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

Part 6:

**Round, square, rectangular and  
hexagonal tubes — Tolerances on shape  
and dimensions**

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

ISO 6362-6:2012

*Partie 6: Tubes ronds, carrés, rectangulaires et hexagonaux —  
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.

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 6362-6 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

ISO 6362 consists of the following parts, under the general title *Wrought aluminium and aluminium alloys — Extruded rods/bars, tubes and profiles*:

- Part 1: *Technical conditions for inspection and delivery*
- Part 2: *Mechanical properties*
- Part 3: *Extruded rectangular bars — Tolerances on shape and dimensions*
- Part 4: *Profiles — Tolerances on shape and dimensions*
- Part 5: *Round, square and hexagonal bars — Tolerances on shape and dimensions*
- Part 6: *Round, square, rectangular and hexagonal tubes — Tolerances on shape and dimensions*
- Part 7: *Chemical composition*

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

## Part 6: Round, square, rectangular and hexagonal tubes — Tolerances on shape and dimensions

### 1 Scope

This part of ISO 6362 specifies the tolerances on dimensions and shape of wrought aluminium and aluminium alloy extruded round bars having diameters in the range from 8 mm up to 350 mm; and square and hexagonal bars having widths across flats in the range from 10 mm up to 220 mm.

It applies to extruded round, square and hexagonal bars.

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

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### 3 Terms and definitions

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

### 4 Materials

For the purposes of this part of ISO 6362, wrought aluminium and aluminium alloys are divided into two groups, which correspond to varying difficulty when manufacturing the products.

The division into group I and group II of the most commonly used general engineering alloys is specified in Table 1 (for seamless tube) and Table 2 (for porthole tube). Grouping of other alloys is subject to agreement between the purchaser and supplier.

**Table 1 — Alloy group A (for seamless tube)**

<b>Group I</b>	1070, 1050, 1050A, 1350, 1100, 1200 3102, 3003, 3103, 3203 5005, 5005A, 5051A 6101, 6101A, 6101B, 6005, 6005A, 6005C, 6008, 6014, 6060, 6360, 6063, 6063A, 6463
<b>Group II</b>	2007, 2011, 2011A, 2014, 2014A, 2017, 2017A, 2024, 2030 5019, 5049, 5051, 5251, 5052, 5154, 5154A, 5454, 5754, 5056, 5083, 5086 6110A, 6012, 6018, 6351, 6061, 6261, 6262, 6081, 6082 7003, 7204, 7005, 7108, 7108A, 7020, 7021, 7022, 7049A, 7050, 7075
NOTE The four-digit numbers listed are taken from the Registration of International Alloy Designations and Chemical Composition Limits for Wrought Aluminium Alloys, published by the Aluminum Association, 1525 Wilson Boulevard, Suite 600, Arlington, VA 22209, USA (known as "Teal Sheets").	

**Table 2 — Alloy group B (for porthole tube)**

<b>Group I</b>	1070, 1050, 1050A, 1350, 1100, 1200 3102, 3003, 3103, 3203 5005, 5005A 6101, 6101A, 6101B, 6005, 6005A, 6005C, 6008, 6014, 6060, 6360, 6063, 6063A, 6463
<b>Group II</b>	5051, 5049, 5251, 5052 6110A, 6012, 6018, 6351, 6061, 6261, 6262, 6081, 6082 7003, 7005, 7108, 7108A, 7020
NOTE The four-digit numbers listed are taken from the Registration of International Alloy Designations and Chemical Composition Limits for Wrought Aluminium Alloys, published by the Aluminum Association, 1525 Wilson Boulevard, Suite 600, Arlington, VA 22209, USA (known as "Teal Sheets").	

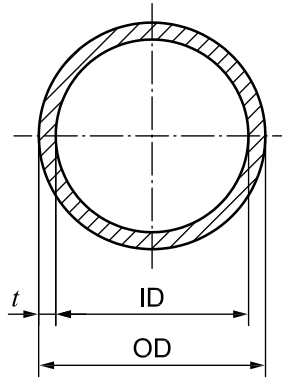
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## 5 Tolerances on dimensions

### 5.1 General

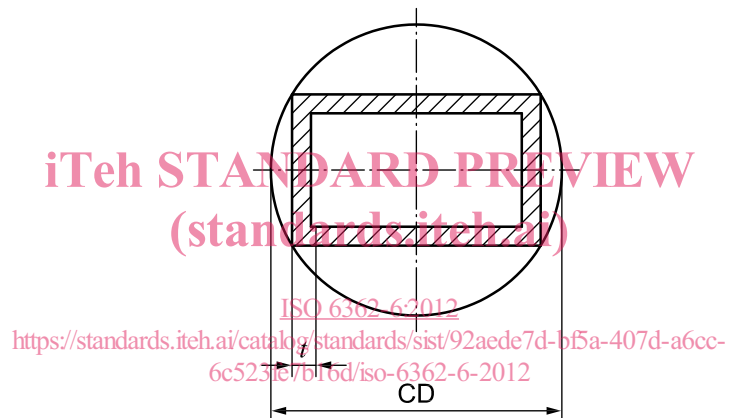
When outside diameter OD, inside diameter ID, and wall thickness  $t$ , are all specified, standard tolerances shall apply to any two of these dimensions, but not to all three. As a result, the purchaser shall only state two nominal dimensions on any given order.

For round tubes see Figure 1. For any tubes that are other than round, see Figure 2.

**Key**

ID inside diameter

OD outside diameter

**Figure 1 — Round tube****Key**

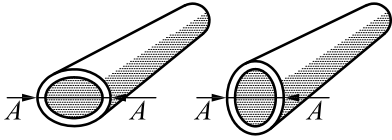
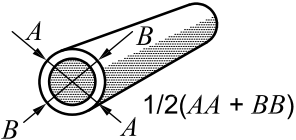
CD circumscribed diameter

**Figure 2 — Circumscribing circle for tubes that are other than round****5.2 Tolerances on diameter for round tube**

Tolerances on diameter for round tube shall be in accordance with Table 3.

Table 3 — Tolerances on diameter for round tube

Dimensions in millimetres

Diameter OD or ID	Tolerance on diameter for round tube			
	Maximum allowable deviation of diameter at any point from specified diameter <sup>a</sup>		Maximum allowable deviation of mean diameter from specified diameter <sup>b</sup>	
				
	Alloy group I <sup>c</sup>	Alloy group II <sup>c</sup>	Alloy group I <sup>c</sup>	Alloy group II <sup>c</sup>
13 < OD or ID ≤ 25	± 0,51	± 0,76	± 0,25	± 0,38
25 < OD or ID ≤ 50	± 0,64	± 0,97	± 0,30	± 0,40
50 < OD or ID ≤ 100	± 0,76	± 1,14	± 0,38	± 0,58
100 < OD or ID ≤ 150	± 1,27	± 1,91	± 0,64	± 0,97
150 < OD or ID ≤ 200	± 1,91	± 2,87	± 0,89	± 1,35
200 < OD or ID ≤ 250	± 2,54	± 3,81	± 1,14	± 1,73
250 < OD or ID ≤ 300	± 3,18	± 4,78	± 1,40	± 2,11
300 < OD or ID ≤ 350	± 3,81	± 5,72	± 1,65	± 2,49
350 < OD or ID ≤ 400	± 4,45	± 6,68	± 1,91	± 2,87
400 < OD or ID ≤ 450	± 5,08	± 7,62	± 2,16	± 3,25

When the tolerance is specified only for either the plus or the minus side, the values in this table shall be doubled.  
Tolerances on dimensions exceeding the specified range shall be agreed upon between the purchaser and the supplier.

<sup>a</sup> These values are not applied to the tubes of temper grade O, coiled tubes and tubes with wall thickness less than 2,5 % of the specified outside diameter.  
<sup>b</sup> The mean diameter is defined as the average value of measurements made at two arbitrary points at right angles to each other.  
<sup>c</sup> Refer to Table 1.

5.3 Tolerances on width, depth or width across flats — Squares, rectangles, hexagons

5.3.1 Seamless tube

The tolerances on width, depth or width across flats for seamless tubes that are other than round are specified in Table 4.



Table 4 — Tolerances on width, depth or width across flats for seamless tubes that are other than round

Dimensions in millimetres

Width, depth or width across flats $W$	Tolerances on width, depth or width across flats for seamless tubes that are other than round <sup>a,b</sup>							
	CD ≤ 100		100 < CD ≤ 200		200 < CD ≤ 300		300 < CD ≤ 350	
	Alloy group <sup>c</sup>							
	I	II	I	II	I	II	I	II
$W \leq 10$	± 0,25	± 0,40	± 0,30	± 0,50	± 0,35	± 0,55	± 0,40	± 0,60
$10 < W \leq 25$	± 0,30	± 0,50	± 0,40	± 0,70	± 0,50	± 0,80	± 0,60	± 0,90
$25 < W \leq 50$	± 0,50	± 0,80	± 0,60	± 0,90	± 0,80	± 1,00	± 0,90	± 1,20
$50 < W \leq 100$	± 0,70	± 1,00	± 0,90	± 1,20	± 1,10	± 1,30	± 1,30	± 1,60
$50 < W \leq 150$	-	-	± 1,10	± 1,50	± 1,30	± 1,70	± 1,50	± 1,80
$150 < W \leq 200$	-	-	± 1,30	± 1,90	± 1,50	± 2,20	± 1,80	± 2,40
$200 < W \leq 300$	-	-	-	-	± 1,70	± 2,50	± 2,10	± 2,80
$300 < W \leq 350$	-	-	-	-	-	-	± 2,80	± 3,50

<sup>a</sup> Not applicable to tubes having a wall thickness less than 2,5 % of the specified outside width, depth or width across flats. The tolerance for tubes with wall thickness less than 2,5 % of the specified width, depth or width across flats shall be determined by multiplying the applicable tolerance as follows:

- wall thickness over 2,0 % up to and including 2,5 % of outside parameter: 1,5 × tolerance;
- wall thickness over 1,5 % up to and including 2,0 % of outside parameter: 2,0 × tolerance;
- wall thickness over 1,0 % up to and including 1,5 % of outside parameter: 3,0 × tolerance;
- wall thickness over 0,5 % up to and including 1,0 % of outside parameter: 4,0 × tolerance.

<sup>b</sup> These tolerances do not apply to tempers O and Tx510. For these tempers, the tolerances shall be subject to agreement between the supplier and purchaser.

<sup>c</sup> Refer to Table 1.

### 5.3.2 Porthole tube

The tolerances on width, depth or width across flats for porthole tubes that are other than round are specified in Table 5.

**Table 5 — Tolerances on width, depth or width across flats for porthole tubes that are other than round**

Dimensions in millimetres

Width, depth or width across flats <i>W</i>	Tolerances on width, depth or width across flats for porthole tubes that are other than round <sup>a,b</sup>							
	CD ≤ 100		100 < CD ≤ 200		200 < CD ≤ 300		300 < CD ≤ 350	
	Alloy group <sup>c</sup>							
	I	II	I	II	I	II	I	II
$W \leq 10$	± 0,25	± 0,40	± 0,30	± 0,50	± 0,35	± 0,55	± 0,40	± 0,60
$10 < W \leq 25$	± 0,30	± 0,50	± 0,40	± 0,70	± 0,50	± 0,80	± 0,60	± 0,90
$25 < W \leq 50$	± 0,50	± 0,80	± 0,60	± 0,90	± 0,80	± 1,00	± 0,90	± 1,20
$50 < W \leq 100$	± 0,70	± 1,00	± 0,90	± 1,20	± 1,10	± 1,30	± 1,30	± 1,60
$50 < W \leq 150$	-	-	± 1,10	± 1,50	± 1,30	± 1,70	± 1,50	± 1,80
$150 < W \leq 200$	-	-	± 1,30	± 1,90	± 1,50	± 2,20	± 1,80	± 2,40
$200 < W \leq 300$	-	-	-	-	± 1,70	± 2,50	± 2,10	± 2,80
$300 < W \leq 350$	-	-	-	-	-	-	± 2,80	± 3,50

<sup>a</sup> Not applicable to tubes having a wall thickness less than 2,5 % of the specified outside width, depth or width across flats. The tolerance for tubes with wall thickness less than 2,5 % of the specified width, depth or width across flats shall be determined by multiplying the applicable tolerance as follows:

- wall thickness over 2,0 % up to and including 2,5 % of outside parameter: 1,5 × tolerance;
- wall thickness over 1,5 % up to and including 2,0 % of outside parameter: 2,0 × tolerance;
- wall thickness over 1,0 % up to and including 1,5 % of outside parameter: 3,0 × tolerance;
- wall thickness over 0,5 % up to and including 1,0 % of outside parameter: 4,0 × tolerance.

<sup>b</sup> These tolerances do not apply to tempers O and Tx510. For these tempers, the tolerances shall be subject to agreement between the supplier and purchaser.

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<sup>c</sup> Refer to Table 2.

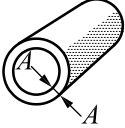
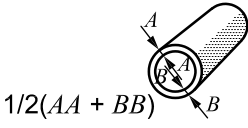
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#### 5.4 Tolerances on wall thickness for round tube

The tolerances on wall thickness for round tubes are specified in Table 6.

Table 6 — Tolerances on wall thickness for round tubes

Dimensions in millimetres

Wall thickness <sup>a</sup> <i>t</i>	Tolerance on wall thickness for round tubes								
	Maximum allowable deviation of wall thickness at any point from specified wall thickness	Maximum allowable deviation of mean wall thickness from specified wall thickness <sup>b</sup>							
		 							
	Outside diameter OD								
OD ≤ 30		30 < OD ≤ 75		75 < OD ≤ 125		125 < OD			
Alloy group <sup>c</sup>									
		I	II	I	II	I	II		
$t \leq 1$	±10 % of the mean wall thickness Max. ± 1,52 Min. ± 0,25	± 0,15	-	-	-	-	-	-	
$1 < t \leq 1,5$		± 0,18	-	± 0,20	-	± 0,20	-	± 0,25	-
$1,5 < t \leq 2$		± 0,20	-	± 0,20	-	± 0,23	-	± 0,30	-
$2 < t \leq 3$		± 0,23	-	± 0,23	-	± 0,25	-	± 0,38	-
$3 < t \leq 6$		± 0,23	± 0,36	± 0,23	± 0,36	± 0,33	± 0,51	± 0,51	± 0,76
$6 < t \leq 10$		± 0,28	± 0,43	± 0,28	± 0,43	± 0,41	± 0,61	± 0,64	± 0,97
$10 < t \leq 12$		-	-	± 0,38	± 0,58	± 0,53	± 0,81	± 0,89	± 1,35
$12 < t \leq 20$		-	-	± 0,51	± 0,76	± 0,71	± 1,07	± 1,14	± 1,73
$20 < t \leq 25$		-	-	-	-	± 0,89	± 1,35	± 1,40	± 2,11
$25 < t \leq 38$		-	-	-	-	± 1,14	± 1,73	± 1,65	± 2,49
$38 < t \leq 50$		-	-	-	-	-	-	± 1,91	± 2,87
$50 < t \leq 60$		-	-	-	-	-	-	± 2,16	± 3,25
$60 < t \leq 75$		-	-	-	-	-	-	± 2,41	± 3,63
$75 < t \leq 90$		-	-	-	-	-	-	± 2,67	± 4,01
$90 < t \leq 100$	-	-	-	-	-	-	± 2,92	± 4,39	
When the tolerance is specified only for either the plus or the minus side, the values in Table 6 shall be doubled.									
Tolerances on dimensions exceeding the specified range shall be agreed upon between the purchaser and supplier.									
<sup>a</sup> In the case where the outside diameter and inside diameter of tube are specified, apply the tolerance value specified in the second column "Maximum allowable deviation of wall thickness at any point from specified wall thickness", taking the mean wall thickness as the wall thickness. <sup>b</sup> The mean wall thickness is defined as the average value of measurements made at two arbitrary positions facing each other with the pipe axis between them. <sup>c</sup> Refer to Table 1.									

5.5 Tolerances on wall thickness for tubes that are other than round

5.5.1 Seamless tube

The tolerances on wall thickness for seamless tubes that are other than round are specified in Table 7.