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## Wrought aluminium and aluminium alloy extruded rods/bars, tubes and profiles —

### Part 4 :

Extruded profiles — Tolerances on shape and dimensions

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

*ISO 6362-4:1988*

*Partie 4 : Profilés filés — Tolérances sur forme et dimensions*

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6362-4 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*.

[ISO 6362-4:1988](#)

<https://standards.iteh.ai/catalog/standards/sist/18d9c8eb-1909-42e2-84c3-094f60592189/iso-6362-4-1988>

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

# Wrought aluminium and aluminium alloy extruded rods/bars, tubes and profiles –

## Part 4 : Extruded profiles – Tolerances on shape and dimensions

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#### 1 Scope and field of application

This part of ISO 6362 specifies the tolerances on shape and dimensions of extruded profiles of wrought aluminium and aluminium alloys with cross-sectional dimensions given by a circumscribing circle not greater than 600 mm. The shape of the cross-section is based on a drawing agreed upon by the purchaser and the supplier.

It does not apply to

- rolled profiles;
- drawn profiles;
- profiles made from sheet by roll forming;
- extruded or drawn tube;
- extruded or drawn rod and bar.

#### 2 Alloy groups

Tolerances are generally defined by the alloy types, which may be divided into two groups:

**Alloy Group I** (with narrower tolerances) includes alloys with the following designations:

Al 99,5	(1050A)	Al Mg2	(5251)
Al 99,0	(1200)	Al Mg2,5	(5052)
Al 99,0Cu	(1100)	Al MgSi	(6060)
Al Mn1	(3103)	Al Mg0,7Si	(6063)
Al Mn1Cu	(3003)	Al Si1MgMn	(6082)
Al Mg1(B)	(5005)	Al SiMg(A)	(6005A)
Al Mg1,5(C)	(5050)	Al Mg1SiCu	(6061)

**Alloy Group II** (with wider tolerances) includes alloys with the following designations:

Al Mg3	(5754)	Al Cu4MgSi	(2017)
Al Mg3Mn	(5454)	Al Cu4Mg1	(2024)
Al Mg3,5	(5154)	Al Cu4SiMg	(2014)
Al Mg4	(5086)	Al Cu6Mn	(2219)
Al Mg4,5Mn0,7	(5083)	Al Zn4,5Mg1	(7020)
Al Mg5Cr	(5056)	Al Zn5,5MgCu	(7075)
Al Cu2,5Mg	(2117)		

However, in addition to the standard tolerances specified, greater or lesser tolerances may be specified by agreement between purchaser and supplier:

- a) for particular applications, or
- b) for special dimensions.

These deviations from standard shall be stated in the order and indicated on the drawing.

#### 3 Tolerances on shape and dimensions

##### 3.1 Dimensional tolerances

###### 3.1.1 Tolerances on cross-sectional dimensions

The tolerances achieved on the cross-sectional dimensions depend on the type of alloy employed. Profiles from alloys of Alloy Group I may be manufactured to tighter tolerances than those from alloys of Alloy Group II.

The tolerances (plus and minus) of

$A$ : metal dimensions except wall thicknesses in hollow sections,

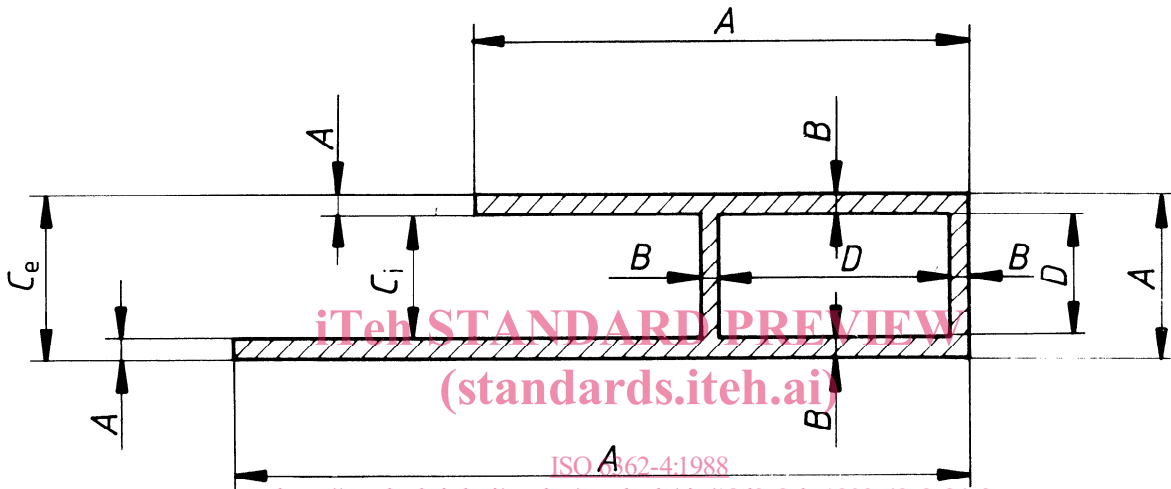
$B$ : wall thicknesses in hollow sections,

$C_e$  or  $C_i$ : space dimensions in open sections,

$D$ : space dimensions in hollow sections,

as shown in figure 1 are given in the appropriate columns of tables 1a and 1b.

NOTE — With angled profiles such as that shown in figure 2a, the tolerances shall not be based on the linear dimensions  $X$ , but on the angular dimensions (see 3.2.5).



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Figure 1

Table 1a — Tolerances on cross-sectional dimensions for profiles with solid and hollow sections<sup>1)</sup>

Values in millimetres

Specified dimension	Allowable deviations (plus and minus) <sup>2)</sup>																				
	Metal dimensions <sup>3) 4)</sup> (75 % or more of the dimension is metal)				Space dimensions (less than 75 % of the dimension is metal) $C_i$ or $C_e$ <sup>5)</sup>																
	Open sections <i>A</i>		Wall thickness of hollow sections <sup>6)</sup> <i>B</i>		Distance <i>a</i> from base																
					< 5		> 5 and < 15		> 15 and < 30		> 30 and < 60		> 60 and < 100		> 100 and < 150		> 150 and < 200				
Alloy Group	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II			
> <	Circumscribing circle sizes < 250																				
— 3,20	0,15	0,23	± 10 % of specified dimension: ± 1,50 max. ± 0,25 min.	± 15 % of specified dimension: ± 2,30 max. ± 0,38 min.	0,15	0,23	0,25	0,33	0,30	0,38	—	—	—	—	—	—	—	—			
3,20 6,30	0,18	0,28			0,18	0,28	0,30	0,41	0,36	0,46	0,41	0,50	—	—	—	—	—	—	—		
6,30 12,50	0,20	0,30			0,20	0,30	0,36	0,46	0,41	0,50	0,46	0,56	0,50	0,60	—	—	—	—	—		
12,50 20,00	0,23	0,36			0,23	0,36	0,41	0,52	0,46	0,58	0,50	0,64	0,56	0,70	—	—	—	—	—		
20,00 25,00	0,25	0,38			0,25	0,38	0,46	0,58	0,50	0,64	0,56	0,70	0,64	0,76	0,76	0,88	—	—	—		
25,00 40,00	0,30	0,46	± 15 % of specified dimension: ± 2,30 max. ± 0,65 min.	± 15 % of specified dimension: ± 2,30 max. ± 0,65 min.	0,30	0,46	0,54	0,68	0,58	0,74	0,66	0,80	0,76	0,92	0,88	1,05	—	—			
40,00 50,00	0,36	0,54			0,36	0,54	0,60	0,78	0,66	0,84	0,78	0,96	0,92	1,10	1,05	1,25	1,25	1,45	1,45		
50,00 100,00	0,60	0,90			0,60	0,90	0,86	1,15	0,96	1,25	1,20	1,50	1,45	1,75	1,70	2,05	2,05	2,35	2,35		
100,00 150,00	0,86	1,30			0,86	1,30	1,10	1,55	1,25	1,70	1,65	2,05	2,00	2,40	2,40	2,80	2,80	3,25	3,25		
150,00 200,00	1,10	1,70			1,10	1,70	1,35	1,95	1,55	2,15	2,10	2,65	2,50	3,05	3,05	3,60	3,55	4,10	4,10		
200,00 250,00	1,35	2,05			1,35	2,05	1,65	2,30	1,90	2,55	2,50	3,25	3,05	3,75	3,70	4,60	4,30	5,00	5,00		
> <	Circumscribing circle sizes > 250 and < 600																				
— 3,20	0,36	0,54			± 15 % of specified dimension: ± 2,30 max. ± 0,65 min.	± 15 % of specified dimension: ± 2,30 max. ± 0,65 min.	0,36	0,54	0,46	0,64	0,50	0,68	—	—	—	—	—	—	—	—	
3,20 6,30	0,38	0,56					0,38	0,56	0,48	0,66	0,56	0,74	0,72	0,88	—	—	—	—	—	—	—
6,30 12,50	0,41	0,60					0,41	0,60	0,50	0,72	0,60	0,80	0,76	0,96	1,25	1,45	—	—	—	—	—
12,50 20,00	0,43	0,64	0,43	0,64			0,56	0,76	0,68	0,88	1,00	1,25	1,50	1,75	—	—	—	—	—		
20,00 25,00	0,46	0,68	0,46	0,68			0,58	0,78	0,76	1,00	1,25	1,45	1,80	2,00	2,30	2,50	—	—	—		
25,00 40,00	0,48	0,72	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 50,00	0,60	0,92	0,60	0,92	0,86	1,15	1,10	1,40	1,80	2,10	2,30	2,60	2,80	3,10	4,30	4,60	—				
50,00 100,00	0,86	1,30	0,86	1,30	1,10	1,55	1,35	1,80	2,05	2,45	2,55	2,95	3,05	3,50	4,55	5,00	—				
100,00 150,00	1,10	1,70	1,10	1,70	1,35	1,95	1,65	2,20	2,30	2,85	2,80	3,35	3,30	3,85	4,85	5,40	—				
150,00 200,00	1,35	2,05	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	—				
200,00 250,00	1,65	2,45	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	—				
250,00 300,00	1,90	2,80	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	—				
300,00 350,00	2,15	3,20	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	—				
350,00 400,00	2,40	3,60	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	—				
400,00 450,00	2,65	3,95	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	—				
450,00 500,00	2,90	4,35	2,90	4,35	3,15	4,60	3,40	4,85	4,05	5,50	4,55	6,00	5,10	6,55	6,60	8,05	—				
500,00 550,00	3,15	4,70	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	—				
550,00 600,00	3,40	5,10	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	—				

1) Tolerances on the dimensions of the spaces in hollow sections are given in table 1b (column D).

2) When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which applies to the mean of the maximum and minimum dimensions permissible under the tolerance.

3) See the note on page 2.

4) These tolerances do not apply to dimensions such as *x* or *z* in figure 2b even when *y* is 75 % or more of *x*. For the tolerance applicable to dimensions *x* and *z*, use the appropriate column under  $C_i$  or  $C_e$ , dependent on the distance *a* from the base.

5) On agreement between purchaser and supplier,  $C_e$  (external dimension) may be specified instead of  $C_i$  (internal dimension).

6) Applies when completely enclosed space is 70 mm<sup>2</sup> or greater; otherwise, column "Open sections" *A* is used.

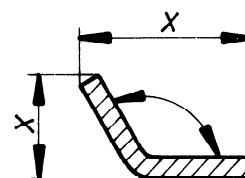


Figure 2a

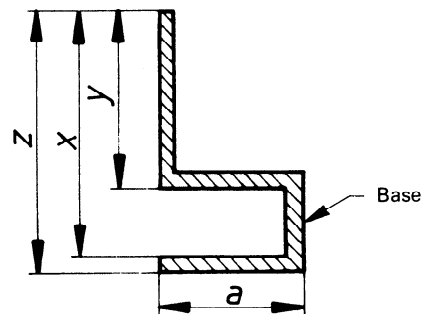


Figure 2b

**Table 1b — Tolerances on space dimensions in hollow sections *D***

Values in millimetres

Specified dimension		Allowable deviations (plus and minus) <i>D</i>	
Over	Up to and including	Alloy Group	
		I	II
Circumscribing circles sizes $\leq 250$			
—	3,20	0,25	0,33
3,20	6,30	0,30	0,41
6,30	12,50	0,36	0,46
12,50	20,00	0,41	0,52
20,00	25,00	0,46	0,58
25,00	40,00	0,54	0,68
40,00	50,00	0,60	0,78
50,00	100,00	0,86	1,15
100,00	150,00	1,10	1,55
150,00	200,00	1,35	1,95
200,00	250,00	1,65	2,30
Circumscribing circle sizes $> 250$ and $\leq 600$			
—	3,20	0,46	0,64
3,20	6,30	0,48	0,66
6,30	12,50	0,50	0,72
12,50	20,00	0,56	0,76
20,00	25,00	0,58	0,78
25,00	40,00	0,80	0,84
40,00	50,00	0,86	1,15
50,00	100,00	1,10	1,55
100,00	150,00	1,35	1,95
150,00	200,00	1,65	2,30
200,00	250,00	1,90	2,70
250,00	300,00	2,15	3,05
300,00	350,00	2,40	3,45
350,00	400,00	2,65	3,85
400,00	450,00	2,90	4,20
450,00	500,00	3,15	4,60
500,00	550,00	3,40	5,00
550,00	600,00	3,65	5,35

NOTE — Tolerances are determined as follows (see figure 2c) :

The tolerance for the width *w* is the value shown in column *D*, bearing in mind that a change in the width *w* will also affect the depth *d*.

The tolerance for the depth *d* is the value shown in column *D*, bearing in mind that a change in the depth *d* will also affect the width *w*.

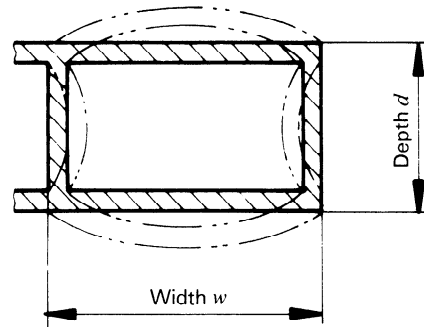


Figure 2c

Example: Alloy Group I, circumscribing circle sizes  $\leq 250$  mm

Dimensions :  $d = 25$  mm,  $w = 40$  mm

Allowable deviations :  $\Delta d = \pm 0,46$  mm,  $\Delta w = \pm 0,54$  mm

The tolerance for either width or depth will always be least between the corners (cf metal dimensions, column *A*, in table 1a).

**Exceptions**

The cross-sectional tolerances of profiles for which the nominal thickness of one wall is three times or more than that of the opposite wall, as shown in figures 3a to 3d, shall not be determined using tables 1a and 1b. In this case, the tolerances shall be as agreed upon between purchaser and supplier.

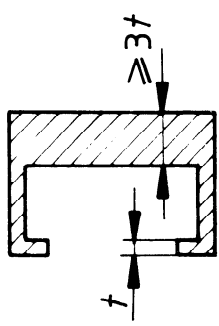


Figure 3a

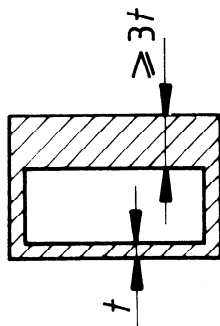


Figure 3b

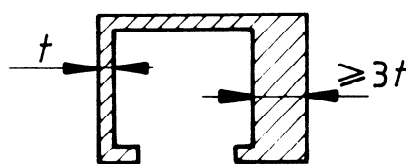


Figure 3c

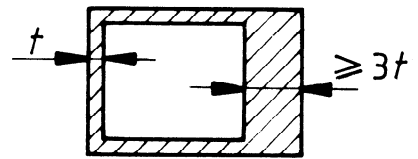


Figure 3d

In the case of profiles with regular hollow sections as exemplified in figure 4, the standard wall thickness tolerance for extruded round tube as given in relevant International Standards is applicable. The void of such profiles shall be round and 25 mm or more in diameter and its mass shall be equally distributed on opposite sides of two or more equally spaced axes.

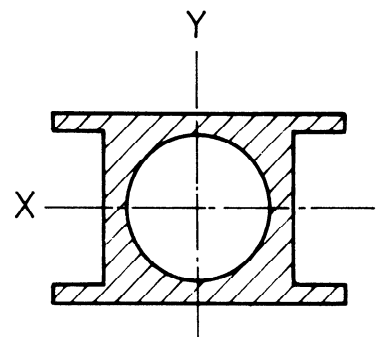


Figure 4

**3.1.2 Length tolerances**

If *fixed lengths* are to be supplied, this shall be stated on the order. The permissible tolerances are given in table 2.

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

**3.1.3 Squareness of cut ends**

The deviation from squareness of cut ends shall not exceed 0,017 mm/mm width (equivalent to a 1° angle). For profiles ordered as fixed lengths, this deviation shall be included in the fixed-length tolerances (table 2).

**3.2 Tolerances on shape**

**3.2.1 Straightness**

Straightness in the longitudinal direction shall be measured by placing the profile on a flat table, the profile resting under its own weight. It shall be specified for the total length  $l_t$  as well as for any segment of 300 mm (see figure 5).

The deviation  $h_t$  from straightness for the length shall not exceed 2 mm/m length.

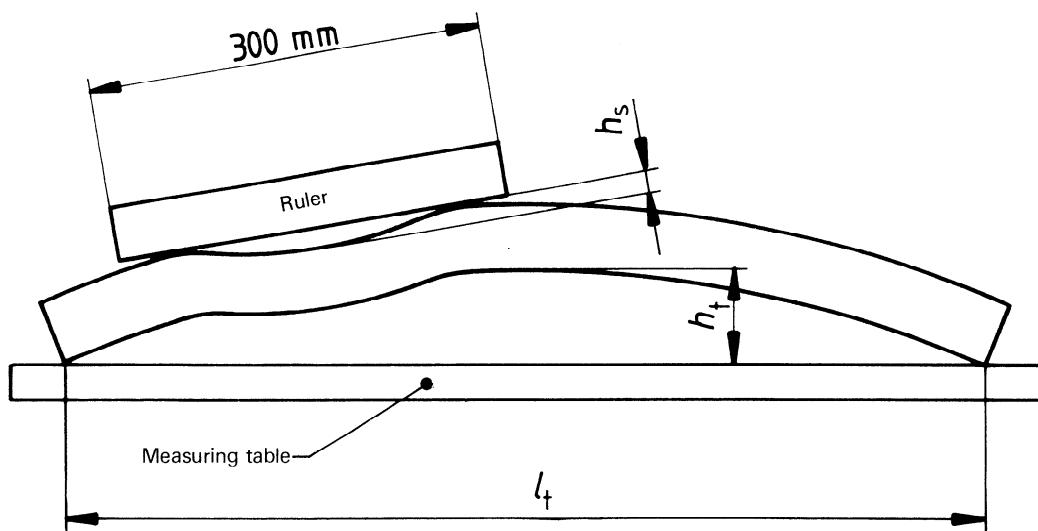
Local deviation  $h_s$  from straightness shall not exceed 0,6 mm/300 mm length.

Straightness tolerances for tempers TX510 shall be subject to agreement between purchaser and supplier.

**Table 2 – Fixed-length tolerances**

Values in millimetres

Circumscribing circle diameter		Specified lengths				
Over	Up to and including	Up to and including 2 000	> 2 000 up to 5 000	> 5 000 up to 10 000	> 10 000 up to 15 000	> 15 000 up to 25 000
—	250	+ 8 0	+ 8 0	+ 12 0	+ 16 0	+ 30 0
250	450	+ 10 0	+ 12 0	+ 16 0	+ 20 0	+ 40 0
450	600	+ 12 0	+ 12 0	+ 16 0	+ 20 0	+ 40 0



**Figure 5**

3.2.2 Flatness

The maximum allowable deviation from flatness of profiles with open and hollow sections is given in table 3 as a function of profile width and thickness (see figure 6).

Table 3 – Flatness tolerances

Values in millimetres

Width $w$		Deviation $h$		
		Hollow sections		Open sections
Over	Up to and including	$e < 5$	$e > 5$	
—	50	0,30	0,20	0,20
50	100	0,60	0,40	0,40
100	150	0,90	0,60	0,60
150	200	1,2	0,80	0,80
200	300	1,8	1,2	1,2
300	400	2,4	1,6	1,6
400	500	3,0	2,0	2,0
500	600	3,6	2,4	2,4

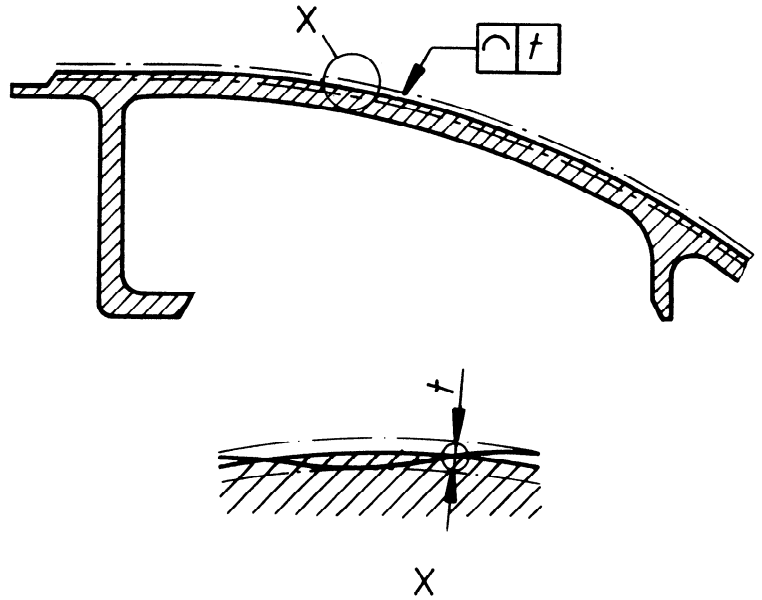


Figure 7

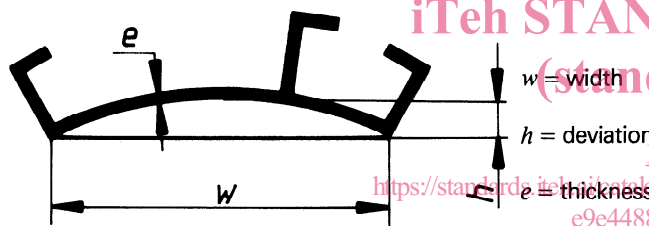


Figure 6

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Table 4 – Permissible contour tolerances

Values in millimetres

Diameter of circumscribing circle		Maximum contour tolerance = Diameter $t$ of the tolerance circle
Over	Up to and including	
—	30	0,30
30	60	0,50
60	90	0,70
90	120	1,0
120	150	1,2
150	200	1,5
200	250	2,0
250	300	2,5
300	400	3,0
400	500	3,5
500	600	4,0

NOTE — Contour tolerances may be checked by placing a section of the profile on a 1 : 1 scale projection of the drawing with the maximum contour tolerance  $t$  indicated on the drawing. Another recommended method is the use of suitable templates (min./max.).

3.2.3 Tolerances for curved cross-sections (contour tolerances)

For profiles with curved cross-sections, the deviation, at any point on the curve, from the theoretically exact line as defined by the drawing shall not be greater than the appropriate tolerance  $t$  given in table 4. Considering all points on the curve, a tolerance zone can be defined, this zone lying between the two envelopes running tangential to all the tolerance circles of diameter  $t$  which can be drawn with their centres lying along the theoretically exact line (see figure 7).



**3.2.4 Twist**

Twist tolerances are applicable to lengths of up to 8 m. Lengths greater than 8 m shall be subject to agreement between purchaser and supplier. Twist  $v$  shall be measured by placing the profile on a flat table, the profile resting under its own weight, and measuring

the maximum distance at any point along the length between the bottom surface of the profile and the flat table surface (see figure 8). From this measurement, the deviation from straightness is subtracted. The remainder is twist. Tolerances are given as a function of the circumscribing circle in table 5 in millimetres per millimetre width  $w$  and metre length  $l$  of the profile.

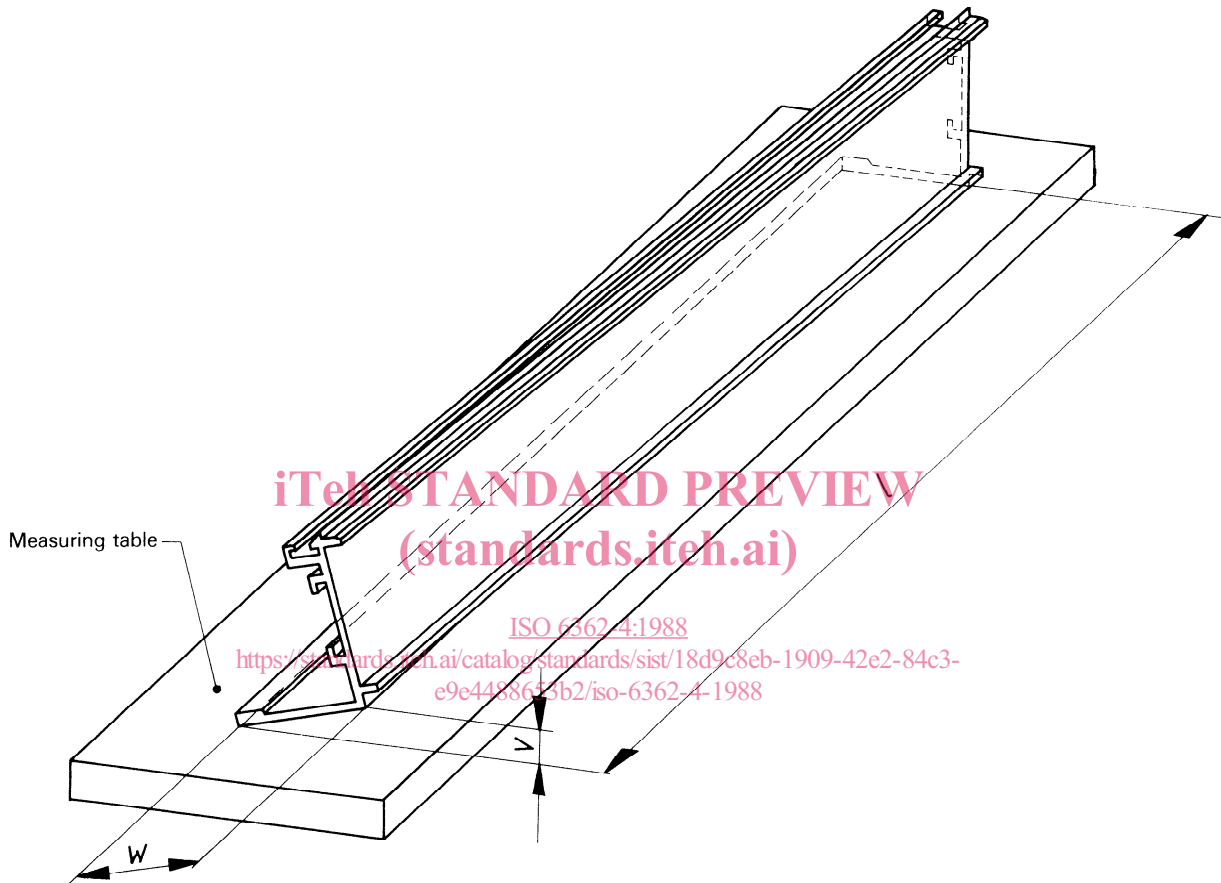


Figure 8

Table 5 – Twist tolerances

Diameter of circumscribing circle mm		Tolerance, mm per millimetre of width			
		Alloy Group I		Alloy Group II <sup>1)</sup>	
Over	Up to and including	per metre of length	in total length, no more than	per metre of length	in total length, no more than
12,5	40	0,052	0,122	0,070	0,140
40	80	0,026	0,087	0,034	0,105
80	250	0,017	0,052	0,026	0,070
250	600	0,010	0,040	0,017	0,058

1) And all materials with a controlled stretch for stress relief. Tempers TX510 are excluded and tolerances for these shall be agreed upon between purchaser and supplier.