INTERNATIONAL STANDARD

ISO 9445

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Cold-rolled stainless steel wide strip and sheet — Tolerances on dimensions and form

Larges bandes et tôles en acier inoxydable laminées à froid — Tolérances sur dimensions et forme

Reference number
ISO 9445:1990(E)

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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Cold-rolled stainless steel wide strip and sheet — Tolerances on dimensions and form

1 Scope

1.1 This International Standard specifies the tolerances on dimensions and form for cold-rolled stainless steel[1] wide strip and sheet, in thicknesses from 0,30 mm to 5,00 mm and in rolling widths from 600 mm to 1 600 mm.

1.2 This International Standard also applies to strip in widths less than 600 mm manufactured from wide strip by longitudinal slitting, and to cut lengths manufactured from such strip.

1.3 For cold-rolled flat products of stainless steels in rolling widths less than 600 mm, ISO 9447 applies.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 683-13:1986, *Heat-treatable steels, alloy steels and free-cutting steels — Part 13: Wrought stainless steels.*

ISO 683-16:1976, *Heat-treated steels, alloy steels and free-cutting steels — Part 16: Precipitation hardening stainless steels.*

ISO 2604-4:1975, *Steel products for pressure purposes — Quality requirements — Part 4: Plates.*

ISO 4955:1983, *Heat-resisting steels and alloys.*

ISO/TR 4956:1984, *Wrought steels for use at elevated temperatures in engines.*

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

ISO 9447:1990, *Cold-rolled stainless steel narrow strip — Tolerances on dimensions and form.*

3 Definitions

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

3.1 stainless steels: Steels with a carbon content of up to and including 1,2 % and a chromium content of 10,5 % and over.

NOTE 1 This definition covers the ferritic, martensitic and austenitic steels of ISO 683-13 and ISO 683-16, and the steels P 46 to P 69 of ISO 2604-4, the heat-resisting steels of ISO 4955, and some of the creep-resisting steels of ISO/TR 4956.

3.2 cold-rolled flat products: Products which, during finishing, have undergone a reduction in cross-section of at least 25 % by cold rolling without prior reheating. In the case of flat products of widths less than 600 mm and for certain qualities of special steel, levels of reduction of cross-section less than 25 % may be included.

3.3 product forms

The definitions given in ISO 6929 apply.

1) See 3.1.

4 Designation on ordering

For complete designation in the order the following should be stated in the sequence given:

— the denomination (strip, sheet or cut length);

— the number of this International Standard;

— the thickness in millimetres (if necessary accurate to two decimal places);

— the width in millimetres;

— for sheet and cut length, the length in millimetres;

— the code letter F where a fine tolerance is required for the flatness (see 6.7.1).

EXAMPLE 1

Strip ISO 9445 - 0,80 × 1 000

EXAMPLE 2

Sheet ISO 9445 - 1,20 × 1 250 × 3 000 F

5 Type of delivery

5.1 Cold-rolled flat products according to this International Standard can be supplied as

a) wide strip (coils with a width of 600 mm and over, see 6.3);

b) sheet cut from wide strip;

c) slit strip in widths less than 600 mm, manufactured by longitudinal slitting of wide strip;

d) cut lengths of strip according to item c).

5.2 The products listed in 5.1 are supplied, unless otherwise agreed, with cut edges; they may have burrs.

6 Tolerances on dimensions and form

6.1 Thickness

The tolerances on thickness are given in table 1. See also 7.1.

6.2 Width

6.2.1 The values for the permissible oversize on nominal widths are given in table 2. Undersize on nominal widths is only permitted by special agreement (see 6.2.2 and 6.8). The values given in table 2 do not apply for products with mill edges.

6.2.2 By special agreement, products can be supplied with permissible undersizes on the nominal width. In this case, the values in table 2 apply as the oversize plus undersize range.

6.3 Diameter of coils

The inside diameter of the coil should be decided by mutual agreement. Preferred inside diameters of coils are approximately 500 mm and approximately 600 mm.

6.4 Length (in the case of sheet or strip in cut lengths)

6.4.1 Preference shall be given to nominal lengths of 2 000 mm, 2 500 mm and 3 000 mm.

NOTE 2 In countries (formerly) working with the inch-system, 2 032 mm (80 in), 2 540 mm (100 in) and 3 048 mm (120 in) may also be used as preferred nominal lengths.

Table 1 — Thickness tolerances for nominal widths from 10 mm to 1 600 mm

Values in millimetres

Nominal thickness[1) 2)]		Thickness tolerance
equal to and over	less than	
0,30	0,50	± 0,04
0,50	0,70	± 0,05
0,70	1,00	± 0,06
1,00	1,50	± 0,08
1,50	2,50	± 0,11
2,50	3,50	± 0,14
3,50	4,50	± 0,17
4,50	5,00[3)]	± 0,20

1) See 7.1.

2) For thicknesses less than 0,30 mm or larger than 5,00 mm, the tolerances are to be agreed upon.

3) Including 5,00 mm.

Table 2 — Permissible oversize on nominal width

Values in millimetres

Nominal thickness		Permissible oversize on nominal width[1)]			
		Nominal width			
equal to and over	less than	less than 100	equal to and over 100 and less than 300	equal to and over 300 and less than 750	equal to and over 750 and less than 1 600
0,30	1,00	0,5	0,8	1,0	1,5[2)]
1,00	1,75	0,7	1,0	1,5	1,5[2)]
1,75	3,00	1,0	1,5	1,5	2,0[2)]
3,00	5,00[3)]	—	—	2,0	2,0[2)]

1) See 6.2.2.

2) For material with edges recut by shearing, the tolerances on width may by agreement be increased to 5 mm.

3) Including 5,00 mm.

6.4.2 The values given in table 3 apply for permissible oversizes on nominal lengths. No undersize on nominal length is permitted. (See also 6.8.)

Table 3 — Length tolerances for sheets and cut lengths

Values in millimetres

Nominal lengths l	Tolerance
up to and including 2 000	$^{+5}_{0}$
over 2 000	$^{+0,0025}_{0} \cdot l$

6.5 Edge camber tolerances

6.5.1 The edge camber tolerances are given in table 4 (see 6.8 and 7.2).

6.5.2 The requirement in 6.5.1 does not apply to work-hardened products and special agreements must be made for this type of condition.

6.6 Out-of-square tolerances for sheet and strip in cut lengths

The out-of-square (see 7.4) shall not exceed 1 % of the width of the product (see also 6.8).

Table 4 — Edge camber tolerances

Values in millimetres

Specified widths		Edge camber tolerance[1)]
equal to and over	less than	
10	25	16
25	40	12
40	125	8
125		4

1) Applicable for a measuring length of 2 000 mm.

6.7 Flatness

6.7.1 The flatness tolerances for sheets and cut lengths shall not exceed 12 mm for normal cases and 8 mm where a fine tolerance is required (see also 6.7.2 and 7.3).

6.7.2 The requirements in 6.7.1 do not apply to work-hardened products and special agreements must be made for this type of condition.

6.8 Ordered format (for sheet)

When ordering sheet, an agreement may be made that the ordered format must be contained in every piece supplied. In this case, the tolerances on width, length, edge camber and out-of-square shall be agreed at the time of enquiry and order.

7 Measurement of dimensions

7.1 Thickness

Thickness may be measured at any arbitrarily chosen point on the product at least 25 mm from the edges. For widths up to and including 50 mm, it shall be measured at the centre of the product width.

7.2 Edge camber

Edge camber is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight-edge (see figure 1).

In the case of strip, testing shall be carried out at a minimum distance of 5 000 mm from the beginning or end of the coil.

7.3 Flatness

Flatness tolerances can be measured in the following ways.

a) Maximum deviation from a flat horizontal surface. With the sheet lying under its own mass on a flat surface, the maximum deviation from flatness is the maximum distance between the lower surface of the sheet and the flat horizontal surface.

b) To measure the flatness, the product shall be laid on an approximately flat surface. Deviation with respect to flatness shall be taken as the greatest distance between the product and a straight-edge placed upon it. The straight-edge should be either 1 000 mm or 2 000 mm long. It may be placed on the product at any position and in any direction. Only the position of the points of contact of plate and straight-edge shall be taken into account.

Unless otherwise agreed, the choice of measurement is left to the manufacturer.

7.4 Out-of-square

Out-of-square is the greatest deviation of an end edge from a straight line at right angles to a side and touching one corner, the measurement being taken as shown in figure 2.

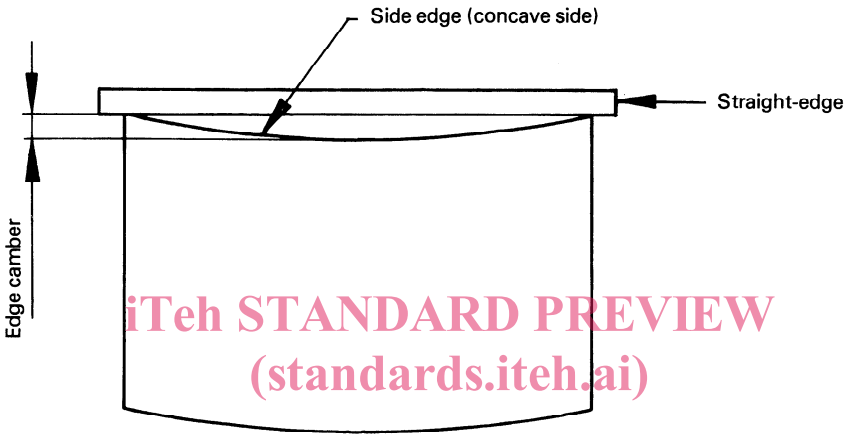

Figure 1 — Measurement of edge camber

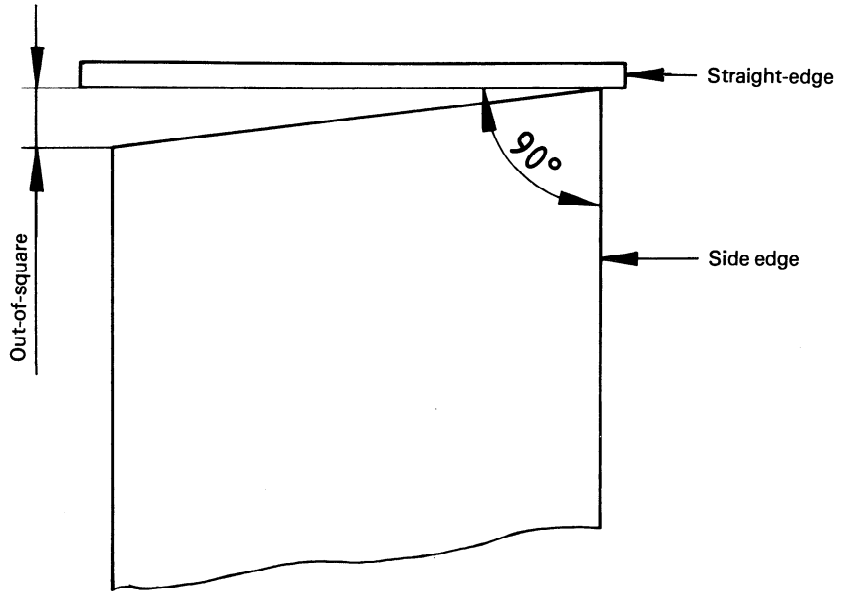

Figure 2 — Measurement of out-of-square

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