

BS EN 10029:2010



BSI Standards Publication

# Hot-rolled steel plates 3 mm thick or above — Tolerances on dimensions and shape

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**National foreword**

This British Standard is the UK implementation of EN 10029:2010. It supersedes BS EN 10029:1991 which is withdrawn.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 secretary.

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EUROPEAN STANDARD

EN 10029

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2010

ICS 77.140.50

Supersedes EN 10029:1991

English Version

## Hot-rolled steel plates 3 mm thick or above - Tolerances on dimensions and shape

Tôles en acier laminées à chaud, d'épaisseur égale ou supérieure à 3 mm - Tolérances sur les dimensions et la forme

Warmgewaltes Stahlblech von 3 mm Dicke an - Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 23 October 2010.

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## Foreword

This document (EN 10029:2010) has been prepared by Technical Committee ECISS/TC 103 “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of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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## 1 Scope

This European Standard specifies tolerances on dimensions and shape for hot-rolled non-alloy and alloy steel plates with the following characteristics:

- a) Nominal thickness:  $3 \text{ mm} \leq t \leq 400 \text{ mm}$ ;
- b) Nominal width:  $w \geq 600 \text{ mm}$ .

Tolerances for products of width  $w < 600 \text{ mm}$  cut or slit from plate should be agreed between manufacturer and purchaser at the time of enquiry and order.

This European Standard applies, but is not limited, to steel grades defined in EN 10025-2 to EN 10025-6:2004+A1:2009, EN 10028-2 to EN 10028-6, EN 10083-2 and EN 10083-3, EN 10084, EN 10085, EN 10149-2 and EN 10149-3, EN 10207 and EN 10225 (see also Annex A). It does not apply to stainless steels.

This European Standard does not include round plates, custom-made plates, chequer or bulb plate for flooring and wide flats.

## 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.

EN 10079, *Definition of steel products*

EN 10163-1, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections — Part 1: General requirements*

EN 10163-2, *Delivery requirements for surface conditions of hot-rolled steel plates, wide flats and sections — Part 2: Plate and wide flats*

## 3 Terms and definitions

For the purposes of this document, the following term and definition apply.

### 3.1

#### **plate**

see EN 10079

## 4 Information to be supplied by the purchaser

### 4.1 Mandatory information

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

- a) quantity to be delivered;
- b) designation of the product form (plate);
- c) number of this dimensional standard (EN 10029);

- d) nominal thickness in millimetres;
- e) nominal width in millimetres;
- f) nominal length in millimetres.

Plates ordered according to this European standard shall be delivered as follows:

- tolerance class A for thickness unless otherwise stated (see 6.1, Table 1);
- trimmed edges;
- normal edge camber and out-of-squareness (see 7.1);
- normal tolerances for flatness, class N (see 7.2, Table 4).

If no information concerning points a) to f) of 4.1 is given by the purchaser, the supplier shall refer back to the purchaser.

## 4.2 Options

A number of options are specified in this European Standard 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 European Standard (see 4.1):

- a) if thickness tolerance class B, C or D is required, include B, C or D in the order designation (see Clause 5 and 6.1);
- b) if plate with untrimmed edges is required, include NK in the order designation (see 6.2.2);
- c) if plate with limited edge camber and out-of-squareness is required, include letter G in the order designation and define the required maximum values for edge camber and out-of-squareness (see 7.1);
- d) if plate with special flatness tolerances is required, include the letter S in the order designation (see 7.2.1 and Table 5);
- e) if plates with a nominal length  $l > 20\,000$  mm are required, the agreed tolerances on length are to be reported (see 6.3, Table 3);
- f) for plates with untrimmed edges, the chosen and agreed measuring points for the measurement of the thickness are to be reported (see 8.2).

## 4.3 Designation

**EXAMPLE** 20 plates of steel S235JR (1.0038), as specified in EN 10025-2 according to this European Standard with nominal thickness of 25 mm, thickness tolerance class B, nominal width 2 000 mm, nominal length 4 500 mm, with trimmed edges, with limited edge camber and out-of-squareness, with special tolerances for flatness:

**20 plates EN 10029-B-G-S**  
**25 x 2 000 x 4 500**  
**Steel EN 10025-2 – S235JR**

## 5 Form of supply

Plate according to this European standard can be supplied:

- with thickness tolerances of class A, B, C or D (see 6.1);
- with trimmed or untrimmed edges (NK) (see 6.2.2);
- with normal or limited edge camber and out-of-squareness (G) (see 7.1);
- with normal (N) or special (S) flatness tolerances (see 7.2).

## 6 Tolerances on dimensions

### 6.1 Thickness

6.1.1 Tolerances on thickness are given in Table 1. Plates may be supplied with either:

- class A: for minus thickness tolerances depending on the nominal thickness;
- class B: for a fixed minus tolerance of 0,3 mm;
- class C: for a fixed minus tolerance of 0,0 mm;
- class D: for symmetrical tolerances.

**Table 1 — Tolerances on thickness**

Dimensions in mm

Nominal thickness $t$	Tolerances on the nominal thickness (see 6.1.1)							
	Class A		Class B		Class C		Class D	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
$3 \leq t < 5$	-0,3	+0,7	-0,3	+0,7	0	+1,0	-0,5	+0,5
$5 \leq t < 8$	-0,4	+0,8	-0,3	+0,9	0	+1,2	-0,6	+0,6
$8 \leq t < 15$	-0,5	+0,9	-0,3	+1,1	0	+1,4	-0,7	+0,7
$15 \leq t < 25$	-0,6	+1,0	-0,3	+1,3	0	+1,6	-0,8	+0,8
$25 \leq t < 40$	-0,7	+1,3	-0,3	+1,7	0	+2,0	-1,0	+1,0
$40 \leq t < 80$	-0,9	+1,7	-0,3	+2,3	0	+2,6	-1,3	+1,3
$80 \leq t < 150$	-1,1	+2,1	-0,3	+2,9	0	+3,2	-1,6	+1,6
$150 \leq t < 250$	-1,2	+2,4	-0,3	+3,3	0	+3,6	-1,8	+1,8
$250 \leq t \leq 400$	-1,3	+3,5	-0,3	+4,5	0	+4,8	-2,4	+2,4

These thickness tolerances apply outside ground areas (see 6.1.2).

At the time of enquiry and order the purchaser shall indicate if class A, B, C or D tolerances is required (see 4.1 and 4.2). If no class is stated, class A applies.

6.1.2 For permissible limits concerning surface imperfections and requirements for repair EN 10163-1 and EN 10163-2 apply.

## 6.2 Width

6.2.1 Tolerances on width for plates with trimmed edges are given in Table 2 depending on the thickness of the plate.

**Table 2 — Tolerances on width**

Dimensions in mm

Nominal thickness $t$	Tolerances	
	Lower	Upper
$t < 40$	0	+20
$40 \leq t < 150$	0	+25
$150 \leq t \leq 400$	0	+30

6.2.2 Tolerances on width for plates with untrimmed edges (NK) shall be the subject of agreement between the manufacturer and purchaser at the time of enquiry and order (see 4.2, option b)).

## 6.3 Length

Tolerances on length are given in Table 3.

**Table 3 — Tolerances on length**

Dimensions in mm

Nominal length $l$	Tolerances	
	Lower	Upper
$l < 4\,000$	0	+20
$4\,000 \leq l < 6\,000$	0	+30
$6\,000 \leq l < 8\,000$	0	+40
$8\,000 \leq l < 10\,000$	0	+50
$10\,000 \leq l < 15\,000$	0	+75
$15\,000 \leq l \leq 20\,000^a$	0	+100

<sup>a</sup> Tolerances on plates with a nominal length  $l > 20\,000$  mm shall be agreed at the time of enquiry and order (see 4.2, option e).

## 7 Tolerances on shape

### 7.1 Edge camber and out-of squareness

For plate specified with normal edge camber and out-of squareness in the order, the edge camber and out of squareness shall be so that it is possible to inscribe a rectangle with the dimensions of the ordered plate within the delivered size.

For plate specified with limited edge camber and out-of squareness (G) in the order, the maximum values for edge camber and out of squareness shall be agreed at the time of enquiry and order (see 4.2, option c)).

## 7.2 Flatness

### 7.2.1 General

Tolerances on flatness are given in Table 4 for normal tolerances (class N) and in Table 5 for special tolerances (class S). The plate shall be supplied with normal tolerances according to Table 4, only if otherwise specified in the order the plate shall be supplied with special tolerances (see 4.2, option d)).

Deviation from flatness shall be determined by measuring the distance between the plate and a straight edge (for details see 8.7). Straight edges of a length of 1 000 mm are used if the wave pitches (distance between the points of contact of the straight edge and the plate) are smaller than or equal to 1 000 mm. For longer wave pitches straight edges of a length of 2 000 mm are used. Deviations from flatness  $\leq 2$  mm shall not be considered as a wave and not be taken into account.

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

The steel types according to Tables 4 and 5 are defined as follows:

- Steel type L: Products with a specified minimum yield strength  $R_e \leq 460$  MPa, neither quenched nor quenched and tempered.
- Steel type H: Products with a specified yield strength  $R_e > 460$  MPa and all grades of quenched and quenched and tempered products.

### 7.2.2 Normal tolerances on flatness (class N)

If the wave pitch (distance between the points of contact of the straight edge and the plate) is  $< 1\,000$  mm the permissible deviation from flatness shall comply with the following requirements:

For distances between the points of contact of two waves between 300 mm and 1 000 mm the maximum flatness tolerance is 1 % for steel type L and 1,5 % of the wave pitch for steel type H, but not exceeding the values in Table 4.

**Table 4 — Normal tolerances on flatness (class N)**

Dimensions in mm

Nominal thickness $t$	Steel Type L <sup>a</sup>		Steel Type H <sup>a</sup>	
	Measuring length <sup>b</sup>			
	1 000	2 000	1 000	2 000
$3 \leq t < 5$	9	14	12	17
$5 \leq t < 8$	8	12	11	15
$8 \leq t < 15$	7	11	10	14
$15 \leq t < 25$	7	10	10	13
$25 \leq t < 40$	6	9	9	12
$40 \leq t < 250$	5	8	8	12
$250 \leq t \leq 400$	6	9	9	13

<sup>a</sup> See 7.2.1.  
<sup>b</sup> Use 1 000 mm measuring length when wave pitch is  $\leq 1\,000$  mm.

### 7.2.3 Special tolerances on flatness (class S)

If the wave pitch (distance between the points of contact of the straight edge and the plate) is < 1 000 mm the permissible deviation from flatness shall comply with the following requirements:

For distances between the points of contact of two waves between 300 mm and 1 000 mm the maximum flatness tolerance is 0,5 % of the wave pitch for steel type L and 1 % of the wave pitch for steel type H, but not exceeding the values in Table 5.

**Table 5 — Special tolerances on flatness (class S)**

Dimensions in mm

Nominal thickness <i>t</i>	Steel Type L <sup>a</sup>		Steel Type H <sup>a</sup>	
	Measuring length <sup>b</sup>			
	1 000	2 000	1 000	2 000
$3 \leq t < 5$	5	10	7	14
$5 \leq t < 8$	5	10	7	13
$8 \leq t < 15$	3	6	7	12
$15 \leq t < 25$	3	6	7	11
$25 \leq t < 40$	3	6	7	11
$40 \leq t < 250$	3	6	6	10
$250 \leq t \leq 400$	4	7	7	11

<sup>a</sup> See 7.2.1.  
<sup>b</sup> Use 1 000 mm measuring length when wave pitch is  $\leq$  1 000 mm.

## 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

Thickness shall be measured at any point situated more than 25 mm from the transverse or longitudinal edges of the plate; other than locally ground area (see 6.1.2).

For plates with untrimmed edges, the measuring points shall be agreed at the time of enquiry and order (see 4.2, option f)).

### 8.3 Width

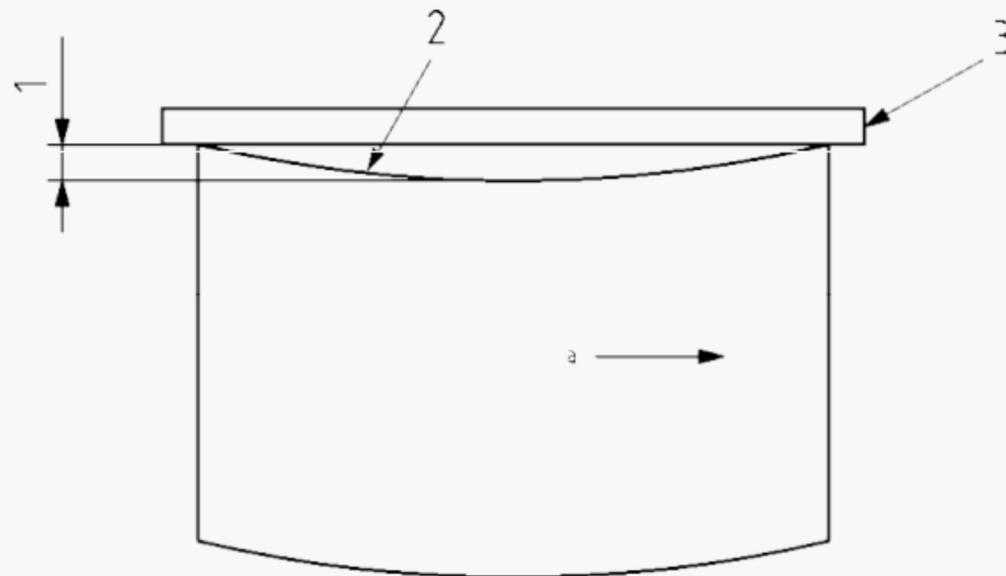
Width shall be measured perpendicular to the major axis of the plate.

### 8.4 Length

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

### 8.5 Edge camber

The edge camber value  $q$  is the maximum deviation between the longitudinal edge and the straight line joining the two ends of this edge. It is measured on the concave edge of the plate (see Figure 1).



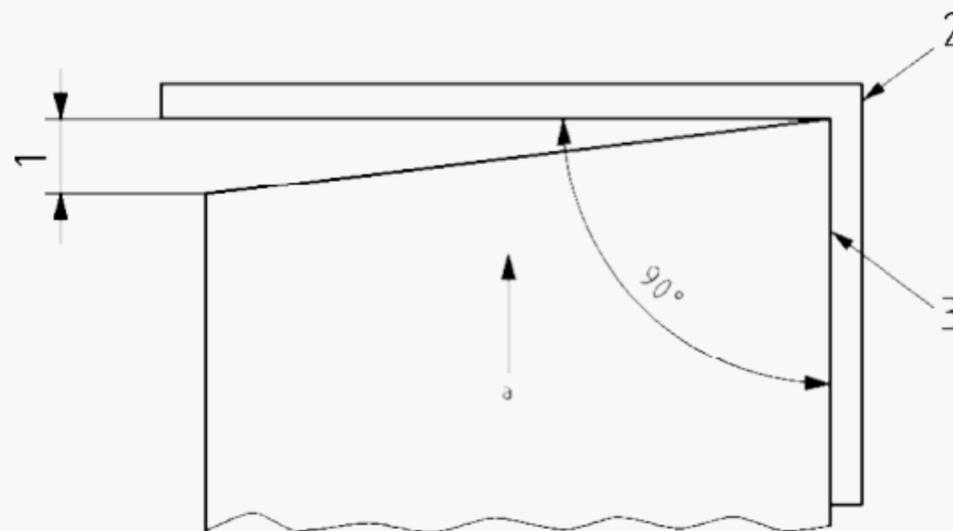
#### Key

- 1 Edge camber  $q$
- 2 Side edge (concave side)
- 3 Straight edge
- a Rolling direction

Figure 1 — Measuring of edge camber

### 8.6 Out-of squareness

The out-of squareness value  $u$  is the orthogonal projection of one transverse edge on one longitudinal edge (see Figure 2).



#### Key

- 1 Out-of squareness  $u$
- 2 Square
- 3 Side edge
- a Rolling direction

Figure 2 — Measuring of out of squareness

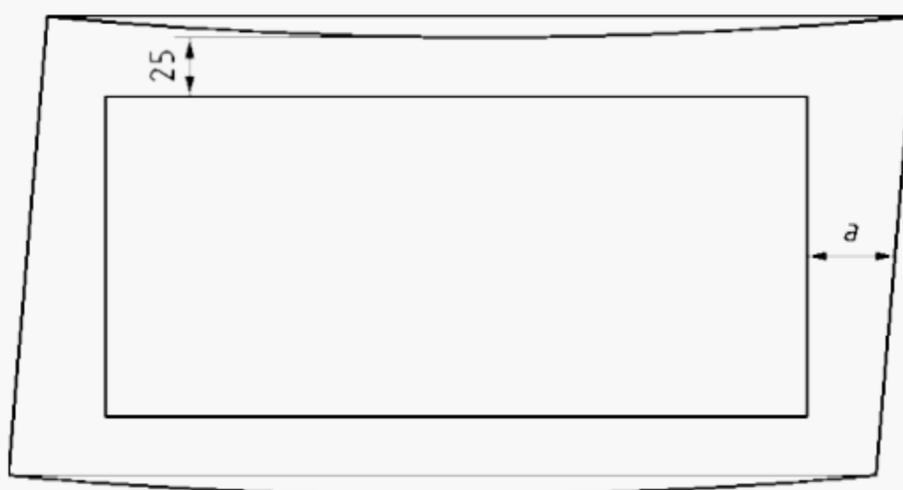
## 8.7 Flatness

To measure flatness the plates shall be placed on a flat surface.

Deviation from flatness shall be determined by measuring the deviation in distance between the plates and a straight edge of 1 000 mm or 2 000 mm long (see Tables 4 and 5) which may be placed in any direction.

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 a point at least 25 mm from the longitudinal edges and at a distance  $a$  from the plate ends, depending on whether the normal tolerances or special tolerances apply respectively (see Figure 3).

Dimensions in millimetres



### Key

$a = 200$  mm for normal flatness tolerances  
 $a = 100$  mm for special flatness tolerances

Figure 3 — Measuring of flatness

## Annex A (informative)

### List of product standards where dimensional standard EN 10029 is applied

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 10025-6:2004+A1:2009, *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 10083-2, *Steels for quenching and tempering — Part 2: Technical delivery conditions for non alloy steels*

EN 10083-3, *Steels for quenching and tempering — Part 3: Technical delivery conditions for alloy steels*

EN 10084, *Case hardening steels — Technical delivery conditions*

EN 10085, *Nitriding steels — Technical delivery conditions*

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, *Weldable structural steels for fixed offshore structures — Technical delivery conditions*



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