BRITISH STANDARD

BS EN
10029:1991

Specification for

Tolerances on dimensions, shape and mass for hot rolled steel plates 3 mm thick or above

This European Standard EN 10029:1991 has the status of a British Standard

Cooperating organizations

The European Committee for Standardization, under whose supervision this European Standard was prepared, comprises the national standards organizations of the following countries.

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Contents

National foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Policy Committee and is the English language version of EN 10029 "Hot rolled steel plates 3 mm thick or above – Tolerances on dimensions, shape and mass".

It supersedes the technical content of clause **14** of BS 4360:1990, clause **18** of BS 1501-1:1980, clause **8** of BS 1501-2:1988 and clause **14** of BS 1501-3:1990. Amendments to BS 4360:1990, BS 1501-1:1980, BS 1501-2:1988 and BS 1501-3:1990 will be published simultaneously with this standard.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10029

April 1991

UDC 669.14-122.4-41:621.753.14:620.1

Descriptors: Iron and steel products, hot rolled products, metal plates, alloy steel, unalloyed steels, stainless steels, designation, dimensional tolerances, form tolerances, weight tolerances

English version

Hot rolled steel plates 3 mm thick or above — Tolerances on dimensions, shape and mass

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

Warmgewalztes Stahlblech von 3 mm Dicke an — Grenzabmaβe, Formtoleranzen, zulässige Gewichtsabweichungen

This European Standard was approved by CEN on 17 April 1991. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 10029:1991 E

Foreword

This draft European Standard has been drawn up by ECISS/TC 12 “Structural steel and steels for pressure purposes, flat products — Dimensions and tolerances” whose Secretariat is held by NNI.

This document was originally drawn up as an EURONORM under the European Coal and Steel Community. With the formation of ECISS and the establishment of the ECISS work programme TC 12 was asked to prepare this document for eventual publication as an European Standard.

This European standard replaces:

EURONORM 29 (1981)	Hot-rolled plates 3 mm thick or above — Tolerances on dimensions, shape and mass.

ECISS/TC 12 met in February 1990 in Brussels and agreed on the text for circulation for formal vote within CEN. The following countries were represented in that meeting: Austria, Belgium, France, Germany, Italy, Netherlands and UK.

The Coordinating Commission (COCOR) of ECISS agreed on 1990-12-04/05 to submit this draft European Standard to the CEN formal vote.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Contents

1 Scope

This European Standard specifies requirements for tolerances for hot-rolled non-alloy and alloy steel plates including stainless steels with the following characteristics:

a) nominal thickness ≥ 3 mm ≤ 250 mm;

b) nominal width ≥ 600 mm;

c) specified minimum yield strength < 700 N/mm^2.

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

This European Standard does not apply to round plates, sketch plates, chequer or raised-droplet pattern floor plates and wide flats for which other EURONORMS exist or European Standards dealing with tolerances on products of steel are being prepared:

— tolerances on dimensions, shape and mass for hot-rolled wide flats of steel (see EURONORM 91)[1)]

2 Normative references

EN 10079, *Definition of steel products.*

EN 10163, *Delivery requirements for surface condition of hot-rolled plates, wide flats and sections of steel; Parts 1 – 3.*

3 Definition

For the purpose of this European Standard the following definition applies:

plate, see EN 10079

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) description of the product (plate);

b) number of this European Standard (EN 10029);

c) nominal thickness in millimetres;

d) the tolerance class required (A, B, C, or D) (see **6.2** and **7.1**);

e) nominal width in millimetres;

f) the letters NK if plate with mill edges is required (see **7.2.2**);

Option 1.

g) nominal length in millimetres;

h) the letter G if plate with limited edge camber and out-of squareness is required (see **8.1**);

Option 2.

i) the letter S if plate with special flatness tolerances is required (see **8.2**).

Option 3.

Where no specific choice is made by the purchaser concerning points c, d, e and g the supplier shall refer back to the purchaser.

4.2 Options

A number of options are specified in clause **11**. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification (see **6.2**).

5 Designation

The designation of products in accordance with **4.1** shall also include the exact designation of the ordered steel grade.

Examples of designation:

a) plate according to this European Standard with nominal thickness of 20 mm, class A thickness tolerance, nominal width 2 000 mm, with trimmed edges, nominal length 4 500 mm, with normal flatness tolerances of steel Fe 360 B, as specified in EN 10025:

plate EN 10029 – 20A ×2 000 × 4 500

steel EN 10025 – Fe 360 B

b) plate according to this European Standard with nominal thickness of 4,5 mm, class B thickness tolerance, nominal width 1 500 mm, with mill edges (NK), nominal length 2 800 mm, with special flatness tolerances (S) and an edge camber limited to 0,2 % of the actual length and an out-of squareness limited to 1 % of the actual width (G) of steel X 10 CrNi 18 9, as specified in EURONORM 88:

plate EN 10029 – 4,
5B × 1 500NK × 2 800 S G

steel EURONORM 88 – X 10 CrNi 18 9

6 Form of supply

6.1 Plate shall be supplied:

a) with thickness tolerances of class A, B, C or D (see **7.1.1**);

b) with trimmed edges or with mill edges (NK) (see **7.2.2**);

[1)] Until this EURONORM is transformed into a European Standard, it can either be implemented or reference made to the corresponding national standard, the list of which is given in annex A to this European Standard.

c) with normal (N) or with special (S) flatness tolerances (see **8.2**).

Table 1 — Tolerances on thickness

Dimensions in mm

Nominal thickness	Tolerances on the nominal thickness (see 7.1.1)[a]								Maximum thickness difference within a plate					
	Class A		Class B		Class C		Class D		Nominal plate width					
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	≥ 600 < 2 000	≥ 2 000 < 2 500	≥ 2 500 < 3 000	≥ 3 000 < 3 500	≥ 3 500 < 4 000	≥ 4 000
≥ 3 < 5	– 0,4	+ 0,8	– 0,3	+ 0,9	– 0	+ 1,2	– 0,6	+ 0,6	0,8	0,9	0,9	–	–	–
≥ 5 < 8	– 0,4	+ 1,1	– 0,3	+ 1,2	– 0	+ 1,5	– 0,75	+ 0,75	0,9	0,9	1,0	1,0	–	–
≥ 8 < 15	– 0,5	+ 1,2	– 0,3	+ 1,4	– 0	+ 1,7	– 0,85	+ 0,85	0,9	1,0	1,0	1,1	1,1	1,2
≥ 15 < 25	– 0,6	+ 1,3	– 0,3	+ 1,6	– 0	+ 1,9	– 0,95	+ 0,95	1,0	1,1	1,2	1,2	1,3	1,4
≥ 25 < 40	– 0,8	+ 1,4	– 0,3	+ 1,9	– 0	+ 2,2	– 1,1	+ 1,1	1,1	1,2	1,2	1,3	1,3	1,4
≥ 40 < 80	– 1,0	+ 1,8	– 0,3	+ 2,5	– 0	+ 2,8	– 1,4	+ 1,4	1,2	1,3	1,4	1,4	1,5	1,6
≥ 80 < 150	– 1,0	+ 2,2	– 0,3	+ 2,9	– 0	+ 3,2	– 1,6	+ 1,6	1,3	1,4	1,5	1,5	1,6	1,7
≥ 150 < 250	– 1,2	+ 2,4	– 0,3	+ 3,3	– 0	+ 3,6	– 1,8	+ 1,8	1,4	1,5	1,6	1,6	1,7	–

[a] These thickness tolerances apply outside ground areas (see **7.1.2**)

6.2 In the absence of information in the order or of code letters for the supply, plate shall be supplied as follows:

— sheared or flame cut edges;

— normal tolerances for flatness, class N (see Table 4).

7 Tolerances on dimensions

7.1 Thickness

7.1.1 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 all plus tolerances depending on the nominal thickness;

— class D: for symmetrical tolerances depending on the nominal thickness.

At the time of enquiry and order the purchaser shall indicate if class A, B, C or D tolerances are required (see **4.1**).

Additionally and within the tolerance limits in nominal thickness, the tolerances between minimum and maximum thickness of an individual plate given in Table 1 shall apply to class A, B, C and D tolerances.

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

7.2 Width

7.2.1 Tolerances on width are given in Table 2.

Table 2 — Tolerances on width

Dimensions in mm

Nominal width	Tolerances	
	Lower	Upper
≥ 600 < 2 000	0	+ 20
≥ 2 000 < 3 000	0	+ 25
≥ 3 000	0	+ 30

7.2.2 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.

Option 1.

7.3 Length

Tolerances on length are given in Table 3.

Table 3 — Tolerances on length

Dimensions in mm

Nominal length	Tolerances	
	Lower	Upper
< 4 000	0	+ 20
≥ 4 000 < 6 000	0	+ 30
≥ 6 000 < 8 000	0	+ 40
≥ 8 000 < 10 000	0	+ 50
≥ 10 000 < 15 000	0	+ 75
≥ 15 000 < 20 000[a]	0	+ 100

[a] Tolerances on plates with a nominal length > 20 000 mm shall be agreed at the time of the enquiry and order. Option 4.

8 Tolerances on shape

8.1 Edge camber and out-of squareness

The edge camber and the out-of squareness of a plate shall be limited so that it shall be possible to inscribe a rectangle with the dimensions of the ordered plate within the delivered size.

Additionally, if agreed at the time of the enquiry and order, edge camber shall be limited to 0,2 % of the actual length of the plate and out-of squareness to 1 % of the actual width of the plate (G).

Option 2.

8.2 Flatness

8.2.1 Tolerances on flatness are given in Table 4 for normal tolerances and in Table 5 for special tolerances. Unless otherwise specified in the order, the plates shall be supplied with normal tolerances.

Option 3.

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

Table 4 — Normal tolerances for flatness, class N

Dimensions in mm

Nominal thickness	Steel type L[a]		Steel type H[a]	
	Measuring length			
	1 000	2 000	1 000	2 000
≥ 3 < 5	9	14	12	17
≥ 5 < 8	8	12	11	15
≥ 8 < 15	7	11	10	14
≥ 15 < 25	7	10	10	13
≥ 25 < 40	6	9	9	12
≥ 40 ≤ 250	5	8	8	11

[a] See **8.2.2**.

If the 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 steel type L max. 1 % or for steel type H max. 1,5 % of the distance between points of contact on the plate between 300 mm to 1 000 mm, but not exceeding the values given in Table 4.

If the 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:

max. 0,5 % of the distance between the points of contact, but not exceeding the values in Table 5 and not < 2 mm.

8.2.2 The steel types according to Table 4 and Table 5 are defined as follows.

Steel type L: Products with a specified minimum yield strength ≤ 460 N/mm^2, neither quenched nor quenched and tempered.

Steel type H: Products with a specified minimum yield strength > 460 N/mm^2 and < 700 N/mm^2 and all grades of quenched and quenched and tempered products.

9 Excess mass

9.1 The excess mass is the difference between the actual delivered mass and the theoretical mass expressed as a percentage of the theoretical mass of the delivery. Unless otherwise specified in the appropriate quality standard, the theoretical mass shall be determined using a volumetric mass of 7,85 kg/dm^3 for carbon steels.

For stainless and alloy steels the values of the applicable quality standard apply.

9.2 Upper limits for the excess mass corresponding to the thickness tolerance classes A, B, C and D (see **7.1.1**) are given in Table 6.

9.3 The excess masses given in Table 6 apply to deliveries with the same nominal dimensions and of the same quality, the mass of which is between 25 *t* and 75 *t*.

The modifications to the upper limits of the excess mass for deliveries of different masses are given in note 1 to Table 6.

9.4 Excess masses which exceed the limits of Table 6 shall not be a reason for rejection, unless otherwise agreed at the time of enquiry and order.

Option 7.

Table 5 — Special tolerances for flatness, class S

Dimensions in mm

Nominal thickness	Steel type L[ab]				Steel type H[a]	
	Plate width					
	< 2 750		≥ 2 750			
	Measuring length					
	1 000	2 000	1 000	2 000	1 000	2 000
≥ 3 < 8	4	8	5	10	Shall be agreed at the time of enquiry and order Option 6	
≥ 8 ≤ 250	3	6	3	6		

[a] See **8.2.2**.

[b] Tighter tolerances shall be the subject of special agreement at the time of enquiry and order. Option 5.

10 Measurements

Measurements shall be carried out at ambient temperature.

10.1 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 areas (see **7.1.2**).

For plates with untrimmed edges, the measuring points shall be agreed at the time of the enquiry and order.

Option 9.

10.2 Width

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

10.3 Length

The length of the plate is the length of the largest rectangle contained within the plate.

10.4 Edge camber

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

10.5 Out-of squareness

The out-of square value u is the orthogonal projection of one transverse edge on one longitudinal edge (see Figure 1).

10.6 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 Table 4 and Table 5) which may be placed in any direction.

Only the part situated between two 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 at least 200 mm or 100 mm from the plate ends, depending on whether the normal tolerances or special tolerances apply respectively (see Figure 1).

Table 6 — Excess mass, classes A, B, C and D

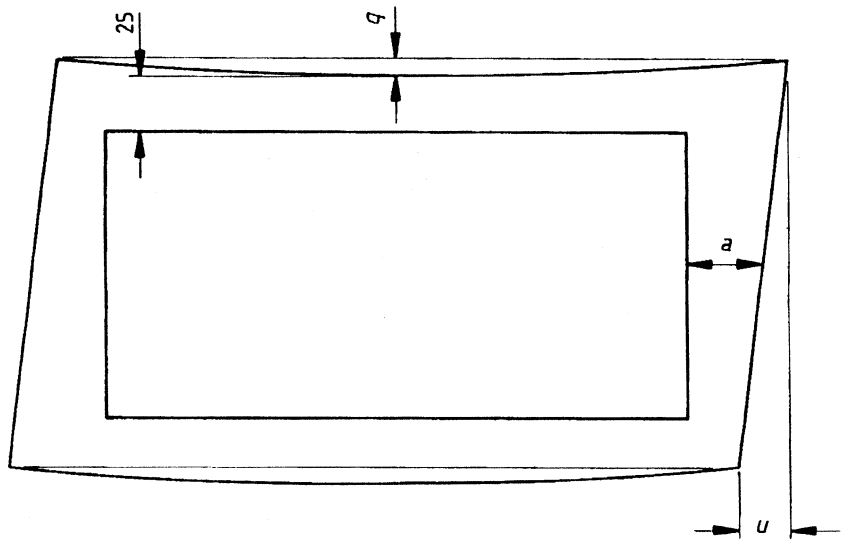
Nominal thickness mm	Class mm	Tolerances thickness mm		Excess mass %[ab]				
				Nominal width mm				
		Lower	Upper	≥ 600 < 2 000	≥ 2 000 < 2 500	≥ 2 500 < 3 000	≥ 3 000 < 3 500	≥ 3 500
≥ 3 < 5	A	– 0,4	+ 0,8	8,5	9,5	10,5	–	–
	B	– 0,3	+ 0,9	11,0	12,0	13,5	–	–
	C	– 0	+ 1,2	19,0	20,5	21,5	–	–
	D	– 0,6	+ 0,6	3,5	4,5	5,5	–	–
≥ 5 < 8	A	– 0,4	+ 1,1	7,0	7,5	8,5	9,0	–
	B	– 0,3	+ 1,2	9,0	9,5	10,0	11,0	–
	C	– 0	+ 1,5	19,0	20,5	21,5	–	–
	D	– 0,75	+ 0,75	3,5	4,5	5,5	–	–
≥ 8 < 15	A	– 0,5	+ 1,2	6,0	6,0	6,5	7,0	7,5
	B	– 0,3	+ 1,4	7,5	8,0	8,5	9,0	9,5
	C	– 0	+ 1,7	10,5	11,0	11,5	12,0	12,5
	D	– 0,85	+ 0,85	3,0	3,0	3,5	4,0	4,5
≥ 15 < 25	A	– 0,6	+ 1,3	4,5	4,5	5,0	5,0	5,5
	B	– 0,3	+ 1,6	6,0	6,0	6,5	6,5	7,0
	C	– 0	+ 1,9	7,5	8,0	8,0	8,5	8,5
	D	– 0,95	+ 0,95	3,0	3,0	3,0	3,5	3,5
≥ 25 < 40	A	– 0,8	+ 1,4	3,5	3,5	4,0	4,0	4,0
	B	– 0,3	+ 1,9	5,0	5,0	5,5	5,5	5,5
	C	– 0	+ 2,2	6,0	6,0	6,5	6,5	6,5
	D	– 1,1	+ 1,1	3,0	3,0	3,0	3,5	3,5
≥ 40 < 80	A	– 1,0	+ 1,8	3,5	3,5	4,0	4,0	4,0
	B	– 0,3	+ 2,5	5,0	5,0	5,5	5,5	5,5
	C	– 0	+ 2,8	5,0	5,5	5,5	5,5	5,5
	D	– 1,4	+ 1,4	3,0	3,0	3,0	3,5	3,5
≥ 80 < 150	A	– 1,0	+ 2,2	3,5	3,5	4,0	4,0	4,0
	B	– 0,3	+ 2,9	4,5	4,5	4,5	4,5	4,5
	C	– 0	+ 3,2	4,5	4,5	4,5	5,0	5,0
	D	– 1,6	+ 1,6	3,0	3,0	3,0	3,5	3,5
≥ 150 ≥ 250	A	– 1,2	+ 2,4	3,5	3,5	3,5	3,5	3,5
	B	– 0,3	+ 3,3	4,0	4,0	4,0	4,0	4,0
	C	– 0	+ 3,6	4,0	4,0	4,0	4,0	4,0
	D	– 1,8	+ 1,8	3,0	3,0	3,0	3,0	3,0

[a] See **9.3**. The excess masses for all tolerance classes given in Table 6 shall be adjusted in relation to the lot mass as detailed below. (MA is the specified value for class A.)

≥ 150 *t*: – 0,2 × MA
≥ 75 < 150 *t*: – 0,1 × MA
≥ 25 < 75 *t*: values in accordance with Table 6
≥ 10 < 25 *t*: + 0,2 × MA
< 10 *t*: + 0,4 × MA

Single plates: more than + 0,4 × MA by special agreement with the customer.
Option 8.
Example: Lot mass 100 *t*, nominal dimensions 20 × 2 500 × 4 500 mm, tolerance class D.
Correction value: – 0,10 × 5,0 % = – 0,5 %
Excess mass: 3 % – 0,5 % = 2,5 %.

[b] These excess mass values have taken account of tolerances on width and length.



a = 200 mm for normal flatness tolerances
a = 100 mm for special flatness tolerances
q = edge camber
u = out-of squareness

Figure 1 — Measuring of edge camber, out-of squareness and flatness

11 Options (see 4.2)

1) Whether mill edges are required (see **4.1** and **7.2.2**).

2) Whether a limited edge camber and out-of squareness is required (see **4.1** and **8.1**).

3) Whether special flatness tolerances class S are required (see **4.1** and **8.2**).

4) What tolerances on length for plates with a nominal length > 20 000 mm are required (see **7.3**, Table 3).

5) Whether tighter tolerances for flatness than class S for steel type L are required (see **8.2.1**, Table 5).

6) Whether special tolerances for flatness for steel type H are required (see **8.2.1**, Table 5).

7) Whether it is a reason for rejection when the excess masses exceed the limits of Table 6 (see **9.4**).

8) Which excess mass over 40 % shall be used for single plates (see Table 6).

9) Where for plates with untrimmed edges, the measuring points for the measurement of the thickness shall be chosen (see **10.1**).

Annex A List of national standards which correspond to EURONORM 91
(for information)

Until EURONORM 91 is transformed into a European Standard, it may be either implemented or reference made to the corresponding national standard as listed in Table 7.

Table 7 — EURONORM 91 with corresponding national standards

EURONORM	Corresponding national standard in						
	Germany	France	United Kingdom	Italy	Belgium	Sweden	Austria
91	DIN 59 200	NF A 46-012	BS 4360	UNI-EU 91	NBN A43-301	SS 21 21 50	M 3231

National appendix NA (informative)

The United Kingdom participation in the preparation of this European Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) to Technical Committee ISM/12 upon which the following bodies were represented:

BEAMA Ltd.
British Constructional Steelwork Association Ltd.
British Railways Board
British Steel Industry
County Surveyors' Society
Department of Transport
Institution of Structural Engineers
Lloyd's Register of Shipping
London Regional Transport
National Association of Steel Stockholders
Railway Industry Association of Great Britain
Society of Motor Manufacturers and Traders Limited
Steel Construction Institute
The Welding Institute

BSI — British Standards Institution

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