

Aluminium and aluminium alloys — Sheet, strip and plate —

Part 3: Tolerances on dimensions and form for hot-rolled products

The European Standard EN 485-3:2003 has the status of a
British Standard

ICS 77.150.10

National foreword

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 11 and a back cover.

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Aluminium and aluminium alloys - Sheet, strip and plate - Part 3: Tolerances on dimensions and form for hot-rolled products

Aluminium et alliages d'aluminium - Tôles, bandes et tôles
épaisses - Partie 3: Tolérances de dimensions et de forme
des produits laminés à chaud

Aluminium und Aluminiumlegierungen - Bänder, Bleche
und Platten - Teil 3: Grenzabmaße und Formtoleranzen für
warmgewalzte Erzeugnisse

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Foreword

This document (EN 485-3:2003) has been prepared by Technical Committee CEN/TC 132 "Aluminium and aluminium alloys", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This document supersedes EN 485-3:1993.

This standard is part of a set of four standards. The other standards deal with:

- *Part 1: Technical conditions for inspection and delivery*
- *Part 2: Mechanical properties*
- *Part 4: Tolerances on dimensions and form for cold-rolled products*

Besides very slight editorial adjustments in the text, the following technical changes have been made:

- Table 1 :

100 mm to 150 mm :	slightly tighter tolerances
150 mm to 220 mm :	new
220 mm to 350 mm :	new
350 mm to 400 mm :	new

New sentence on cold-compressed plate added after the table.

- Table 3 :

0 mm to 6 mm :	slightly tighter tolerances (1 st and 4 th columns)
6 mm to 12 mm :	tighter tolerances (2 nd , 3 rd and 4 th columns)
12 mm to 50 mm :	tighter tolerances for all products
50 mm to 200 mm :	tighter tolerances for all products
200 mm to 400 mm :	new

Last column added (length over 3 000 mm up to and including 6 000 mm), new sentence after the table (width 6 500 mm to 15 000 mm).

New sentence on cold-compressed plate added after the table.

- Table 5 :

50 mm to 350 mm :	extension of 50 mm to 200 mm values up to 350 mm
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New sentence on cold-compressed and unstretched plate added after the table.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This part of this European Standard specifies the tolerances on form and dimensions for wrought aluminium and aluminium alloy sheet, strip and plate obtained by hot-rolling, for general engineering applications.

It applies to products with a thickness from 2,5 mm up to and including 400 mm.

It does not apply to semi-finished rolled products in coiled form to be subjected to further rolling (reroll stock) or to special products such as corrugated, embossed, etc. sheet and strip or to special applications such as aerospace which are dealt with in separate European Standards.

Technical conditions for inspection and delivery of products covered by this standard are specified in EN 485-1.

NOTE Some of the products listed in the present standard can be subject to patent or patent applications, and their listing herein does not in any way imply the granting of a licence under such patent right.

CEN/TC 132 affirms it is its policy that in the case when a patentee refuses to grant licences on standardised standard products under reasonable and not discriminatory conditions, then this product shall be removed from the corresponding standard.

2 Normative references

Not applicable.

3 Tolerances on dimension

3.1 Thickness

Tolerances on thickness for sheet, strip and plate are specified in Table 1.

3.2 Width

3.2.1 Tolerances on width for strip are specified in Table 2.

3.2.2 Tolerances on width for sheet and plate are specified in Table 3.

3.3 Length

3.3.1 Tolerances on length for strip are not specified.

3.3.2 Length tolerances for sheet and plate are specified in Table 3.

4 Tolerances on form

4.1 Lateral curvature

4.1.1 Lateral curvature tolerances for strip are not specified.

4.1.2 Lateral curvature tolerances for sheet and plate with cut or sawn edges are specified in Table 4.

The deviation from straightness, d , is measured as indicated in Figure 1, while the sheet or plate is resting on an horizontal base plate.

4.2 Flatness

4.2.1 Flatness tolerances for strip are not specified.

4.2.2 Flatness tolerances for sheet and plate are specified in Table 5 and are expressed as a percentage of the length L and/or the width W and/or the measured chord length l .

Deviation from flatness, d , resulting from arching, buckling or edge waves, is measured as shown in Figures 2 to 5, using a lightweight straightedge and a feeler gauge, dial gauge or scale, while the sheet or plate is resting on an horizontal base plate concave side upwards.

These tolerances do not apply to sheet and plate supplied in the O (annealed) or F (as fabricated) tempers.

These tolerances do not include end or corner turnup.

4.3 Squareness

4.3.1 Squareness tolerances for strip are not specified.

4.3.2 Squareness tolerances for sheet and plate are specified in Table 6.

The squareness tolerance is expressed as the maximum allowable difference in length of diagonals AA and BB as shown in Figure 6.

Table 1 - Tolerances on thickness

Dimensions in millimetres

Specified thickness		Tolerance on thickness for specified width				
Over	Up to and including	Up to and including 1 250	Over 1 250 up to and including 1 600	Over 1 600 up to and including 2 000	Over 2 000 up to and including 2 500	Over 2 500 up to and including 3 500
≥ 2,5	4	± 0,28	± 0,28	± 0,32	± 0,35	± 0,40
4	5	± 0,30	± 0,30	± 0,35	± 0,40	± 0,45
5	6	± 0,32	± 0,32	± 0,40	± 0,45	± 0,50
6	8	± 0,35	± 0,40	± 0,40	± 0,50	± 0,55
8	10	± 0,45	± 0,50	± 0,50	± 0,55	± 0,60
10	15	± 0,50	± 0,60	± 0,65	± 0,65	± 0,80
15	20	± 0,60	± 0,70	± 0,75	± 0,80	± 0,90
20	30	± 0,65	± 0,75	± 0,85	± 0,90	± 1,0
30	40	± 0,75	± 0,85	± 1,0	± 1,1	± 1,2
40	50	± 0,90	± 1,0	± 1,1	± 1,2	± 1,5
50	60	± 1,1	± 1,2	± 1,4	± 1,5	± 1,7
60	80	± 1,4	± 1,5	± 1,7	± 1,9	± 2,0
80	100	± 1,7	± 1,8	± 1,9	± 2,1	± 2,2
100	150	± 2,1	± 2,2	± 2,5	± 2,6	-
150	220	± 2,5	± 2,6	± 2,9	± 3,0	-
220	350	± 2,8	± 2,9	± 3,2	± 3,3	-
350	400	± 3,5	± 3,7	± 3,9	± 4,2	-

Values for cold-compressed plate are subject to agreement between manufacturer and purchaser.

Table 2 - Tolerances on width for strip

Dimensions in millimetres

Specified thicknesses	Tolerance on width for specified width	
	Less than 500	500 up to and including 2 500
From 2,5 up to and including 15	by agreement	+8 0

Table 3 - Tolerances on width and length for sheet and plate

Dimensions in millimetres

Specified thickness		Tolerance on width and length for specified width and length				
Over	Up to and including	Up to and including 1 000	Over 1 000 up to and including 2 000	Over 2 000 up to and including 3 000	Over 3 000 up to and including 3 500	For length over 3 500 up to and including 6 000
-	6	+5 0	+7 0	+8 0	+10 0	+10 0
6	12	+6 0	+7 0	+8 0	+10 0	+10 0
12	50	+6 0	+8 0	+9 0	+10 0	+10 0
50	200	+8 0	+8 0	+9 0	+10 0	+10 0
200	400	+11 0	+11 0	+12 0	+12 0	+12 0

For length over 6 000 mm up to and including 15 000 mm, tolerance on length shall be $^{+0,2}_0$ % of the nominal length.

Values for cold-compressed plate are subject to agreement between manufacturer and purchaser.

Table 4 - Lateral curvature tolerances for sheet and plate

Dimensions in millimetres

Specified width		Lateral curvature d_{\max} for specified length L			
Over	Up to and including	Up to and including 2 000	Over 2 000 up to and including 3 000	Over 3 000 up to and including 5 000	Over 5 000 up to and including 15 000
-	1 250	4	7	10	0,2 % of specified length
1 250	1 500	3	6	8	
1 500	2 000	3	6	7	
2 000	3 500	-	5	6	

Table 5 - Flatness tolerances for sheet and plate

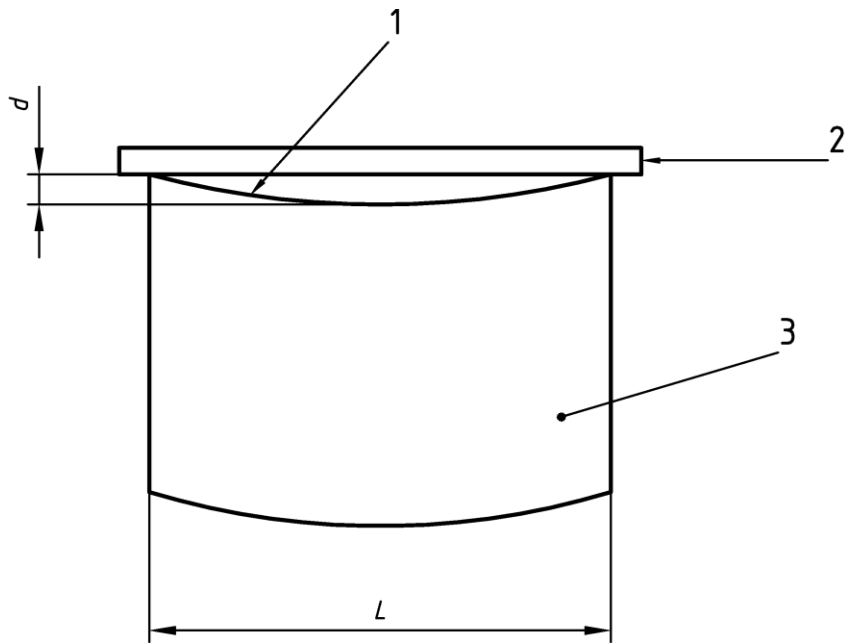
Specified thickness mm		Total deviation %		Partial deviation % (for a chord of at least 300 mm) d_{\max}/l
Over	Up to and including	on length d_{\max}/L	on width d_{\max}/W	
≥ 2,5	3,0	0,4	0,5	0,5
3,0	6,0	0,3	0,4	0,35
6,0	50	0,2	0,4	0,3
50	350	0,2	0,2	by agreement

Values for cold-compressed or unstretched plate are subject to agreement between manufacturer and purchaser.

Table 6 - Squareness tolerances for sheet and plate

Dimensions in millimetres

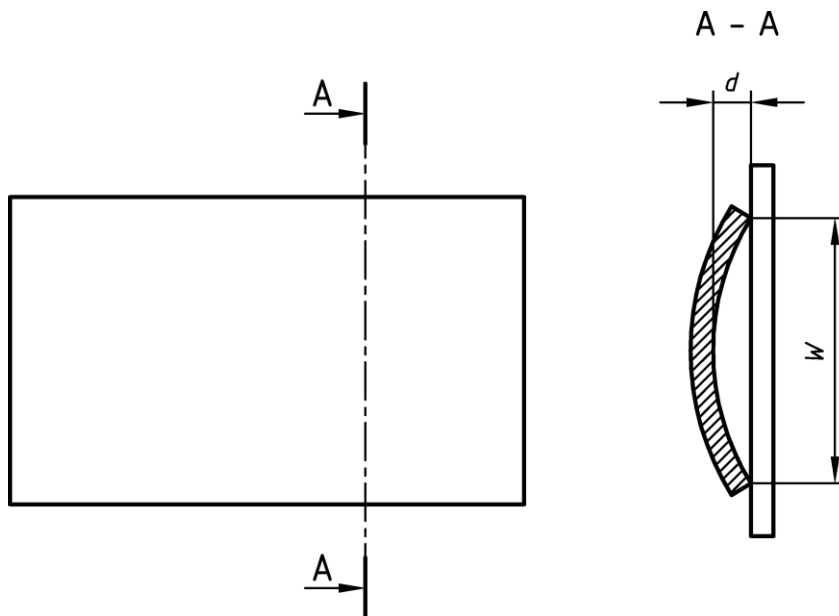
Specified length		Squareness tolerance for specified width			
Over	Up to and including	Up to and including 1 000	Over 1 000 up to and including 1 500	Over 1 500 up to and including 2 000	Over 2 000 up to and including 3 500
-	2 000	6	7	8	-
2 000	3 000	7	7	9	10
3 000	3 500	7	8	10	10
3 500	5 000	8	10	10	12
5 000	-	12	12	15	15



Key

- d Deviation from straightness
- L Length of the sheet or plate
- 1 Side edge (concave side)
- 2 Straight edge
- 3 Plate or sheet

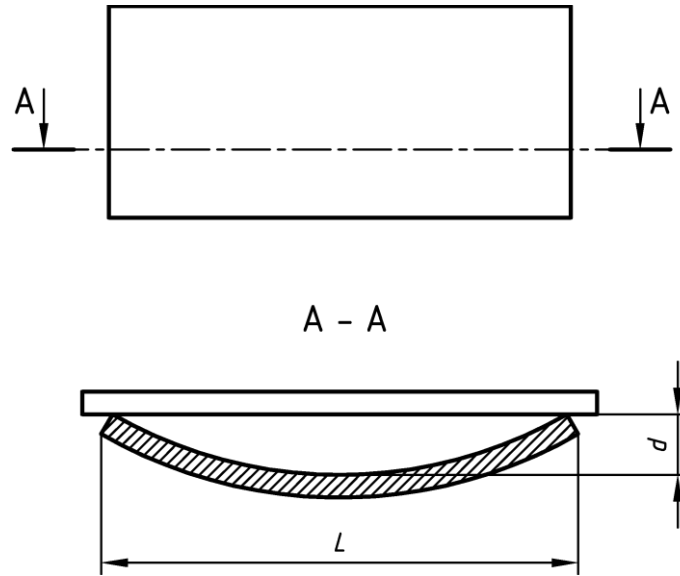
Figure 1 - Lateral curvature of plate or sheet of length L (see 4.1.2)



Key

- d Deviation from flatness
- W Width of the sheet or plate

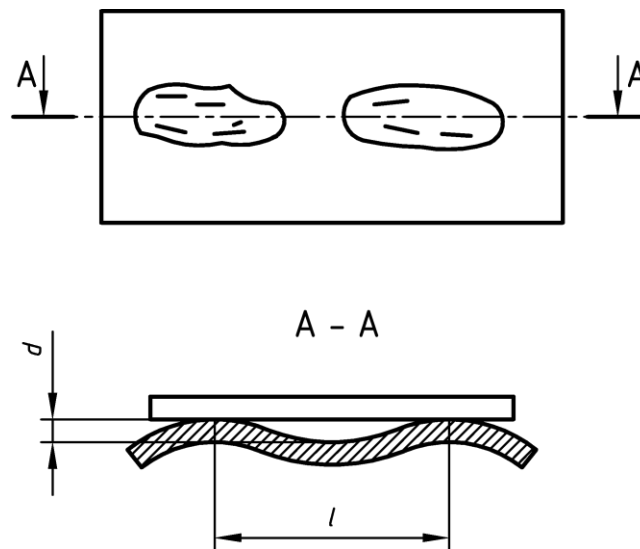
Figure 2 - Transverse arch (see 4.2.2)



Key

- d* Deviation from flatness
- L* Length of the sheet or plate

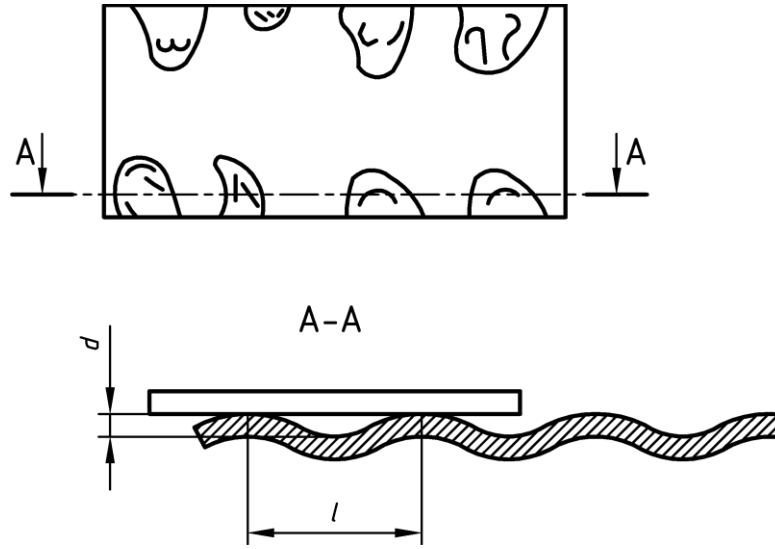
Figure 3 - Longitudinal arch (see 4.2.2)



Key

- d* Deviation from flatness
- l* Length of buckle (chord)

Figure 4 - Buckles (see 4.2.2)



Key

- d Deviation from flatness
- l Length of edge wave (chord)

Figure 5 - Edge waves (see 4.2.2)

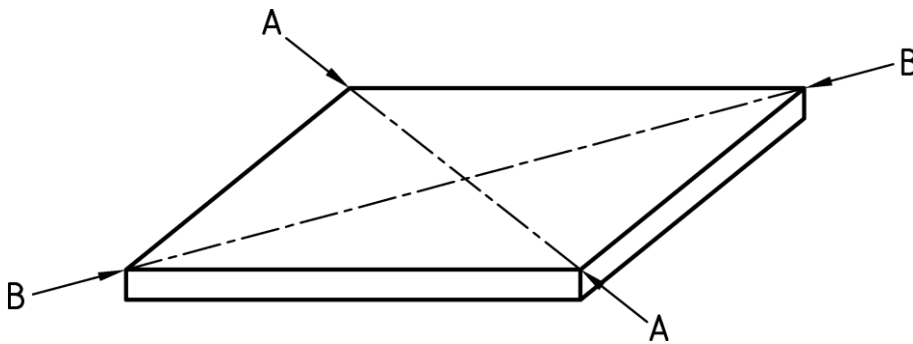


Figure 6 - Measurement of squareness (see 4.3.2)

Bibliography

EN 485-1, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 1: Technical conditions for inspection and delivery.*

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