INTERNATIONAL STANDARD

ISO 6361-4

Second edition
2011-08-15

Wrought aluminium and aluminium alloys — Sheets, strips and plates —

Part 4: Sheets and plates: Tolerances on shape and dimensions

Aluminium et alliages d'aluminium corroyés — Tôles, bandes et tôles épaisses —

Partie 4: Tôles et tôles épaisses: Tolérances sur forme et dimensions

Reference number
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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 6361-4 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

This second edition cancels and replaces the first edition (ISO 6361-4:1988), which has been technically revised.

ISO 6361 consists of the following parts, under the general title *Wrought aluminium and aluminium alloys — Sheets, strips and plates*:

— *Part 1: Technical conditions for inspection and delivery*

— *Part 2: Mechanical properties*

— *Part 3: Strips: Tolerances on shape and dimensions*

— *Part 4: Sheets and plates: Tolerances on shape and dimensions*

— *Part 5: Chemical composition*

Wrought aluminium and aluminium alloys — Sheets, strips and plates —

Part 4:
Sheets and plates: Tolerances on shape and dimensions

1 Scope

This part of ISO 6361 specifies the tolerances on shape and dimensions for wrought aluminium and aluminium alloy sheet and plate by hot-rolling or cold-rolling for general engineering applications.

It applies to products with a thickness over 0,15 mm up to and including 203 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 those that are corrugated or embossed.

Technical conditions for inspection and delivery of products covered by this part of ISO 6361 are specified in ISO 6361-1.

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.

ISO 6361-1, *Wrought aluminium and aluminium alloys — Sheets, strips and plates — Part 1: Technical conditions for inspection and delivery*

3 Dimensional tolerances

3.1 Thickness

Thickness tolerances for a cold-rolled product are specified in Tables 1 and 2.

Thickness tolerances for a hot-rolled product are specified in Tables 3 and 4.

When the tolerance is specified as either all plus or minus side, the value in Table 1, Table 2, Table 3 or Table 4 shall be doubled.

Tolerances for the products exceeding the range of specified thickness and width shall be agreed upon between the purchaser and the supplier.

Table 1 — Thickness tolerances for cold-rolled product

Dimensions in millimetres

Specified thickness		Alloy number					
		1050, 1050A, 1070, 1070A,1080, 1080A, 1085, 1100, 1100A, 1 200, 1230A, 3003, 3103, 3203, 3005, 3105, 4006, 4007, 4015, 5005, 5010, 5110A, 5050, 8011A, 8021, 8079					
		Specified width					
Over	Up to and including	Up to and including 450	Over 450, up to and including 900	Over 900, up to and including 1 400	Over 1 400, up to and including 1 800	Over 1 800, up to and including 2 300	Over 2 300, up to and including 2 600
		Tolerance					
≥0,15	0,20	±0,03	±0,03	±0,05			
0,20	0,25	±0,03	±0,04	±0,05			
0,25	0,45	±0,04	±0,04	±0,05	±0,06		
0,45	0,70	±0,04	±0,05	±0,06	±0,08		
0,70	0,90	±0,05	±0,05	±0,06	±0,09	±0,13	
0,90	1,1	±0,05	±0,06	±0,08	±0,10	±0,13	
1,1	1,7	±0,06	±0,08	±0,10	±0,13	±0,15	
1,7	1,9	±0,06	±0,08	±0,10	±0,15	±0,20	
1,9	2,4	±0,08	±0,08	±0,10	±0,15	±0,20	
2,4	2,7	±0,09	±0,10	±0,13	±0,18	±0,23	
2,7	3,6	±0,11	±0,11	±0,13	±0,18	±0,23	±0,25
3,6	4,5	±0,15	±0,15	±0,20	±0,23	±0,28	±0,30
4,5	5,0	±0,18	±0,18	±0,23	±0,28	±0,33	±0,38
5,0	6,5	±0,23	±0,23	±0,28	±0,33	±0,38	±0,43
6,5	8,0	±0,33	±0,33	±0,33	±0,38	±0,43	±0,51
8,0	11	±0,48	±0,48	±0,48	±0,48	±0,58	±0,66
11	16	±0,64	±0,64	±0,64	±0,64	±0,76	±0,89

Table 2 — Thickness tolerances for cold-rolled product

Dimensions in millimetres

Specified thickness		Alloy number: 2014, 2014A, 2017, 2017A, 2618A, 2219, 2024, 2124, 3004, 3104, 5021, 5026, 5040, 5042, 5049, 5449, 5251, 5052, 5154, 5154A, 5254, 5454, 5754, 5456, 5059, 5070, 5082, 5182, 5083, 5383, 5086, 6016, 6025, 6061, 6082, 7204,7010, 7020, 7021, 7022, 7050, 7075, 7475, 7178											
		Specified width											
Over	Up to and including	Up to and including 450	Over 450, up to and including 900	Over 900, up to and including 1 200	Over 1 200, up to and including 1 400	Over 1 400, up to and including 1 500	Over 1 500, up to and including 1 700	Over 1 700, up to and including 1 800	Over 1 800, up to and including 2 000	Over 2 000, up to and including 2 100	Over 2 100, up to and including 2 300	Over 2 300, up to and including 2 400	Over 2 400, up to and including 2 600
		Tolerance											
≥0,20	0,25	±0,03	±0,04	±0,06	±0,06								
0,25	0,45	±0,04	±0,04	±0,06	±0,09								
0,45	0,70	±0,04	±0,05	±0,06	±0,09	±0,10	±0,10	±0,10					
0,70	0,90	±0,05	±0,05	±0,06	±0,10	±0,13	±0,13	±0,13	±0,15				
0,90	1,1	±0,05	±0,06	±0,08	±0,10	±0,13	±0,13	±0,13	±0,15				
1,1	1,7	±0,06	±0,08	±0,10	±0,13	±0,15	±0,15	±0,15	±0,18				
1,7	1,9	±0,08	±0,08	±0,10	±0,13	±0,15	±0,15	±0,15	±0,18				
1,9	2,4	±0,09	±0,09	±0,10	±0,13	±0,15	±0,15	±0,15	±0,18	±0,18	±0,30		
2,4	2,7	±0,10	±0,10	±0,13	±0,13	±0,18	±0,18	±0,18	±0,20	±0,20	±0,41		
2,7	3,2	±0,11	±0,11	±0,13	±0,13	±0,18	±0,18	±0,18	±0,20	±0,20	±0,41	±0,46	±0,51
3,2	3,6	±0,11	±0,11	±0,13	±0,13	±0,18	±0,25	±0,30	±0,33	±0,36	±0,41	±0,46	±0,51
3,6	4,5	±0,15	±0,15	±0,20	±0,20	±0,23	±0,30	±0,36	±0,38	±0,41	±0,43	±0,48	±0,58
4,5	5,0	±0,18	±0,18	±0,25	±0,25	±0,28	±0,36	±0,41	±0,43	±0,43	±0,43	±0,56	±0,66
5,0	6,5	±0,23	±0,23	±0,28	±0,28	±0,33	±0,41	±0,46	±0,46	±0,46	±0,46	±0,61	±0,71
6,5	8,0	±0,33	±0,33	±0,33	±0,33	±0,38	±0,46	±0,51	±0,51	±0,51	±0,51	±0,64	±0,76
8,0	11	±0,48	±0,48	±0,48	±0,48	±0,51	±0,51	±0,58	±0,58	±0,64	±0,64	±0,66	±0,84
11	16	±0,64	±0,64	±0,64	±0,64	±0,64	±0,64	±0,64	±0,76	±0,76	±0,76	±0,89	±0,89

Table 3 — Thickness tolerances for hot-rolled product

Dimensions in millimetres

Specified thickness		Alloy number 1050, 1050A, 1070, 1070A, 1080, 1080A, 1085,1100, 1100A, 1 200, 1230A, 3003, 3103, 3203, 3005, 3105, 4006, 4007, 4015, 5005, 5010, 5110A, 5050, 8011A					
		Specified width					
Over	Up to and including	Up to and including 900	Over 900, up to and including 1 400	Over 1 400, up to and including 1 800	Over 1 800, up to and including 2 300	Over 2 300, up to and including 2 600	Over 2 600, up to and including 3 400
		Tolerance					
≥4	5	±0,25	±0,30	±0,35	±0,40		
5	6	±0,30	±0,40	±0,45	±0,50		
6	8	±0,45	±0,45	±0,55	±0,65	±0,75	±0,85
8	11	±0,55	±0,55	±0,65	±0,75	±0,85	±0,95
11	16	±0,65	±0,65	±0,75	±0,85	±0,95	±1,0
16	22	±0,80	±0,80	±0,80	±0,90	±1,1	±1,1
22	29	±0,90	±0,90	±0,90	±1,1	±1,4	±1,4
29	35	±1,0	±1,0	±1,0	±1,3	±1,7	±1,7
35	40	±1,1	±1,1	±1,1	±1,5	±1,9	±1,9
40	50	±1,3	±1,3	±1,3	±1,8	±2,2	±2,2
50	55	±1,5	±1,5	±1,5	±2,0	±2,5	±2,5
55	70	±1,9	±1,9	±1,9	±2,5	±3,2	±3,2
70	75	±2,3	±2,3	±2,3	±3,0	±3,8	±3,8
75	100	±2,8	±2,8	±2,8	±3,6	±4,1	±4,1
100	150	±3,2	±3,2	±3,8	±4,1		
150	203	±4,1	±4,1	±4,1	±4,1		
This specification shall be applied to the products of temper grade H112 and those finished by the hot-rolled condition.							

Table 4 — Thickness tolerances for hot-rolled product

Dimensions in millimetres

Specified thickness		Alloy number 2014, 2014A, 2017, 2017A, 2618A, 2219, 2024, 2124, 3004, 3104, 5021, 5026, 5040, 5042, 5049, 5449, 5251, 5052, 5154, 5154A, 5254, 5454, 5754, 5456, 5059, 5070, 5082, 5182, 5083, 5383, 5086, 6016, 6025, 6061, 6082, 7204,7010, 7020, 7021, 7022, 7050, 7075, 7475, 7178					
		Specified width					
Over	Up to and including	Up to and including 900	Over 900, up to and including 1 400	Over 1 400, up to and including 1 800	Over 1 800, up to and including 2 300	Over 2 300, up to and including 2 600	Over 2 600, up to and including 3 400
		Tolerance					
≥4	5	±0,30	±0,35	±0,50	±0,60		
5	6	±0,40	±0,45	±0,55	±0,65		
6	8	±0,50	±0,50	±0,60	±0,70	±0,80	±0,90
8	11	±0,60	±0,60	±0,70	±0,80	±0,90	±1,0
11	16	±0,70	±0,70	±0,80	±0,90	±1,0	±1,1
16	22	±0,80	±0,80	±0,80	±0,90	±1,1	±1,1
22	29	±0,90	±0,90	±0,90	±1,1	±1,4	±1,4
29	35	±1,0	±1,0	±1,0	±1,3	±1,7	±1,7
35	40	±1,1	±1,1	±1,1	±1,5	±1,9	±1,9
40	50	±1,3	±1,3	±1,3	±1,8	±2,2	±2,2
50	55	±1,5	±1,5	±1,5	±2,0	±2,5	±2,5
55	70	±1,9	±1,9	±1,9	±2,5	±3,2	±3,2
70	75	±2,3	±2,3	±2,3	±3,0	±3,8	±3,8
75	100	±2,8	±2,8	±2,8	±3,6	±4,1	±4,1
100	150	±3,2	±3,2	±3,6	±4,1	±4,1	
150	203	±4,1	±4,1	±4,1	±4,1	±4,1	
This specification shall be applied to the products of temper grade H112 and those finished by the hot-rolled condition.							

3.2 Width

Width tolerances for shared sheet and plate are specified in Table 5.

Width tolerances for sawed sheet and plate are specified in Table 6.

Width is measured at room temperature during cutting. The allowable maximum deviation shall be 0,23 mm per 1 000 mm in width, by a temperature difference of 10 °C against the reference temperature of 20 °C.

When the width tolerance for the product with a thickness up to and including 6,5 mm is specified as either all plus or minus side, the value in Table 5 or Table 6 shall be doubled.

Tolerances for the products exceeding the range of specified thickness and width shall be agreed upon between the purchaser and the supplier.

Table 5 — Width tolerance for sheared sheet and plate

Dimensions in millimetres

Specified thickness		Specified width			
Over	Up to and including	Up to and including 150	Over 150, up to and including 600	Over 600, up to and including 2 500	Over 2 500, up to and including 3 500
		Tolerance			
≥0,15	3,2	±2	±3	±3	±4
3,2	6,5	±3	±3	±3	±5
6,5	16	$^{+7}_{0}$	$^{+8}_{0}$	$^{+10}_{0}$	$^{+11}_{0}$

Table 6 — Width tolerances for sawed sheet and plate

Dimensions in millimetres

Specified thickness		Specified width			
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
		Tolerance			
≥2,0	6,5	±3	±3	±5	±7
6,5	203	$^{+7}_{0}$	$^{+8}_{0}$	$^{+9}_{0}$	$^{+10}_{0}$

3.3 Length

Length tolerances for sheared sheet and plate are specified in Table 7.

Length tolerances for sawed sheet and plate are specified in Table 8.

Length is measured at room temperature during cutting. The allowable maximum deviation shall be 0,23 mm per 1 000 mm in length, by a temperature difference of 10 °C against the reference temperature of 20 °C.

When the width tolerance for the product with a thickness up to and including 6,5 mm is specified as either all plus or minus side, the value in Table 7 or Table 8 shall be doubled.

Tolerances for the products exceeding the range of specified thickness and width shall be agreed upon between the purchaser and the supplier.

Table 7 — Length tolerances for sheared sheet and plate

Dimensions in millimetres

Specified thickness		Specified width					
Over	Up to and including	Up to and including 750	Over 750, up to and including 1 500	Over 1 500, up to and including 3 000	Over 3 000, up to and including 6 000	Over 6 000, up to and including 9 000	Over 9 000, up to and including 10 000
		Tolerance					
≥0,15	3,2	±2	±3	±3	±4	±5	±6
3,2	6,5	±3	±3	±3	±4	±6	±7
6,5	16	$^{+7}_{0}$	$^{+10}_{0}$	$^{+11}_{0}$	$^{+13}_{0}$	$^{+14}_{0}$	$^{+16}_{0}$

Table 8 — Length tolerances for sawed sheet and plate

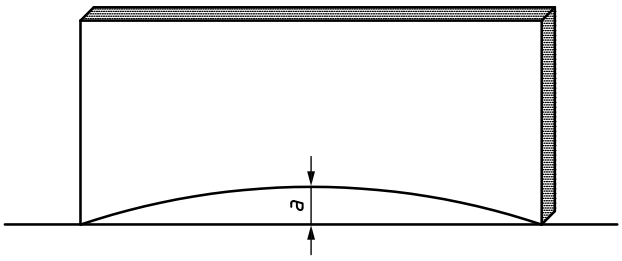
Dimensions in millimetres

Specified thickness		Specified width					
Over	Up to and including	Up to and including 750	Over 750, up to and including 1 500	Over 1 500, up to and including 3 000	Over 3 000, up to and including 6 000	Over 6 000, up to and including 9 000	Over 9 000, up to and including 10 000
		Tolerance					
≥2,0	6,5	±3	±3	+5	+7	+7	+8
6,5	203	$^{+7}_{0}$	$^{+8}_{0}$	$^{+10}_{0}$	$^{+13}_{0}$	$^{+14}_{0}$	$^{+16}_{0}$

4 Shape tolerances

4.1 Lateral curvature

Lateral curvature is the depth of the arc over the whole length as shown in Figure 1.



Key

a maximum value

Figure 1 — Lateral curvature of sheet and plate

When tested with the sheet resting on a flat surface, against a straight edge, the lateral curvature shall not exceed the appropriate value given in Table 9.

The maximum value for the products exceeding the range of specified thickness, width and length shall be agreed upon between the purchaser and the supplier

Table 9 — Lateral curvature tolerances

Dimensions in millimetres

Specified thickness		Specified width		Specified length						
Over	Up to and including	Over	Up to and including	Up to and including 1 500	Over 1 500, up to and including 2 300	Over 2 300, up to and including 3 000	Over 3 000, up to and including 3 800	Over 3 800, up to and including 4 500	Over 4 500, up to and including 5 500	Over 5 500, up to and including 6 000
				Maximum values						
≥0,15	3,2		100	6	14	25	39	57	76	102[a]
		100	250	3	6	10	14	22	29	38[a]
		250	900	2	3	5	6	10	13	19[a]
		900	3 500	1	2	3	5	6	10	13[a]
3,2	6,5	100	900	2	3	6	9	14	19	25[a]
		900	3 500	1	2	3	5	6	10	13[a]
6,5	203		250	6	14	25	39	57	76	102[a]
		250	450	2	3	6	10	15	20	25[a]
		450	3 500	1	2	3	5	8	11	14[a]

[a] For the product over 6 000 mm and up to and including 10 000 mm in length, the maximum value in this table shall be applied for any 6 000 mm length.

4.2 Flatness tolerances

Flatness tolerances for strip are not specified.

Flatness tolerances for sheet and plate are specified in Table 10 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 straight edge and a feeler gauge, dial gauge or scale, while the sheet or plate is resting on a horizontal base plate with the concave side upwards.

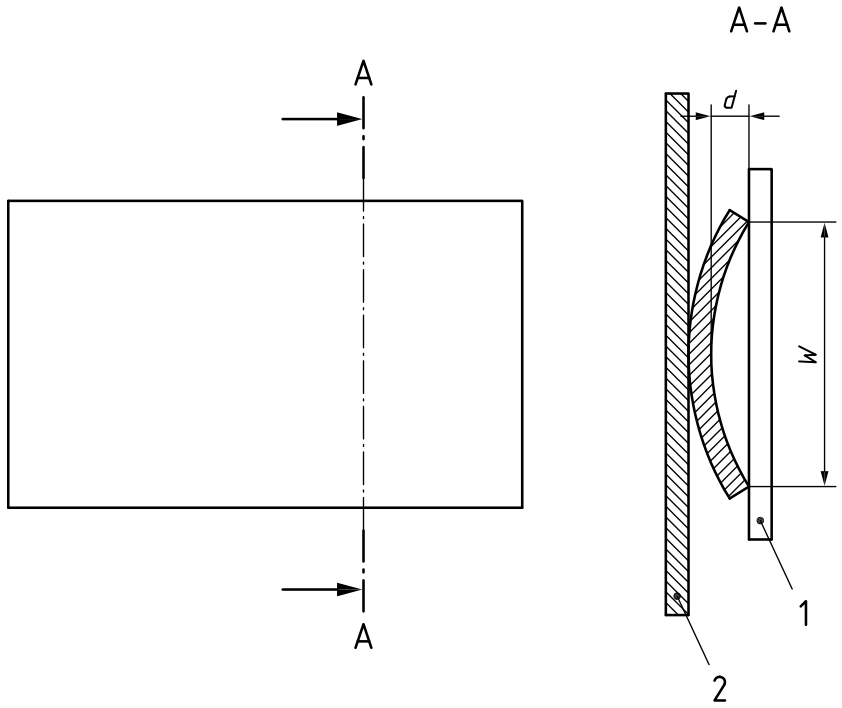
These tolerances do not apply to sheet and plate supplied in the O (annealed) or HX8 (hard temper) temper and over tempers.

These tolerances do not include end or corner turnup.

The maximum values for products exceeding the range of specified thickness and width shall be agreed upon between the purchaser and the supplier.

Table 10 — Flatness tolerances

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	
0,20	0,50	by agreement	by agreement	by agreement
0,50	3,0	0,4	0,5	0,5
3,0	6,0	0,3	0,4	0,4
6,0	50	0,2	0,3	0,3
50	203	0,2	0,2	by agreement



Key

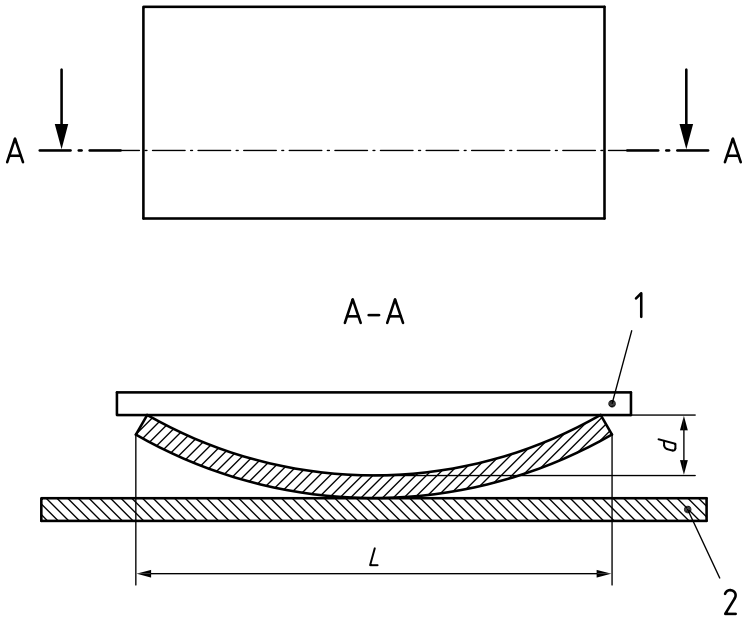
d deviation from flatness

W width of the sheet or plate

1 straight edge

2 base plate

Figure 2 — Transverse arch



Key

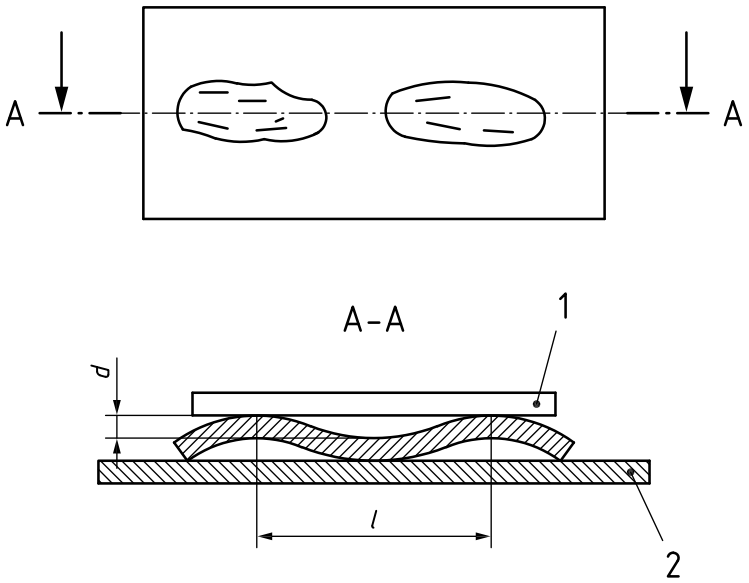
d deviation from flatness

L length of the sheet or plate

1 straight edge

2 base plate

Figure 3 — Longitudinal arch



Key

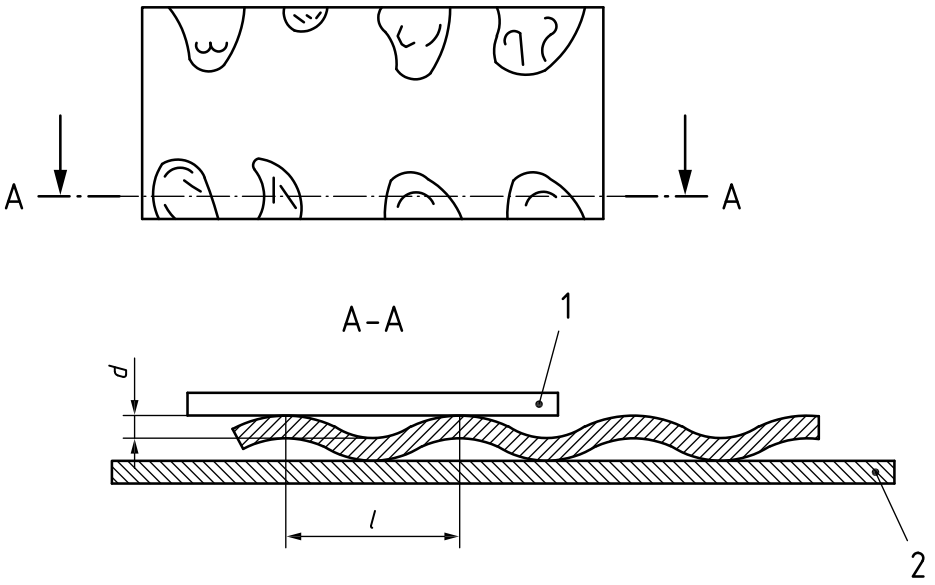
d deviation from flatness

l length of buckle (chord)

1 straight edge

2 base plate

Figure 4 — Buckles



Key

d deviation from flatness

l length of edge wave (chord)

1 straight edge

2 base plate

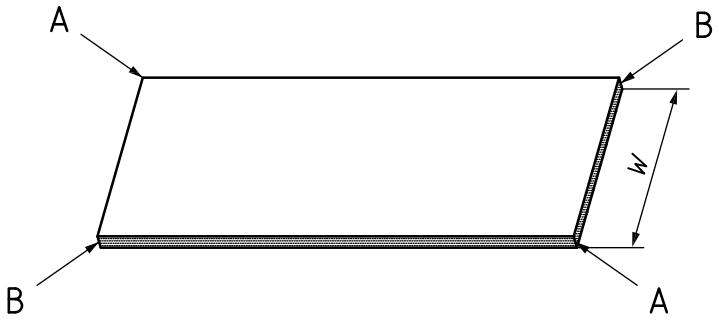
Figure 5 — Edge waves

4.3 Squareness tolerances

The diagonal distances between opposite corners of any sheet shall not differ by more than the values shown in Table 11.

Table 11 — Squareness tolerances

Specified length mm	**Specified width,** mm W[a]	
	Up to and including 900	Over 900
	Maximum value	
Up to and including 3 700	$2{,}4 \times \frac{W}{300}$	$2{,}0 \times \frac{W}{300}$
Over 3 700	$3{,}6 \times \frac{W}{300}$	$2{,}8 \times \frac{W}{300}$
In the case where the specified width is not an exact multiple of 300 mm, the maximum value of squareness shall be determined by using the next larger exact multiple for the width. For example, when the specified width is 1 400 mm and the specified length 1 800 mm, the tolerance thereon shall be 2,0 mm × 5 (multiple) = 10 mm.		
[a] See Figure 6.		



Key

W width

Figure 6 — Specified width

ICS 77.150.10

Price based on 12 pages