INTERNATIONAL STANDARD

ISO 6363-6

First edition
2012-07-15

Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires —

Part 6: Drawn round tubes — Tolerances on form and dimensions

Aluminium et alliages d'aluminium corroyés — Barres, tubes et fils étirés à froid —

Partie 6: Tubes ronds étirés — Tolérances sur forme et dimensions

Reference number
ISO 6363-6:2012(E)

COPYRIGHT PROTECTED DOCUMENT

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

Published in Switzerland

Contents

Page

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 6363-6 was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 6, *Wrought aluminium and aluminium alloys*.

ISO 6363 consists of the following parts, under the general title *Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires*:

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

— *Part 2: Mechanical properties*

— *Part 3: Drawn round bars and wires — Tolerances on form and dimensions (symmetric plus and minus tolerances on diameter)*

— *Part 4: Drawn rectangular bars and wires — Tolerances on form and dimensions*

— *Part 5: Drawn square and hexagonal bars and wires — Tolerances on form and dimensions*

— *Part 6: Drawn round tubes — Tolerances on form and dimensions*

Wrought aluminium and aluminium alloys — Cold-drawn rods/ bars, tubes and wires —

Part 6: Drawn round tubes — Tolerances on form and dimensions

1 Scope

This part of ISO 6363 specifies the tolerances on form and dimensions of wrought aluminium and aluminium alloy drawn round tubes (seamless and porthole).

This part of ISO 6363 applies to cold-drawn round tubes.

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 6363-1, *Wrought aluminium and aluminium alloys — Cold-drawn rods/bars, tubes and wires — 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 6363-1 apply.

4 Materials

For the purposes of this part of ISO 6363, wrought aluminium and aluminium alloys are divided into two groups, which correspond to varying difficulty whenever manufacturing the products.

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

Table 1 — Alloy group

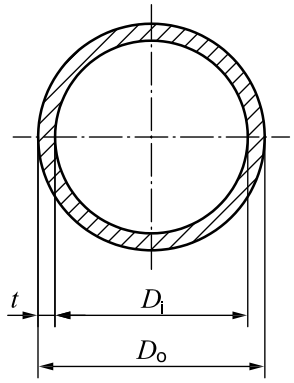
Group I	1050, 1050A, 1070, 1100, 1200, 1350 3003, 3102, 3103, 3203 5005, 5005A, 5019, 5049, 5050, 5051, 5051A, 5052, 5056, 5083, 5086, 5154, 5154A, 5251, 5754
Group II	2007, 2011, 2011A, 2014, 2014A, 2017, 2017A, 2024, 2030 6018, 6056, 6060, 6061, 6063, 6063A, 6081, 6082, 6181, 6261, 6262, 6463 7003, 7005, 7020, 7021, 7022, 7049A, 7050, 7075, 7108, 7108A, 7204
NOTE The four-digit numbers listed are taken from the Registration of International Alloy Designations and Chemical Composition Limits for Wrought Aluminium Alloys (also known as “Teal sheets”)[1] (published by the Aluminum Association, USA).	

5 Tolerances on dimensions

5.1 General

Whenever outside diameter, D_o, inside diameter, D_i, 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 outside diameter, inside diameter and wall thickness, t, see Figure 1.



Key

D_i inside diameter (ID)

D_o outside diameter (OD)

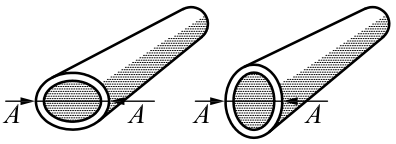
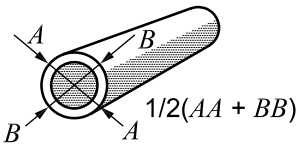
Figure 1 — Round tube

5.2 Diameter — Round tube

Tolerances on diameter for round tubes shall be in accordance with Table 2.

Table 2 — Tolerances on diameter for round tubes

Dimensions in millimetres

Diameter (OD or ID)	Tolerance on diameter for round tubes		
	Maximum allowable deviation of diameter at any point from specified diameter[a]		Maximum allowable deviation of mean diameter from specified diameter[b]
			
	Alloy group I[c]	Alloy group II[c]	Alloy groups I and II[c]
4 ≤ OD or ID ≤ 12	±0,08	±0,15	±0,08
12 < OD or ID ≤ 25	±0,10	±0,20	±0,10
25 < OD or ID ≤ 50	±0,13	±0,25	±0,13
50 < OD or ID ≤ 75	±0,15	±0,30	±0,15
75 < OD or ID ≤ 125	±0,20	±0,41	±0,20
125 < OD or ID ≤ 150	±0,25	±0,51	±0,25
150 < OD or ID ≤ 200	±0,38	±0,76	±0,38
200 < OD or ID ≤ 250	±0,51	±1,0	±0,51
250 < OD or ID ≤ 300	±0,64	±1,3	±0,64
300 < OD or ID ≤ 320	±0,76	±1,5	±0,76

Whenever 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.

[a] These values are not applied to the tubes of temper grade O, coiled tubes and tubes with wall thickness less than 2,5 % of specified outside diameter.

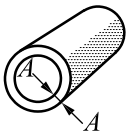
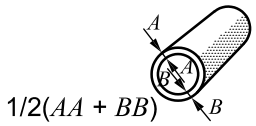
[b] The mean diameter is defined as the average value of measurements carried out at two arbitrary points at right angles to each other.

[c] See Table 1.

5.3 Wall thickness — Round tube

The tolerances on wall thickness variation shall be in accordance with Table 3.

Table 3 — Tolerances on wall thickness of cold-drawn tubes

Wall thickness[a] t	Tolerance		
	Maximum allowable deviation of wall thickness at any point from specified wall thickness		Maximum allowable deviation of mean wall thickness from specified wall thickness[b]
			
	Alloy group I[c]	Alloy group II[c]	Alloy groups I and II[c]
$0,3 \leq t \leq 0,8$	±0,05	±10 % of specified wall thickness, but with ±0,08 as minimum	±0,05
$0,8 < t \leq 1,2$	±0,08		±0,08
$1,2 < t \leq 2$	±0,10		±0,10
$2 < t \leq 3$	±0,15		±0,13
$3 < t \leq 5$	±0,20		±0,15
$5 < t \leq 7$	±0,30		±0,20
$7 < t \leq 9$	±0,51		±0,38
$9 < t \leq 12$	±0,76		±0,51
$12 < t \leq 15$	±1,0		±0,64
$15 < t \leq 19$	±1,3		±0,76
$19 < t \leq 20$	±1,5		±0,89

Whenever 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.

[a] In the case where the outside diameter and inside diameter of tube are specified, apply the tolerance value specified in the column "Maximum allowable deviation of wall thickness at any point from specified wall thickness", taking mean wall thickness as the wall thickness.

[b] The mean wall thickness is defined as the average value of measurements carried out at two arbitrary positions facing each other with the pipe axis between them.

5.4 Fixed-length tolerances

Tolerances on fixed length shall be in accordance with Table 4.

Table 4 — Tolerances on fixed length

Dimensions in millimetres

Outside diameter OD	Tolerance on fixed lengths L		
	$L \leq$ 3 500	3 500 < $L \leq$ 9 000	9 000 < $L \leq$ 15 000
OD ≤ 6	$^{+7}_{0}$	$^{+10}_{0}$	$^{+13}_{0}$
6 < OD ≤ 75	$^{+4}_{0}$	$^{+7}_{0}$	$^{+10}_{0}$
75 < OD ≤ 150	$^{+5}_{0}$	$^{+8}_{0}$	$^{+11}_{0}$
Tolerances on dimensions exceeding the range of specified dimensions shall be agreed upon between the purchaser and the supplier.			

5.5 Squareness of cut ends

The squareness of cut ends shall be within half of the fixed-length tolerance range specified in Table 4 for both fixed and random lengths. For example 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

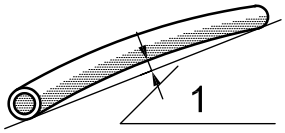
Tolerances on form for O temper shall be subject to agreement between the purchaser and supplier.

6.2 Straightness

The straightness tolerance of round tubes is specified in Table 5.

Table 5 — Tolerances on straightness of round tube

Dimensions in millimetres

Outside diameter OD	Tolerances on straightness of round tube[a]	
	 **Key** 1 straightness	
	Maximum allowable deviation of straightness for any 300 mm length	Maximum allowable deviation of straightness for total length L[b]
OD ≤ 9	13	$13 \times \frac{L}{300}$
9 < OD ≤ 150	0,3	$0{,}3 \times \frac{L}{300}$
Tolerance on dimensions exceeding the range of specified dimensions shall be agreed upon between the purchaser and supplier.		
[a] These are values obtained by placing the tube on a flat surface, so that the weight of the tube minimizes the deviation. These values do not apply to temper grade O. [b] Whenever the total length of tube does not constitute an integral multiple of 300 mm, the tolerance is determined by rounding up fractions to a unit for every 300 mm.		

Bibliography

[1] *Registration of International Alloy Designations and Chemical Composition Limits for Wrought Aluminium Alloys* (also known as “Teal sheets”). The Aluminum Association, Arlington, VA. Available at: http://www.aluminum.org/tealsheets

ICS 23.040.15; 77.150.10

Price based on 7 pages