0,96	0	+1,12
$10{,}00 < t \leq 12{,}50$	0	+0,98	0	+1,00	0	+1,04	0	+1,20
$12{,}50 < t \leq 15{,}00$	0	+1,04	0	+1,06	0	+1,12	0	+1,28
$15{,}00 < t \leq 25{,}00$	0	+1,12	0	+1,18	0	+1,26	0	+1,40

Annex B
(informative)

Standards with steel grades for this dimensional standard

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10025-5, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

EN 10025-6, *Hot rolled products of structural steels — Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition*

EN 10028-2, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-4, *Flat products made of steels for pressure purposes — Part 4: Nickel alloy steels with specified low temperature properties*

EN 10028-5, *Flat products made of steels for pressure purposes — Part 5: Weldable fine grain steels, thermomechanically rolled*

EN 10028-6, *Flat products made of steels for pressure purposes — Part 6: Weldable fine grain steels, quenched and tempered*

EN 10111, *Continuously hot-rolled low carbon steel sheet and strip for cold forming — Technical delivery conditions*

EN 10120, *Steel sheet and strip for welded gas cylinders*

EN 10149-2, *Hot rolled flat products made of high yield strength steels for cold forming — Part 2: Delivery conditions for thermomechanically rolled steels*

EN 10149-3, *Hot-rolled flat products made of high yield strength steels for cold forming — Part 3: Delivery conditions for normalized or normalized rolled steels*

EN 10207, *Steels for simple pressure vessels — Technical delivery requirements for plates, strips and bars*

EN 10225-1, *Weldable structural steels for fixed offshore structures — Technical delivery conditions — Part 1: Plates*

EN 10338, *Hot rolled and cold rolled non-coated flat products of multiphase steels for cold forming — Technical delivery conditions*

EN ISO 683-1, *Heat-treatable steels, alloy steels and free-cutting steels - Part 1: Non-alloy steels for quenching and tempering (ISO 683-1)*

EN ISO 683-2, *Heat-treatable steels, alloy steels and free-cutting steels - Part 2: Alloy steels for quenching and tempering (ISO 683-2)*

EN ISO 683-3, *Heat-treatable steels, alloy steels and free-cutting steels - Part 3: Case hardening steels (ISO 683-3)*

EN ISO 683-5, *Heat treatable steels, alloy steels and free-cutting steels - Part 5: Nitriding steels (ISO 683-5)*

EN ISO 4957, *Tool steels (ISO 4957)*

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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