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**Wrought aluminium and aluminium  
alloys — Extruded rods/bars, tubes  
and profiles —**

Part 4:  
**Tolerances on form and dimensions  
for profiles**

*Aluminium et alliages d'aluminium corroyés — Barres, tubes et  
profilés filés —*

*Partie 4: Tolérances sur forme et dimensions pour profilés*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This third edition cancels and replaces the second edition (ISO 6362-4:2012), which has been technically revised. The main changes are as follows:

- errors have been corrected and expressions modified throughout.

A list of all parts in the ISO 6362 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles —

## Part 4: Tolerances on form and dimensions for profiles

### 1 Scope

This document specifies the tolerances on dimensions and shape of wrought aluminium and aluminium alloy extruded profiles with a cross-section contained within a circumscribing circle not greater than 800 mm.

It is applicable to extruded profiles for general engineering applications only.

### 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.

ISO 6362-1, *Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles — Part 1: Technical conditions for inspection and delivery*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6362-1 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

##### **circumscribing circle**

smallest circle which encloses entirely the cross-section of the shape

Note 1 to entry: This dimension may have to be increased when shapes are subjected to corrections of the uneven thickness or in the case of hollow shapes for which the centre of the circumscribing circle needs to be considered, based on the void. These matters should be confirmed with the supplier beforehand as required.

### 4 Materials

Alloys mentioned in this document are listed in ISO 6362-7.

NOTE Four-digit numerical designations are completely identical with Registration of International Alloy Designations and Chemical Composition Limits for Wrought Aluminum and Wrought Aluminum Alloys (known as “Teal sheets”)<sup>[1]</sup>.

For the purposes of this document, wrought aluminium and aluminium alloys are divided into two groups, which correspond to varying difficulty when manufacturing the products.

The division of the most commonly alloys used in general engineering into Group I and Group II is specified in [Table 1](#) and [Table 2](#), respectively.

Grouping of other alloys is subject to agreement between the purchaser and the supplier.

**Table 1 — Alloy Group I**

Alloy system	Alloy number
Pure aluminium	1070, 1070A, 1060, 1050, 1050A, 1100, 1200, 1350
Al-Mn system alloy	3021, 3003, 3102, 3103, 3203
Al-Mg system alloy	5005, 5005A, 5051A, 5251
Al-Mg-Si system alloy	6005, 6005A, 6005C, 6008, 6012, 6014, 6018, 6023, 6060, 6061, 6063, 6063A, 6065, 6081, 6082, 6182, 6101, 6101A, 6101B, 6106, 6110A, 6261, 6262, 6262A, 6351, 6360, 6463

**Table 2 — Alloy Group II (all aluminium alloys except those given in alloy Group I)**

Alloy system	Alloy number
Al-Mg system alloy	5019, 5049, 5052, 5083, 5086, 5154A, 5454, 5754
Al-Cu-Mg system alloy	2007, 2014, 2014A, 2017, 2017A, 2024, 2030
Al-Zn-Mg system alloy	7204, 7003, 7005, 7020, 7021, 7022, 7049A, 7050, 7075, 7108, 7108A

## 5 Tolerances on form and dimensions

### 5.1 Dimensional tolerances

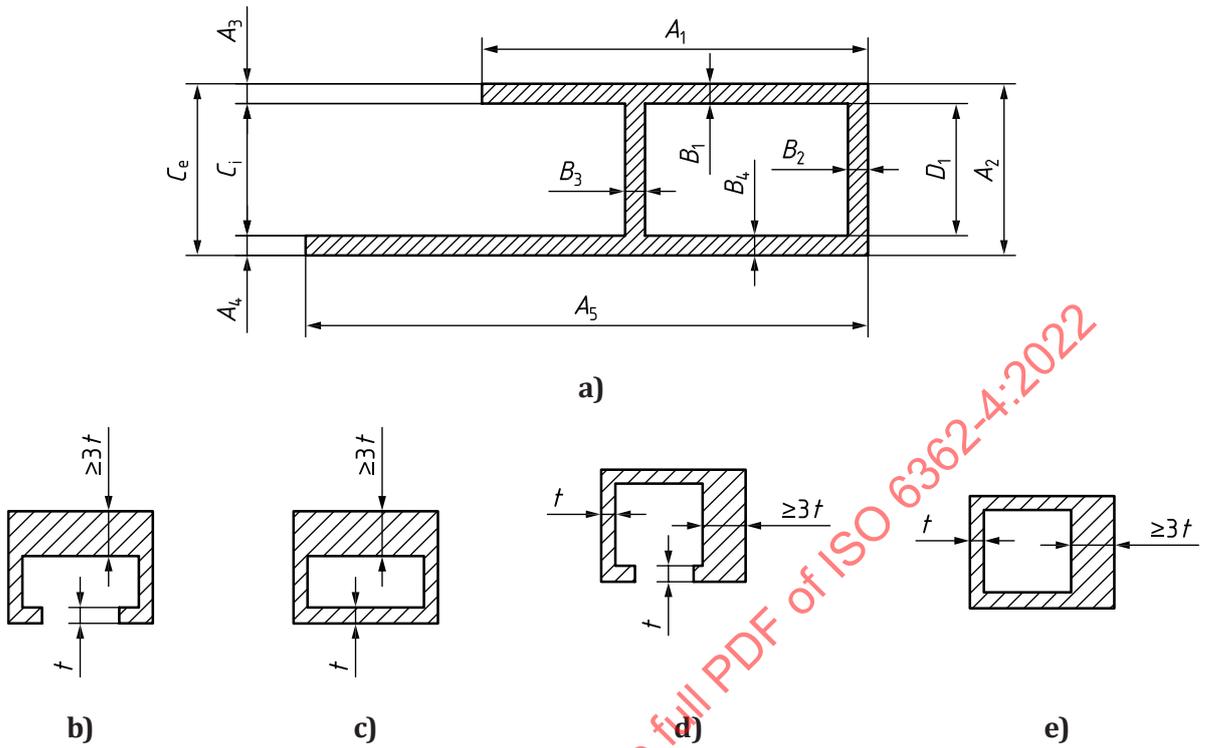
Tolerances on dimensions (see [Figures 1](#) and [2](#)) are specified in [Tables 3](#) to [5](#).

The tolerances to be applied to the sectional dimensions as shown in [Figure 1](#), where the nominal thickness of one wall is equal to or greater than three times the thickness of the other wall,  $t$ , shall be agreed between the purchaser and the supplier; see [Figure 1](#) b) to e).

The purchaser should specify whether ordinary or special tolerances are required.

In the case of angled shapes as shown in [Figure 3](#), the tolerances shall be decided not on the base of the length of dimension X, but on the base of the angle  $\alpha$  (see [6.6](#)).

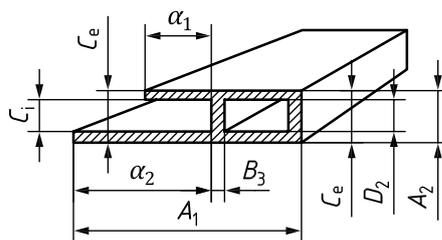
Even when value Y in [Figure 3](#) is equal to or greater than 75 % of value X, these tolerances are not applied to the dimension X or Z. The tolerances for X and Y shall conform to the column corresponding to space dimension Ci and Ce depending on the distance from the reference base.



**Key**

- $A_1$  to  $A_5$  dimensions of metallic parts except the thickness of wall surface at hollow place ( $B$ )
- $B_1$  to  $B_4$  thickness of wall surface at hollow place
- $C_e$ ,  $C_i$  dimensions of empty space at opening
- $D_1$  dimensions of empty space at hollow place

**Figure 1 — Sectional dimensions**



**Key**

- $\alpha_1, \alpha_2$  distance between specified point and root of let

**Figure 2 — Definition of  $\alpha_1, \alpha_2$  on sectional dimensions**

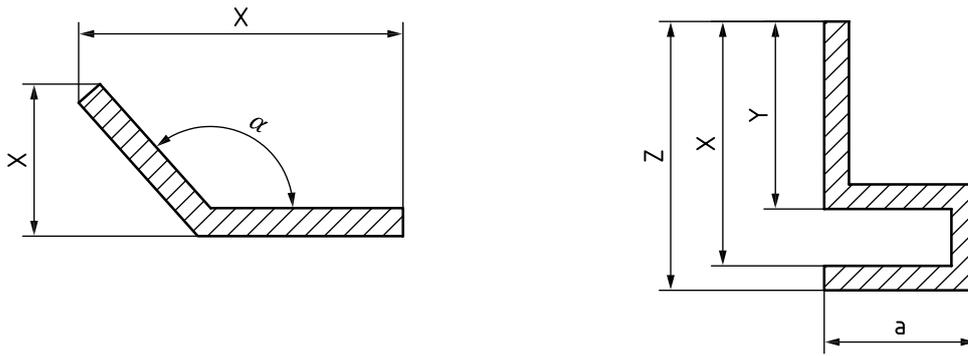


Figure 3 — Sectional dimensions

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Table 3 (continued)

Diameter of circumscribing circle	Dimension at specified part	Tolerance <sup>a</sup>															
		Metallic part (where 75 % or more is metal)		Hollow part (where more than 25 % is hollow space, i.e. less than 75 % is metal) <i>C<sub>i</sub></i> or <i>C<sub>e</sub></i> <sup>b</sup>													
		Metallic part other than that in the right column <i>A<sub>1</sub></i> , <i>A<sub>2</sub></i>	Thickness of hollow part <sup>c</sup> <i>B</i>	Distance between specified point and root of let $\alpha^d$													
Alloy Group	I	II	I	II	I	II	I	II	I	II	I	II					
250 < D ≤ 800	250,00 < A ≤ 300,00	±2,8	±4,2	±20 %	±20 %	±3,0	±4,3	±3,2	±4,5	±3,8	±5,0	±4,1	±5,2	±4,7	±5,8	±6,0	±7,0
	300,00 < A ≤ 350,00	±3,2	±4,8	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±3,3	±4,8	±3,6	±5,0	±4,1	±5,5	±4,4	±5,6	±5,0	±6,3	±6,2	±7,4
	350,00 < A ≤ 400,00	±3,6	±5,4	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±3,7	±5,4	±3,9	±5,5	±4,5	±5,9	±4,7	±6,0	±5,3	±6,7	±6,5	±7,8
	400,00 < A ≤ 450,00	±4,0	±5,9	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±4,1	±5,9	±4,3	±6,0	±4,8	±6,4	±5,0	±6,5	±5,6	±7,2	±6,8	±8,2
	450,00 < A ≤ 500,00	±4,4	±6,5	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±4,4	±6,4	±4,6	±6,5	±5,1	±6,9	±5,3	±6,9	±5,9	±7,6	±7,1	±8,6
	500,00 < A ≤ 550,00	±4,7	±7,1	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±4,8	±7,0	±4,9	±7,1	±5,4	±7,4	±5,6	±7,4	±6,2	±8,1	±7,3	±9,0
	550,00 < A ≤ 800,00	±5,1	±7,7	±20 % but ±3,4 max.	±20 % but ±3,4 max.	±5,1	±7,5	±5,3	±7,6	±5,7	±7,8	±5,8	±7,8	±6,5	±8,5	±7,6	±9,4

Dimensional tolerances for the space portions of hollow parts shall be as given in Table 5 (column D).

When either only a minus or plus side tolerance is specified, the value in this table shall be doubled.

<sup>a</sup> When the dimensional tolerance is not made equal at the plus side and minus side, determine the value in the column corresponding to the centre of allowable range, and use this value as a standard to decide the tolerance.

<sup>b</sup> If the purchaser and the supplier agree, the outside dimension *C<sub>e</sub>* may be specified instead of the inside dimension *C<sub>i</sub>*.

<sup>c</sup> This is applicable when the space volume enveloped with hollow part is 70 mm<sup>2</sup> or larger. If less than 70 mm<sup>2</sup>, employ column A.

<sup>d</sup> If 5 mm or under, employ column A.

Table 4 — Tolerance (special class) on sectional dimensions

Dimensions in millimetres

Diameter of circumscribing circle	Dimension at specified part	Tolerance <sup>a</sup>													
		Metallic part (where 75 % or more is metal)		Hollow part (where more than 25 % is hollow space, i.e. less than 75 % is metal)						Distance between specified point and root of let $\alpha^d$					
		Metallic part other than that in the right column	Thickness of wall surface at hollow part <sup>c</sup>	5 < $\alpha \leq 15$		15 < $\alpha \leq 30$		30 < $\alpha \leq 60$		60 < $\alpha \leq 100$		100 < $\alpha \leq 150$		150 < $\alpha \leq 200$	
	Alloy Group	I	II	I	II	I	II	I	II	I	II	I	II	I	II
250 ≤ D	A ≤ 3,20	±0,15	±0,23	±0,25	±0,33	±0,30	±0,38	—	—	—	—	—	—	—	—
	3,20 < A ≤ 6,30	±0,18	±0,28	±0,30	±0,41	±0,36	±0,46	±0,50	—	—	—	—	—	—	—
	6,30 < A ≤ 12,50	±0,20	±0,30	±0,36	±0,46	±0,41	±0,50	±0,56	±0,50	±0,60	—	—	—	—	—
	12,50 < A ≤ 20,00	±0,23	±0,36	±0,41	±0,52	±0,46	±0,58	±0,64	±0,56	±0,70	—	—	—	—	—
	20,00 < A ≤ 25,00	±0,25	±0,38	±0,46	±0,58	±0,50	±0,64	±0,70	±0,64	±0,76	±0,76	±0,88	—	—	—
	25,00 < A ≤ 40,00	±0,30	±0,46	±0,54	±0,68	±0,58	±0,74	±0,80	±0,80	±0,76	±0,92	±0,88	±1,05	—	—
	40,00 < A ≤ 50,00	±0,36	±0,54	±0,60	±0,78	±0,66	±0,84	±0,78	±0,96	±0,92	±1,10	±1,05	±1,25	±1,45	—
	50,00 < A ≤ 100,00	±0,60	±0,90	±0,86	±1,15	±0,96	±1,25	±1,20	±1,50	±1,45	±1,75	±1,70	±2,05	±2,35	—
	100,00 < A ≤ 150,00	±0,86	±1,30	±1,10	±1,55	±1,25	±1,70	±1,65	±2,05	±2,00	±2,40	±2,40	±2,80	±3,25	—
	150,00 < A ≤ 200,00	±1,10	±1,70	±1,35	±1,95	±1,55	±2,15	±2,10	±2,65	±2,50	±3,05	±3,05	±3,60	±4,10	—
200,00 < A ≤ 250,00	±1,35	±2,05	±1,65	±2,30	±1,90	±2,55	±2,50	±3,25	±3,05	±3,75	±3,70	±4,60	±5,00	—	

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Table 4 (continued)

Diameter of circum-scribing circle	Dimension at specified part	Tolerance <sup>a</sup>																
		Metallic part (where 75 % or more is metal)		Hollow part (where more than 25 % is hollow space, i.e. less than 75 % is metal) <i>C<sub>i</sub></i> or <i>C<sub>e</sub></i>														
		Metallic part other than that in the right column <i>A<sub>1</sub></i> , <i>A<sub>2</sub></i>		Thickness of wall surface at hollow part <sup>c</sup> <i>B</i>		Distance between specified point and root of let $\alpha^d$												
Alloy Group	I	II	I	II	5 < $\alpha \leq 15$		15 < $\alpha \leq 30$		30 < $\alpha \leq 60$		60 < $\alpha \leq 100$		100 < $\alpha \leq 150$		150 < $\alpha \leq 200$			
250 < <i>D</i> ≤ 800	A ≤ 3,20	±0,36	±0,54			±0,46	±0,64	±0,50	±0,68	—	—	—	—	—	—	—	—	—
	3,20 < <i>A</i> ≤ 6,30	±0,38	±0,56			±0,48	±0,66	±0,56	±0,74	±0,72	±0,88	—	—	—	—	—	—	—
	6,30 < <i>A</i> ≤ 12,50	±0,41	±0,60			±0,50	±0,72	±0,60	±0,80	±0,76	±0,96	±1,25	±1,45	—	—	—	—	—
	12,50 < <i>A</i> ≤ 20,00	±0,43	±0,64			±0,56	±0,76	±0,68	±0,88	±1,00	±1,25	±1,50	±1,75	—	—	—	—	—
	20,00 < <i>A</i> ≤ 25,00	±0,46	±0,68			±0,58	±0,78	±0,76	±1,00	±1,25	±1,45	±1,80	±2,00	±2,30	±2,55	±2,75	—	—
	25,00 < <i>A</i> ≤ 40,00	±0,48	±0,72			±0,60	±0,84	±0,86	±1,10	±1,50	±1,75	±2,05	±2,25	±2,55	±2,75	—	—	—
	40,00 < <i>A</i> ≤ 50,00	±0,60	±0,92	±15 % but	±15 % but	±0,86	±1,15	±1,10	±1,40	±1,80	±2,10	±2,30	±2,60	±2,80	±3,10	±4,30	±4,60	±5,00
	50,00 < <i>A</i> ≤ 100,00	±0,86	±1,30	±2,30 max.	±2,30 max.	±1,10	±1,55	±1,35	±1,80	±2,05	±2,45	±2,55	±2,95	±3,05	±3,50	±4,55	±5,40	±5,85
	100,00 < <i>A</i> ≤ 150,00	±1,10	±1,70	±0,38 min.	±0,38 min.	±1,35	±1,95	±1,65	±2,20	±2,30	±2,85	±2,80	±3,35	±3,30	±3,85	±4,85	±5,40	±5,75
	150,00 < <i>A</i> ≤ 200,00	±1,35	±2,05			±1,65	±2,30	±1,90	±2,55	±2,55	±3,25	±3,05	±3,75	±3,55	±4,25	±5,10	±5,75	±6,15
	200,00 < <i>A</i> ≤ 250,00	±1,65	±2,45			±1,90	±2,70	±2,15	±2,95	±2,80	±3,60	±3,30	±4,10	±3,80	±4,60	±5,35	±6,15	±6,55
	250,00 < <i>A</i> ≤ 300,00	±1,90	±2,80			±2,15	±3,05	±2,40	±3,35	±3,05	±4,00	±3,55	±4,50	±4,05	±5,00	±5,60	±6,55	±6,90
	300,00 < <i>A</i> ≤ 350,00	±2,15	±3,20			±2,40	±3,45	±2,65	±3,70	±3,30	±4,35	±3,80	±4,90	±4,30	±5,40	±5,85	±6,90	±7,30
	350,00 < <i>A</i> ≤ 400,00	±2,40	±3,60			±2,65	±3,85	±2,90	±4,10	±3,55	±4,75	±4,05	±5,25	±4,55	±5,75	±6,10	±7,30	±7,65
	400,00 < <i>A</i> ≤ 450,00	±2,65	±3,95			±2,90	±4,20	±3,15	±4,45	±3,80	±5,15	±4,30	±5,65	±4,85	±6,15	±6,35	±7,65	±8,45
500,00 < <i>A</i> ≤ 550,00	±3,15	±4,70			±3,40	±5,00	±3,65	±5,25	±4,30	±5,90	±4,85	±6,40	±5,35	±6,90	±6,85	±8,45	±8,80	
550,00 < <i>A</i> ≤ 800,00	±3,40	±5,10			±3,65	±5,35	±3,90	±5,60	±4,55	±6,25	±5,10	±6,80	±5,60	±7,30	±7,10	±8,80	±9,20	

Dimensional tolerances for the space portions of hollow parts shall be as given in Table 5 (column D).

<sup>a</sup> When the dimensional tolerance is not made equal at the plus side and minus side, determine the value in the column corresponding to the centre of allowable range, and use this value as a standard to decide the tolerance.

<sup>b</sup> If the purchaser and the supplier agree, the outside dimension *C<sub>e</sub>* may be specified instead of the inside dimension *C<sub>i</sub>*.

<sup>c</sup> This is applicable when the space volume enveloped with hollow part is 70 mm<sup>2</sup> or larger. If less than 70 mm<sup>2</sup>, employ column A.

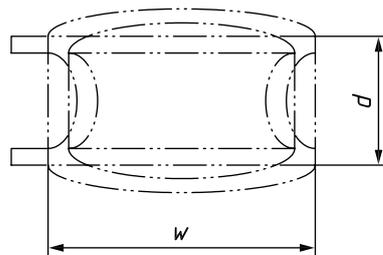
<sup>d</sup> If 5 mm or under, employ column A.

**Table 5 — Tolerances  $D$  for space portion of hollow part**

Dimensions in millimetres

Diameter of circumscribing circle	Dimension at specified point	Tolerance $D$			
		(ordinary class)		(special class)	
		Alloy I	Alloy II	Alloy I	Alloy II
250 ≤ $D$	$A \leq 3,20$	±0,38	±0,50	±0,25	±0,33
	$3,20 < A \leq 6,30$	±0,45	±0,62	±0,30	±0,41
	$6,30 < A \leq 12,50$	±0,54	±0,69	±0,36	±0,46
	$12,50 < A \leq 20,00$	±0,62	±0,78	±0,41	±0,52
	$20,00 < A \leq 25,00$	±0,69	±0,87	±0,46	±0,58
	$25,00 < A \leq 40,00$	±0,81	±1,02	±0,54	±0,68
	$40,00 < A \leq 50,00$	±0,90	±1,17	±0,60	±0,78
	$50,00 < A \leq 100,00$	±1,29	±1,73	±0,86	±1,15
	$100,00 < A \leq 150,00$	±1,65	±2,33	±1,10	±1,55
	$150,00 < A \leq 200,00$	±2,03	±2,93	±1,35	±1,95
$200,00 < A \leq 250,00$	±2,48	±3,45	±1,65	±2,30	
250 < $D \leq 800$	$A \leq 3,20$	±0,69	±0,96	±0,46	±0,64
	$3,20 < A \leq 6,30$	±0,72	±0,99	±0,48	±0,66
	$6,30 < A \leq 12,50$	±0,75	±1,08	±0,50	±0,72
	$12,50 < A \leq 20,00$	±0,84	±1,14	±0,56	±0,76
	$20,00 < A \leq 25,00$	±0,87	±1,17	±0,58	±0,78
	$25,00 < A \leq 40,00$	±0,90	±1,26	±0,60	±0,84
	$40,00 < A \leq 50,00$	±1,29	±1,73	±0,86	±1,15
	$50,00 < A \leq 100,00$	±1,65	±2,33	±1,10	±1,55
	$100,00 < A \leq 150,00$	±2,03	±2,93	±1,35	±1,95
	$150,00 < A \leq 200,00$	±2,48	±3,45	±1,65	±2,30
	$200,00 < A \leq 250,00$	±2,85	±4,05	±1,90	±2,70
	$250,00 < A \leq 300,00$	±3,23	±4,58	±2,15	±3,05
	$300,00 < A \leq 350,00$	±3,60	±5,18	±2,40	±3,45
	$350,00 < A \leq 400,00$	±3,98	±5,78	±2,65	±3,85
	$400,00 < A \leq 450,00$	±4,35	±6,30	±2,90	±4,20
	$450,00 < A \leq 500,00$	±4,73	±6,90	±3,15	±4,60
	$500,00 < A \leq 550,00$	±5,10	±7,50	±3,40	±5,00
$550,00 < A \leq 800,00$	±5,48	±8,03	±3,65	±5,35	

NOTE The tolerances for the space dimension  $d$  and  $w$  shown in Figure 4 are determined as follows. The tolerance of  $w$  is applied to the dimension  $d$  in column  $D$ . The tolerance of  $d$  is applied to the dimension  $w$  in column  $D$ . Furthermore, when tolerances as described above are smaller than the values in the  $A_1, A_2$  columns of Tables 3 and 4 corresponding to the width  $w$  or depth  $d$ , the values in the  $A_1$  and  $A_2$  columns apply.



**Figure 4 — Sectional dimensions**

**5.2 Length**

If fixed lengths are to be supplied, tolerances on fixed length are as given in [Table 6](#).

**Table 6 — Tolerance on fixed length**

Dimensions in millimetres

Diameter of circumscribing circle	Tolerances on fixed length <i>L</i>				
	$L \leq 2\,000$	$2\,000 < L \leq 5\,000$	$5\,000 < L \leq 10\,000$	$10\,000 < L \leq 15\,000$	$15\,000 < L \leq 25\,000$
$D \leq 100$	+5 0	+7 0	+10 0	+16 0	+22 0
$100 < D \leq 200$	+7 0	+9 0	+12 0	+18 0	+24 0
$200 < D \leq 450$	+8 0	+11 0	+14 0	+20 0	+28 0
$450 < D \leq 800$	+9 0	+14 0	+16 0	+22 0	+30 0

NOTE If no fixed length is specified in the order document, profiles may be delivered in random lengths.

**5.3 Squareness of cut ends**

The squareness of cut ends shall be within half of the fixed-length tolerance range specified in [Table 6](#) for both fixed and random length (e.g. for a fixed-length tolerance of  $+10_0$  mm, the squareness of cut ends shall be within 5 mm).

**6 Tolerances on form**

**6.1 General**

Tolerances on form for O and TX510 tempers shall be subject to agreement between the supplier and the purchaser.

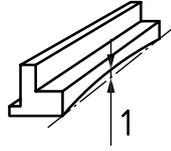
**6.2 Straightness**

Deviations from straightness  $h_s$  and  $h_t$  shall be measured as shown in [Figure 5](#) with the profile placed on a horizontal base-plate so that its own mass decreases the deviation.

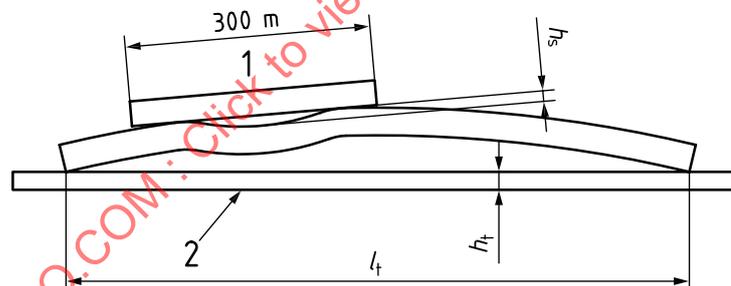
The tolerances on straightness shall be as specified in [Table 7](#).

**Table 7 — Tolerance on straightness**

Dimensions in millimetres

Diameter of circumscribing circle	Minimum wall thickness	Tolerance <sup>a,b</sup>			
					
		Ordinary class		Special class	
		Per any length $300 h_s$	Per whole length $(l_t)^c h_t$	Per any length $300 h_s$	Per whole length $(l_t)^d h_t$
$D \leq 38$	$W \leq 2,4$	2 max.	$6,6 \times \frac{l_t}{1\ 000}$ max.	1,3 max.	$4,3 \times \frac{l_t}{1\ 000}$ max.
	$2,4 < W$	0,6 max.	$2 \times \frac{l_t}{1\ 000}$ max.	0,3 max.	$1,0 \times \frac{l_t}{1\ 000}$ max.
$38 < D \leq 300$					
$300 < D$		0,6 max.	$2 \times \frac{l_t}{1\ 000}$ max.	0,5 max.	$1,6 \times \frac{l_t}{1\ 000}$ max.

<sup>a</sup> Does not apply to temper grade 0.  
<sup>b</sup> Applicable to the values obtained when the shape is laid on a flat table under its own weight so that the camber is minimum.  
<sup>c</sup> Does not apply to the plane with the opening part.



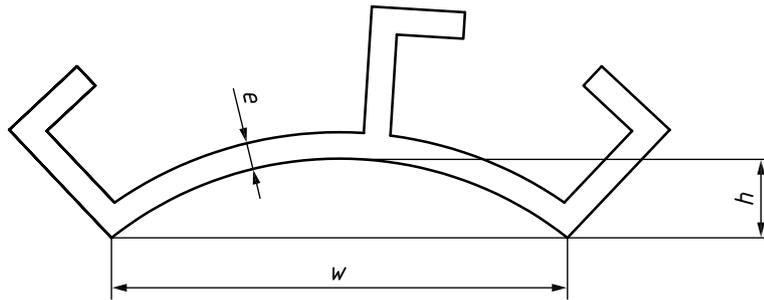
**Key**

- $l_t$  total length
- $h_t$  camber of the total length
- $h_s$  camber at arbitrary position
- 1 ruler
- 2 flat table

**Figure 5 — Straightness**

**6.3 Convexity/concavity**

The convexity/concavity shall be measured as shown in [Figure 6](#). The maximum allowable deviation on convexity/concavity for solid and hollow profiles shall be as specified in [Table 8](#).



**Key**  
 w width  
 h flatness  
 e thickness

**Figure 6 — Flatness**

**Table 8 — Tolerance on flatness**

Dimensions in millimetres

Width <i>W</i>	Tolerance							
	Ordinary class				Special class			
	Solid and hollow shapes				Hollow shapes			
	Minimum thickness at the measurement position							
	5,0 max.				Over 5,0			
	Per any 25 width	Per whole width <i>W</i>	Per any 25 width	Per whole width <i>W</i>	Per any 25 width	Per whole width <i>W</i>	Per any 25 width	Per whole width <i>W</i>
$W \leq 25$		0,20 max.		0,10 max.		0,15 max.		0,10 max.
$25 < W$	0,20 max.	0,008 <i>W</i> max.	0,10 max.	0,004 <i>W</i> max.	0,15 max.	0,006 <i>W</i> max.	0,10 max.	0,004 <i>W</i> max.

NOTE These tolerances do not apply to temper grade O and to the plane with the opening part.

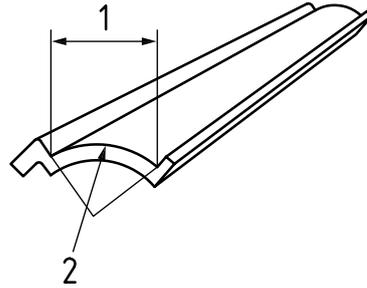
**6.4 Curved cross-section or contour**

The tolerances for the curved cross-section shall be applied only when required by the purchaser. The tolerances for the cross-section may be substituted by the tolerances for the contour profile, in which case the deviation at any point of the curve from the theoretically exact line as defined by the drawing shall not be greater than the appropriate tolerance *t* specified in Table 9 (see Figures 7 and 8).

For the shape with arc length of over 25 mm, the tolerance shall be ±0,13 mm per 25 mm length of the arc, but when the arc length is less than 25 mm, the tolerance shall be ±0,13 mm.

When the centre angle at the curved cross-section is 90° or more, measure it every 90° and its fraction.

NOTE These tolerances do not apply to temper grade O.

**Key**

- 1 arc
- 2 curved cross-section

**Figure 7 — Tolerances for curved cross-section****Table 9 — Tolerance for contour profile**

Dimensions in millimetres

Diameter of circumscribing circle	Tolerance $t$ for contour profile <sup>a</sup> (diameter of allowable circle)
$D \leq 30$	0,30
$30 < D \leq 60$	0,50
$60 < D \leq 90$	0,70
$90 < D \leq 120$	1,0
$120 < D \leq 150$	1,2
$150 < D \leq 200$	1,5
$200 < D \leq 250$	2,0
$250 < D \leq 300$	2,5
$300 < D \leq 400$	3,0
$400 < D \leq 500$	3,5
$500 < D \leq 600$	4,0

<sup>a</sup> The tolerance of the contour profile may be confirmed by the method that the section of shape is placed on the actual-sized projection drawing on which tolerance  $t$  is written in.

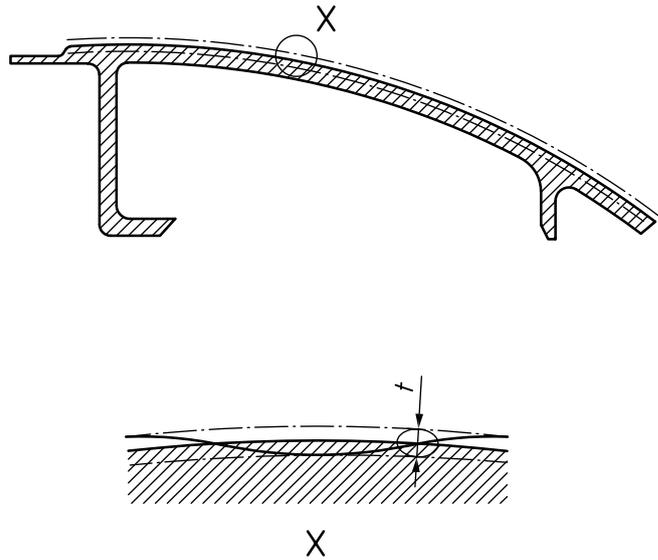


Figure 8 — Arc section

6.5 Twist

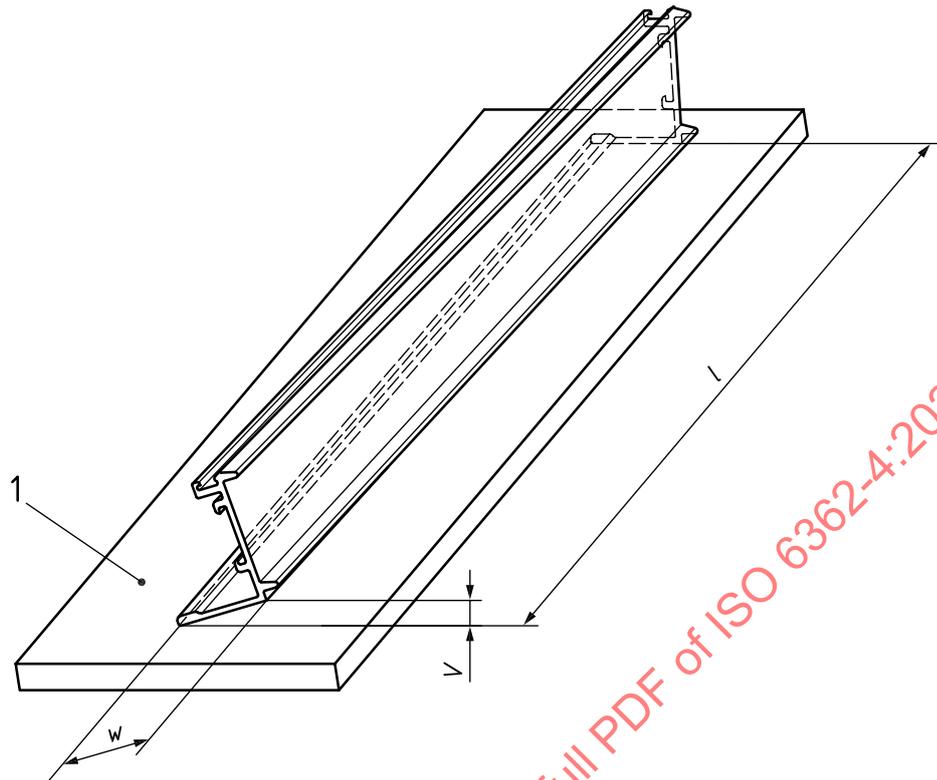
Twist shall be measured as shown in Figure 9 by placing the profile on a flat base-plate, the profile resting under its own mass, and measuring the maximum distance at any point along the length between the bottom surface of the profile and the base-plate surface.

Twist tolerances are specified in Table 10 as a function of the width *W* and the length *l* of the profile.

Table 10 — Tolerance on twist (maximum value)

Dimensions in millimetres

Diameter of circumscribing circle	Tolerance (per width ( <i>W</i> ) 1 mm)			
	Alloy Group I		Alloy Group II	
	Per 1 m length	Maximum per whole length	Per 1 m length	Maximum per whole length
$12,5 < D \leq 40$	0,052	0,122	0,070	0,140
$40 < D \leq 80$	0,026	0,087	0,034	0,105
$80 < D \leq 250$	0,017	0,052	0,026	0,070
$250 < D \leq 800$	0,010	0,040	0,017	0,058

**Key**

- $l$  whole length
- $w$  width
- $V$  twist
- 1 flat table

**Figure 9 — Twist****6.6 Angularity**

The deviation from a specified angle shall be measured as shown in [Figures 10](#) and [11](#).

The angularity tolerances for right angles shall be as specified in [Table 11](#) as a function of profile width  $W$ .

The maximum allowable deviation  $\alpha$  in an angle other than a right angle shall be  $\pm 1^\circ$ .

In the case of unequal side lengths, the tolerance on angularity shall apply to the shorter side of the angle, i.e. it is measured starting from the longer side.

For profiles with a value of  $W$  which exceeds 400 mm, the tolerance shall be subject to agreement between the supplier and purchaser.