
**Continuously hot-rolled stainless steel
strip, plate/sheet and cut lengths —
Tolerances on dimensions and form**

*Bandes, tôles et feuillards coupés à longueur en acier inoxydable laminés
à chaud en continu — Tolérances sur les dimensions et la forme*

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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.ch
Web www.iso.ch

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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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9444 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 4, *Heat treatable and alloy steels*.

This second edition cancels and replaces the first edition (ISO 9444:1990) as well as ISO 9446:1990 the contents of which have been combined and technically revised.

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Continuously hot-rolled stainless steel strip, plate/sheet and cut lengths — Tolerances on dimensions and form

1 Scope

1.1 This International Standard specifies the tolerances on dimensions and form for continuously hot-rolled stainless steel narrow strip in actual widths of less than 600 mm. It also applies to cut lengths taken from such strip.

1.2 This International Standard also specifies the tolerances on dimensions and form for continuously hot-rolled stainless steel wide strip in actual widths from 600 mm to 2 500 mm and for plate/sheet cut from such strip.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6929:1987, *Steel products — Definitions and classification*

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3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.

3.1

hot-rolled sheet/plate

flat rolled product, the edges being allowed to deform freely, supplied flat and generally square or rectangular, but also in any other shape, e.g. circular or according to the design sketch; the edges are as-rolled or sheared or flame-cut or chamfered

NOTE The product may also be delivered precurved.

Hot-rolled sheet/plate may be produced:

- a) directly rolled on a reversing mill, or by cutting from a parent plate rolled on a reversing mill;
- b) by cutting from hot-rolled strip rolled on a continuous mill.

Reversing-mill plate is known generally as “quarto-plate”.

Continuous-mill sheet/plate is known generally as “hot-rolled sheet/plate”.

Where further subdivision is required to be made on the basis of thickness for statistical purposes, the following is recommended:

- 1) **sheet**: thickness less than 3 mm (except electrical sheet);
- 2) **plate**: thickness equal to or greater than 3 mm.

[ISO 6929:1987, definition 6.2.6.2.2.2]

3.2

hot-rolled strip

hot-rolled flat product which immediately after the final rolling pass or after pickling or annealing is wound into laps so as to form a coil

NOTE Hot-rolled strip as-rolled has slightly convex edges, but it may also be supplied with sheared edges or be obtained by slitting wider hot-rolled strip.

[ISO 6929:1987, definition 6.2.6.2.2.3.1]

According to its actual width, including hot-rolled slit strips irrespective of the rolling width, hot-rolled strip is classified as:

- a) **hot-rolled wide strip:** strip of a width equal to or greater than 600 mm;
- b) **hot-rolled narrow strip:** strip of a width less than 600 mm.

After decoiling and cutting to length, hot-rolled narrow strip may be supplied as cut lengths.

4 Information to be supplied by the purchaser

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for products under this specification. Such requirements to be considered include, in the order listed, but not limited to, the following:

- a) the type of delivery [see 5.2 a) to d)];
- b) the number of this International Standard, i.e. ISO 9444;
- c) the thickness, in millimetres, (if necessary accurate to two decimal places);
- d) for hot-rolled narrow strip and cut lengths whether normal tolerances (see Table 1) or fine tolerances (F) (see Table 2) of thickness are required;
- e) the width, in millimetres;
- f) the condition of the edges (M = mill edges, T = trimmed edges);
- g) for narrow strip and wide strip [see 5.2 a) and b)], the condition of the ends [R = mill (rolled) ends, C = cropped ends];
- h) for plate/sheet and cut lengths, the length in millimetres.

EXAMPLE 1 Hot-rolled narrow strip in accordance with this International Standard, with a specified thickness of 2,5 mm, a specified width of 500 mm, with mill edges (M) and cropped ends (C):

Hot rolled narrow strip ISO 9444-2,5 × 500M-C

EXAMPLE 2 Sheet in accordance with this International Standard, with a specified thickness of 2,0 mm, a specified width of 1 200 mm, with trimmed edges (T) and a specified length of 2 500 mm:

Sheet ISO 9444-2,0 × 1200T × 2500

4.2 In the absence of information in the order concerning special requirements for tolerances on dimension and shape [see 4.1 c) to h)], hot-rolled products covered by this International Standard shall be delivered according to the basic specifications of this International Standard, i.e. with normal tolerances and/or in the usual delivery condition.

5 Type of delivery and delivery condition

5.1 General

In the absence of agreements at the time of enquiry and order concerning special requirements for the delivery condition given in 5.3, flat products covered by this International Standard shall be delivered according to the basic specifications of this International Standard.

5.2 Type of delivery

Flat products according to this International Standard can be supplied as:

- a) hot-rolled narrow strip (strip in actual widths less than 600 mm);
- b) hot-rolled wide strip (strip in actual widths from 600 mm to 2 500 mm);
- c) hot-rolled cut lengths [cut from hot-rolled narrow strip in accordance with 5.2 a)];
- d) hot-rolled plate/sheet [cut from hot-rolled wide strip in accordance with 5.2 b)].

5.3 Delivery condition

5.3.1 Hot-rolled strip, plate/sheet and cut lengths covered by this International Standard are supplied in the as-rolled and annealed, descaled condition unless otherwise agreed.

5.3.2 Hot-rolled strip, plate/sheet and cut lengths are usually supplied with trimmed (slit) edges. Delivery with mill (as-rolled) edges shall be by special agreement.

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6 Tolerances on thickness

6.1 Normal tolerances on thickness and crown for hot-rolled strip

6.1.1 The normal tolerances on thickness, which include crown, are given in Table 1.

6.1.2 If required for hot-rolled strip of categories A and B intended for cold rolling, the difference in thickness throughout one coil shall not exceed the values given in Table 3.

6.1.3 If the purchaser requires tolerances on crown tighter than those implicit in the tolerance on thickness, the tolerances on crown shall be subject to agreement between manufacturer and purchaser, and shall be specified on the purchase order.

6.2 Fine tolerances on thickness and crown for hot-rolled narrow strip and cut lengths

6.2.1 The specified tolerances on thickness for hot-rolled narrow strip are only valid for deliveries of more than two coils of the same steel grade and same nominal dimensions. For smaller deliveries, a special agreement shall be made at the time of ordering.

The fine tolerances on thickness for cut lengths are valid regardless of the quantities supplied.

6.2.2 The fine tolerances on thickness, which include crown, are given in Table 2.

Table 1 — Normal tolerances on specified thickness for hot-rolled strip ^a

Dimensions in millimetres

Specified thickness <i>t</i>	Tolerances on specified thickness ^{b,c,d} for nominal width of							
	<i>w</i> ≤ 1 200		1 200 < <i>w</i> ≤ 1 500		1 500 < <i>w</i> ≤ 1 800		1 800 < <i>w</i> ≤ 2 500	
	Category A	Category B	Category A	Category B	Category A	Category B	Category A	Category B
<i>t</i> ≤ 2,0	± 0,22	± 0,24	± 0,25	± 0,27	± 0,27	± 0,29	—	—
2,0 < <i>t</i> ≤ 2,5	± 0,23	± 0,25	± 0,27	± 0,29	± 0,30	± 0,32	± 0,33	± 0,35
2,5 < <i>t</i> ≤ 3,0	± 0,26	± 0,28	± 0,29	± 0,31	± 0,31	± 0,34	± 0,34	± 0,36
3,0 < <i>t</i> ≤ 4,0	± 0,29	± 0,31	± 0,31	± 0,34	± 0,34	± 0,36	± 0,35	± 0,38
4,0 < <i>t</i> ≤ 5,0	± 0,31	± 0,34	± 0,34	± 0,36	± 0,36	± 0,39	± 0,38	± 0,41
5,0 < <i>t</i> ≤ 6,0	± 0,34	± 0,36	± 0,36	± 0,39	± 0,38	± 0,41	± 0,40	± 0,43
6,0 < <i>t</i> ≤ 8,0	± 0,38	± 0,41	± 0,39	± 0,42	± 0,40	± 0,43	± 0,46	± 0,49
8,0 < <i>t</i> ≤ 10,0	± 0,42	± 0,45	± 0,43	± 0,46	± 0,44	± 0,48	± 0,52	± 0,56
10,0 < <i>t</i> ≤ 13,0	± 0,46	± 0,49	± 0,47	± 0,50	± 0,48	± 0,52	± 0,56	± 0,60
<i>t</i> > 13,0	The tolerances have to be agreed at the time of enquiry and order.							

^a For wide strip, the specified values for tolerances shall not apply to the uncropped ends of the coil for a total length *l* which is calculated using the formula:

$$l(m) = \frac{90}{\text{Nominal thickness (mm)}}$$
provided that the result does not exceed 20 m total per coil.

^b Tolerances of category A apply to all grades except those covered by the exception in footnote c.

^c Tolerances of category B apply to stainless steel types with Ni > 20 % or Mo > 2 % or N > 0,11 %.

^d Trimmed edges or sheared ends may have burrs.

Table 2 — Fine tolerances (F) on specified thickness for hot-rolled narrow strip and cut lengths

Dimensions in millimetres

Specified thickness <i>t</i>	Fine tolerances on specified thicknesses ^{a, b} for widths <i>w</i> < 600	
	Category FA	Category FB
0,80 ≤ <i>t</i> ≤ 1,50	± 0,12	± 0,13
1,50 < <i>t</i> ≤ 2,0	± 0,14	± 0,16
2,0 < <i>t</i> ≤ 4,0	± 0,16	± 0,17
4,0 < <i>t</i> ≤ 5,0	± 0,17	± 0,18
5,0 < <i>t</i> ≤ 6,0	± 0,18	± 0,20
6,0 < <i>t</i> ≤ 8,0	± 0,19	± 0,21
8,0 < <i>t</i> ≤ 10,0	± 0,21	± 0,23
10,0 < <i>t</i> ≤ 13,0	± 0,23	± 0,25

^a Fine tolerances of category FA apply to all grades except those covered by the exception in footnote b.

^b Fine tolerances of category FB apply to stainless steel types with Ni > 20 % or Mo > 2 % or N > 0,11 %.

Table 3 — Permitted thickness differences within one coil for hot-rolled strip of categories A and B intended for cold rolling

Dimensions in millimetres

Specified thickness t	Permitted thickness differences for width of strip		
	$\leq 1\,200$	$> 1\,200$ $\leq 1\,500$	$> 1\,500$ $\leq 2\,500$
$t \leq 2,0$	0,20	0,24	0,28
$2,0 < t \leq 3,0$	0,22	0,27	0,33
$3,0 < t \leq 13,0$	0,28	0,32	0,40

NOTE The thickness (within one coil) shall change gradually; the changes shall not be visually discontinuous.

6.2.3 For hot-rolled narrow strip of categories FA and FB intended for cold rolling, the difference in thickness throughout one coil shall not exceed:

- 0,14 mm for specified thicknesses ≤ 4 mm;
- 0,17 mm for specified thicknesses > 4 mm ≤ 8 mm.

These requirements are not applicable at the beginning and at the end of the coil over a length of 3 m.

Variations in thickness shall be gradual and shall not occur with visible discontinuity.

6.2.4 If the purchaser requires tolerances on crown tighter than those implicit in the tolerance on thickness, the tolerances on crown shall be subject to agreement between manufacturer and purchaser, and shall be specified on the purchase order.

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7 Tolerances on width

7.1 Tolerances on width for hot-rolled narrow strip and cut lengths

7.1.1 The tolerances on width for hot-rolled narrow strip and cut lengths with mill (as-rolled) edges shall be agreed at the time of enquiry and order.

7.1.2 The tolerances on width for hot-rolled narrow strip and cut lengths with trimmed (slit) edges are given in Table 4.

Table 4 — Tolerances on width for hot-rolled narrow strip and cut lengths with trimmed (slit) edges

Dimensions in millimetres

Specified width w	Tolerances on width for specified thicknesses of				
	$\leq 3,0$	$> 3,0$ $\leq 5,0$	$> 5,0$ $\leq 7,0$	$> 7,0$ $\leq 8,0$	$> 8,0$ $\leq 13,0$
$w < 250$	$\begin{matrix} +0,5 \\ 0 \end{matrix}$	$\begin{matrix} +0,7 \\ 0 \end{matrix}$	$\begin{matrix} +0,8 \\ 0 \end{matrix}$	$\begin{matrix} +1,2 \\ 0 \end{matrix}$	$\begin{matrix} +1,8 \\ 0 \end{matrix}$
$250 \leq w < 600$	$\begin{matrix} +0,6 \\ 0 \end{matrix}$	$\begin{matrix} +0,8 \\ 0 \end{matrix}$	$\begin{matrix} +1,0 \\ 0 \end{matrix}$	$\begin{matrix} +1,4 \\ 0 \end{matrix}$	$\begin{matrix} +2,0 \\ 0 \end{matrix}$