Hot rolled narrow steel strip

Dimensional and geometrical tolerances

English version of DIN EN 10048

DIN EN 10048

ICS 77.140.50

Descriptors: Steel, strip, tolerances.

This standard, together with DIN EN 10051, February 1992 edition, supersedes DIN 1016, June 1987 edition.

Warmgewalzter Bandstahl – Grenzabmaße und Formtoleranzen

European Standard EN 10048:1996 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been prepared by ECISS/TC 13.

The responsible German body involved in the preparation of this standard was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee 20/1 *Maßnormen für warmgewalzte Flacherzeugnisse.*

The DIN Standards corresponding to the EURONORMs referred to in clause 2 of the EN are as follows:

EURONORM	DIN Standard
EU 85-70	DIN 17211
EU 86-70	DIN 17212
EU 89-71	DIN 17221
EU 96-79	DIN 17350
EU 132-79	DIN 17222

Amendments

In comparison with DIN 1016, June 1987 edition, the following amendments have been made.

a) The scope of the standard has been restricted to cover only strip less than 600 mm in nominal width.

b) Closer tolerances on thickness have been specified.

c) Smaller increments have been specified for thickness tolerances for steel exhibiting a high deformation resistance at elevated temperature (cf. tables 3 and 4).

d) Closer tolerances on width for strip with slit edges have been specified.

Previous editions

DIN 1541-1: 1932-5; DIN 1541-2: 1932-05; DIN 1016: 1941x-10, 1959-01, 1972-11, 1987-06.

Continued overleaf.

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Standards referred to

(and not included in **Normative references**)

DIN 17210
Case hardening steel – Technical delivery conditions

DIN 17211
Nitriding steels – Technical delivery conditions

DIN 17212
Steel for flame and induction hardening – Technical delivery conditions

DIN 17221
Hot rolled steel for springs suitable for quenching and tempering – Technical delivery conditions

DIN 17222
Cold rolled steel strip for springs – Technical delivery conditions

DIN 17350
Tool steel – Technical delivery conditions

DIN EN 10051
Continuously hot rolled uncoated unalloyed and alloy steel plate, sheet and strip – Dimensional and geometrical tolerances

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10048

August 1996

ICS 77.140.50

Descriptors: Steel, strip, tolerances.

English version

Hot rolled narrow steel strip
Tolerances on dimensions and shape

Feuillards laminées à chaud – Tolérances de dimensions et de forme

Warmgewalzter Bandstahl – Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 1995-10-04.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 13 "Flat products for cold working - Qualities, dimensions, tolerances and specific tests" the secretariat of which is held by IBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 1997, and conflicting national standards shall be withdrawn at the latest by February 1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

1.1 This European Standard applies to uncoated hot rolled narrow steel strip, of width less than 600 mm, made of the steel grades covered by the following:

- EURONORMS 85, 86, 89, 96, 132;

- European Standards EN 10025, EN 10028-2, EN 10028-3, EN 10083-1, EN 10083-2, EN 10083-3, EN 10088-2, EN 10113-2, EN 10113-3, EN 10137-2, EN 10137-3, EN 10149-2, EN 10149-3, EN 10155, EN 10207 and EN 10208-2;

- draft European Standards prEN 10028-5, prEN 10028-6 and prEN 10084.

  NOTE: This European Standard may be applied to other types of steels if agreed at the time of ordering.

1.2 This European Standard does not apply to hot rolled wide strip and narrow strip (width < 600 mm) obtained by slitting hot rolled wide strip. (The tolerances on shape and dimensions applicable to these products are given in EN 10051.)

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10025	Hot rolled products of non-alloy structural steels - Technical delivery conditions
EN 10028-2	Flat products made of steels for pressure purposes - Part 2 : Non-alloy and alloy steels with specified elevated temperature properties
EN 10028-3	Flat products made of steels for pressure purposes - Part 3 : Weldable fine grain steels, normalized
prEN 10028-6[1)]	Flat products made of steels for pressure purposes - Part 6 : Weldable fine grain steels, quenched and tempered
EN 10051	Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - tolerances on dimensions and shape
EN 10079	Definition of steel products
EN 10083-1	Quenched and tempered steels - Part 1 : Technical delivery conditions for special steels
EN 10083-2	Quenched and tempered steels - Part 2 : Technical delivery conditions for unalloyed quality steels
EN 10083-3	Quenched and tempered steels - Part 3 : Technical delivery conditions for boron steels
prEN 10084[1)]	Case hardening steels - Technical delivery conditions
EN 10113-2	Hot rolled products in weldable fine grain structural steels - Part 2 : Delivery conditions for normalized rolled steels
EN 10113-3	Hot rolled products in weldable fine grain structural steels - Part 3 : Delivery conditions for thermomechanically rolled steels
EN 10155	Structural steels with improved atmospheric corrosion resistance - Technical delivery conditions
EN 10207	Steels for simple pressure vessels - Technical delivery requirements for plates, strips and bars
EN 10088-2	Stainless steels - Part 2 : Technical delivery conditions for sheet, plate and strip for general purposes

EN 10137-2	Plate and wide flats of high yield strength quenched and tempered or precipitation hardened structural steels - Part 2 : Delivery conditions for quenched and tempered steels
EN 10137-3	Plate and wide flats of high yield strength quenched and tempered or precipitation hardened structural steels - Part 3 : Delivery conditions for precipitation hardened steels
EN 10149-2	Hot rolled flat products of high yield strength steels for cold forming - Part 2 : Delivery conditions for thermomechanically rolled steels
EN 10149-3	Hot rolled flat products of high yield strength steels for cold forming - Part 3 : Delivery conditions for normalized/normalizing rolled steels
EN 10208-2	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2 : Pipes of requirement class B.
EURONORM 85[1)]	Nitriding steels - Quality Specifications
EURONORM 86[2)]	Steel for flame and induction hardening - Quality specifications
EURONORM 89[2)]	Alloy steels for hot formed and treated springs - Quality specifications
EURONORM 96[2)]	Tool steels - Quality requirements
EURONORM 132[2)]	Cold rolled steel strip for springs - Quality requirements

3 Definitions

For the definition of the terms "hot rolled", "strip", "hot rolled wide strip" and "narrow strip", see EN 10079.

[1)] Until these EURONORMS are transformed into European Standards, they may either be used or reference may be made to the corresponding national standards, the list of which is given in annex B of this standard.

4 Forms and condition of delivery

4.1 Forms of delivery

Hot rolled narrow strip covered by this European Standard may be delivered:

- in coils, the diameter and weight of which shall be agreed at the time of ordering, or
- in cut lengths (when the coils have been decoiled and cut to lengths), the length and finish of which shall be agreed at the time of ordering.

4.2 Condition of delivery

4.2.1 Products covered by this European Standard are usually supplied in the as rolled condition. By agreement the products may also be supplied mechanically or chemically descaled (pickled), neutralized and oiled.

4.2.2 The products are usually supplied with as-rolled edges. Delivery with slit edges shall be the subject of a special agreement.

Option 1

4.2.3 Hot rolled narrow strip in coils may be supplied with or without end tongues subject to agreement at the time of ordering.

Option 2

5 Information to be supplied by the purchaser

5.1 General

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) description of the product (coil or length);

b) number of this European Standard (EN 10048);

c) nominal thickness and width in mm;

d) the letters GK if strip with slit edges is ordered (see 4.2.2);

e) nominal length in mm (for products cut to length);

f) the letter S for products cut to length to tight tolerances on length;

g) the surface finish required (see 4.2.1);

h) the condition of the coil ends required (see 4.2.3);

5.2 Options

A number of options are specified in clause 11. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification.

6 Designation

The designation of products in accordance with 5.1 shall also include the exact designation of the ordered grade of steel.

Examples of designation

a) strip in coil according to this European Standard with a nominal thickness of 2,5 mm, a nominal width of 500 mm, and with as rolled edges, of steel S235JR (or 1.0037), as specified in EN 10025.

- Strip EN 10048-2,5 x 500-EN 10025-S235JR

or

- Strip EN 10048-2,5 x 500-EN 10025-1.0037

b) cut lengths according to this European Standard with a nominal thickness of 2,0 mm, a nominal width of 450 mm, with slit edges (GK), in lengths of 4000 mm to tight length tolerances (S), of steel S355N (or 1.0562) as specified in EN 10113-2.

- Length EN 10048-2 x 450GK x 4000S-EN 10113-2-S355N

or

- Length EN 10048-2 x 450GK x 4000S-EN 10113-2-1.0562

7 Tolerances on dimensions

7.1 Thickness and tolerances on crown

The tolerances on thickness and the tolerances on crown are given in 7.1.1 for narrow steel strip with normal deformation resistance at elevated temperatures and in 7.1.2 for narrow steel strip exhibiting a high deformation resistance at elevated temperatures.

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

7.1.1 Thickness and crown tolerances for narrow steel strip with normal deformation at elevated temperatures.

7.1.1.1 The tolerances on thickness, which include crown, are given in table 1.

These normal tolerances are designated category A, which comprise all the steels not listed in table 4, taking account of the restriction in Note 2 of this table.

Table 1 : Tolerances on thickness

Dimensions in millimetres

Nominal thickness t_n	Tolerances on thickness for nominal widths W_n	
	$10 \leq W_n < 100$	$100 \leq W_n < 600$
$0,80 \leq t_n \leq 1,50$	$\pm$ 0,08	$\pm$ 0,10
$1,50 < t_n \leq 2,0$	$\pm$ 0,10	$\pm$ 0,12
$2,0 < t_n \leq 4,0$	$\pm$ 0,11	$\pm$ 0,13
$4,0 < t_n \leq 5,0$	$\pm$ 0,12	$\pm$ 0,14
$5,0 < t_n \leq 6,0$	$\pm$ 0,13	$\pm$ 0,15
$6,0 < t_n \leq 10,0$	$\pm$ 0,14	$\pm$ 0,16
$10,0 < t_n \leq 15,0$	$\pm$ 0,16	$\pm$ 0,18

7.1.1.2 It may be agreed at the time of ordering that the total tolerance on thickness be either all plus or all minus tolerance.

Option 3

7.1.1.3 For narrow strip intended for rerolling, the difference in thickness throughout one coil shall not exceed:

0,14 mm for nominal thicknesses $\leq$ 4 mm,
0,17 mm for nominal thicknesses $>$ 4 and $\leq$ 8 mm,
0,20 mm for nominal thicknesses $>$ 8 mm.

7.1.1.4 Variations in thickness shall be gradual and shall not occur irregularly.

7.1.1.5 For narrow strip intended for rerolling, the crown, i.e. the increase in thickness of the strip between two measuring points respectively 15 mm from the edge and the middle of the strip (see 9.1.3), shall not exceed the values given in table 2.

Table 2 : Tolerances on crown for narrow strip intended for rerolling

Dimensions in millimetres

Nominal width of the narrow strip W_n	Tolerances on crown
$W_n < 250$	0 to 0,07
$250 \leq W_n < 600$	0 to 0,08

7.1.1.6 The crown shall be as regular and symmetrical as possible relative to the axis of the narrow strip.

7.1.2 Thickness and crown tolerances for narrow steel strip exhibiting a high deformation resistance at elevated temperatures.

The tolerances on thickness and on camber are those given in tables 1 and 2 with a percentage increase as specified in table 3.

Table 3 : Percentage increase of tolerances on thickness and on crown of narrow strip exhibiting a high deformation resistance at elevated temperatures.

Percentage increase of tolerance on thickness and on crown relative to narrow strip made of mild steel %	Category [1]
10	B
20	C
30	D

[1] Categories B, C and D are defined in table 4 classifying all the steel grades covered by this European Standard as a function of the value to be considered for the percentage increase of tolerances on thickness and on camber.

Table 4 : Thickness tolerance increments for steels exhibiting a high deformation resistance at elevated temperatures [1) 2)]

Category B (Increment of 10%)		Category C (Increment of 20%)		Category D (Increment of 30%)	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
E295; E335; E360	EN 10025	L360; L415; L445	EN 10208-2	L480; L550	prEN 10208-2
S355	EN 10025	S420; S460	EN 10113 2; -3	S500; S550;	prEN 10149-2
S355	EN 10155	S420; S460	EN 10149-2;	S600; S650;	prEN 10149-2
S355	EN 10149-2		EN 10149-3	S700	prEN 10149-2
	EN 10149-3				
S355	EN 10113	P460	prEN 10028-6;	S500; S550;	prEN 10137-2
P295; P355	EN 10028-2		EN 10028-3	S620; S690;	prEN 10137-2
		S460	EN 10137-2	S890; S960	prEN 10137-2
				P500; P550;	prEN 10028-6
				P620; P690	prEN 10028-6
C35	EN 10083-2	C53	EU 86-70	CT 70	EU 96-79
C35E	EN 10083-1	C55	EN 10083-2	1 CS 75	EU 132-79
C36	EU 86-70	C55E	EN 10083-1	CT 80	EU 96-79
C45	EN 10083-2	1 CS 55	EU 132-79	2 CS 85	EU 132-79
C45E	EN 10083-1	C60	EN 10083-2	2 CS 100	EU 132-79
C46	EU 86-70	C60E	EN 10083-1	CT 105	EU 96-79
C50	EN 10083-2	1 CS 60	EU 132-79	CT 120	EU 96-79
C50E	EN 10083-1	1 CS 67	EU 132-79		
16Mo3	EN 10028-2	25CrMo4	EN 10083-1	50CrMo4	EN 10083-1
20MnB5	EN 10083-3	34CrMo4	EN 10083-1	36CrNiMo4	EN 10083-1
30MnB5	EN 10083-3	41 CrMo4	EU 86-70	34CrNiMo6	EN 10083-1
38MnB5	EN 10083-3	42CrMo4	EN 10083-1	30CrNiMo8	EN 10083-1
28Mn6	EN 10083-1	14 CrNi 6	prEN 10084	51CrV4	EN 10083-1
27MnCrB5-2	EN 10083-3	20 NiCrMo 2-2	prEN 10084	all grades	EU 85-70
33MnCrB5-2	EN 10083-3	17 CrNiMo 7-6	prEN 10084	for instance	
39MnCrB6-2	EN 10083-3			39 CrMoV 13	EU 85-70
38Cr2	EN 10083-1			31 CrMo 12	EU 85-70
46Cr2	EN 10083-1			34 CrAlMo 5	EU 85-70
34Cr4	EN 10083-1			41 CrAlMo 7	EU 85-70
41 Cr4	EN 10083-1			all grades	EU 89-71
45 Cr2	EU 86-70			for instance	
38 Cr4	EU 86-70			50 CrV 4	EU 89-71
16 MnCr5	prEN 10084			67 SiCr 5	EU 132-79
13CrMo4-5	EN 10028-2			50 CrV 4	EU 132-79
10CrMo9-10	EN 10028-2				
All ferritic and martensitic stainless steels	EN 10088-2	All non-Mo-alloyed austenitic stainless steels	EN 10088-2	All Mo-alloyed austenitic stainless steels	EN 10088-2

[1)] The list of corresponding national standards and designations are given in annex A, tables A.1 to A.3. In the event of a national standard having been recently replaced by a European Standard, the old designation and corresponding standard are indicated in brackets.

[2)] In this table not all steel grades and quality classes covered by the present European Standards and EURONORMS are mentioned. Other grades, the designation of which is based on the same characteristic values (similar values or values of the same order) for the mechanical properties (R_o, R_m, etc) or for the chemical composition or intermediate grades shall be classified in the same categories as the comparable grades mentioned in this table.

Examples:

Grades P460NH or P460NL1 (according to EN 10028-3): Category C (as P460).
Grade 2 CS 75 (EU 132-79); category D (as 1 CS 75).
Grade 37 Cr4 (EN 10083-1); category B (as 34Cr4 and 38Cr4).

7.2 Tolerances on width

The tolerances on width are given in 7.2.1 for narrow steel strip with normal deformation resistance at elevated temperatures and in 7.2.2 for narrow steel strip exhibiting a high deformation resistance at elevated temperatures.

7.2.1 Width tolerances for narrow steel strip with normal deformation resistance at elevated temperatures.

The tolerances on width are given in table 5 for narrow strip with as-rolled edges and in table 6 for narrow strip with slit edges.

Table 5: Tolerances on width for narrow strip with as-rolled edges

Dimensions in millimetres

Nominal width of the narrow strip W_n	Tolerances on width [1]
$W_n < 40$	0/+ 1,6
$40 \leq W_n < 80$	0/+ 2,0
$80 \leq W_n < 125$	0/+ 2,4
$125 \leq W_n < 250$	0/+ 3,0
$250 \leq W_n < 400$	0/+ 3,6
$400 \leq W_n < 500$	0/+ 4,2
$500 \leq W_n < 600$	0/+ 4,5

[1] Symmetrical plus and minus values for the tolerances on width may be agreed at the time of ordering (e.g. : ± 1,8 instead of 0/+ 3,6 mm). However, the total tolerance range shall correspond to the values in the table.
Option 4.

Table 6 : Tolerances on width for narrow strip with slit edges

Nominal width W_n	Tolerances on width [1) 2)] for nominal thickness of				
	≤ 3,0	> 3,0 ≤ 5,0	> 5,0 ≤ 7,0	> 7,0 ≤ 10,0	> 10,0
$W_n < 80$	0/+ 0,5	0/+ 0,7	0/+ 0,8	0/+ 1,0	by agreement
$80 \leq W_n < 250$	0/+ 0,5	0/+ 0,7	0/+ 0,8	0/+ 1,2	
$250 \leq W_n <$ 400	0/+ 0,6	0/+ 0,8	0/+ 1,0	0/+ 1,2	
$400 \leq W_n <$ 600	0/+ 0,6	0/+ 0,8	0/+ 1,0	0/+ 1,4	

[1)] Symmetrical plus and minus values for the tolerance on width may be agreed at the time of ordering (e.g. : ± 0,4 mm instead of 0/+ 0,8 mm). However, the total tolerance range shall correspond to the values given in the table.
Option 4.

[2)] Tighter tolerances may be the subject of special agreements at the time of ordering.
Option 5.

7.2.2 Width tolerances for narrow steel strip exhibiting a high deformation resistance at elevated temperatures.

7.2.3 Variations in width shall be gradual and shall not occur irregularly.

7.3 Tolerances on cut lengths

7.3.1 Lengths cut from narrow strip are normally delivered in fixed lengths between 1000 and 12000 mm, with the tolerances given in table 7.

The type of tolerance selected shall be specified at the time of ordering.
Option 6.

Short lengths may be supplied as long as this has not been expressly excluded under the terms of the order and the lengths supplied do not fall below 50 % of the nominal lengths.

Table 7 : Tolerances on length

Dimensions in millimetres

Type of tolerances	Tolerances on length [1]
Normal tolerances	+ 50 0
Fine tolerances	+ (0,005 x L + 10) but max. 50[2] 0

[1] Only normal tolerances are applicable to hot cut bars.

[2] L = ordered length.

7.3.2 In the case of cut lengths other than those specified in 7.3.1, the tolerances shall be agreed upon at the time of ordering.

8 Tolerances on shape

8.1 Straightness of edges (edgewise bow)

8.1.1 For products of thickness < 2 mm, the tolerance on straightness of edges shall be agreed at the time of ordering.

8.1.2 For products of thickness ≥ 2 mm, the tolerance on straightness of edges relative to a length of 2500 mm shall be as follows:

20 mm for products of width < 40 mm
10 mm for products of width ≥ 40 mm and < 600 mm.

8.1.3 For lengths other than 2500 mm, the tolerance on straightness shall be calculated on the basis of the following formula with the result being rounded to the next highest millimetre:

$$\text{tolerance on straightness of edges} = \frac{(\text{non-standard length})^2}{(\text{standard length})^2} \times (\text{tolerance on straightness defined in 8.1.2})$$

8.2 Form of coils

The coils shall be tightly wound, as round as possible and with straight edges; gradually stepped displacement of the edge of the strip to one side shall not exceed 35 mm.

8.3 Tolerances on squareness

The out-of-squareness of lengths shall not exceed 1 % of the nominal width or fraction thereof.

9 Measurements

9.1 Thickness

9.1.1 For products of width up to 30 mm, the thickness is measured at any point on the longitudinal axis. For products of width greater than 30 mm, it is measured at any point at least 10 or 15 mm from the longitudinal edges depending on whether they are slit or as-rolled edges.

9.1.2 The measurements shall be taken at least 3000 mm from the ends of coils with end tongues and at least 2000 mm for coils without end tongues.

9.1.3 The measuring points for determining the camber (see 7.1.1.5) shall be on a line running perpendicular to the longitudinal axis of the product.

9.1.4 The variation in thickness over a coil (see 7.1.1.3) shall be measured on a line running parallel to the edge of the narrow strip at least 15 mm from it.

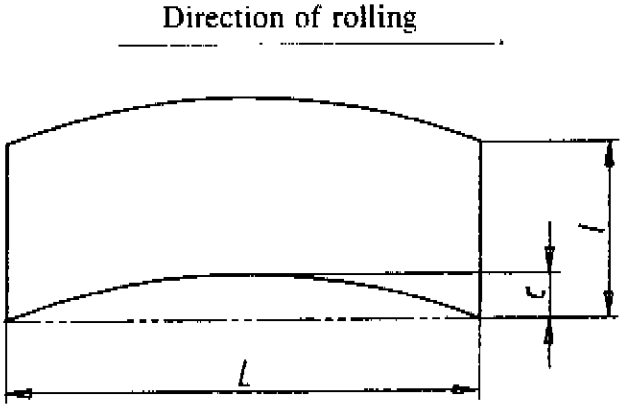
The requirements of 7.1.1.3 are not applicable at the beginning and the end of the coil over a length of 3 m.

9.2 Width

The width shall be measured perpendicular to the longitudinal axis outside the area of any end tongue.

9.3 Straightness of edges

The tolerance on straightness of edges (see 8.1) is the maximum deviation between a longitudinal edge and the straight line passing through the two ends of the reference measuring length (2500 mm). The straightness shall be measured on the concave side of the product and, for coils, outside any end tongue area (see figure 1).



where:

L is the reference measuring length
W is the width of product
c is the tolerance on straightness

Figure 1 : Straightness of edges

10 Packing

The coils shall be secured so that they cannot be damaged nor unwind during normal careful loading, transportation and storage.

The cut lengths shall be packed so that they do not become damaged when carefully loaded, transported and stored.

11 Options (see 5.2)

1. If edges are to be slit (see 4.2.2).

2. If coils may be delivered with end tongues (see 4.2.3).

3. If the total thickness tolerances shall be all over or all under (see 7.1.1.2).

4. If the width tolerance shall be symmetrical all plus or all minus (see 7.2.1; Table 5 : Note 1 and Table 6 : Note 1).

5. If narrow strip with slit edges shall have tighter thickness tolerances (see 7.2.1; Table 6 : Note 2).

6. If cut lengths are supplied, whether normal or fine tolerances are required (see 7.3.1).

Annexes

Annex A (informative)

List of corresponding national designations, standards or specifications for categories B, C and D of table 4

As a supplement to table 4, tables A.1 to A.3 include the corresponding national designations, standards or specifications for categories B, C and D.

In these tables, in the event of a national standard having been recently replaced by a European Standard, the old designation and the corresponding standard are indicated in brackets.

Table A.1 : Corresponding national designations and standards for category B (10% increase)

Europe		Germany		France	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
E295; E335; E360	EN 10025	(St 50-2; St 60-2; St 70-2)	(DIN 17 100)	(A 50-2; A 60-2; A 70-2)	(NF A 35-501)
S355	EN 10025	(St 52-3)	(DIN 17 100)	(E 36-3; E 36-4)	(NF A 36-101)
S355	EN 10155	(WtSt 52)	(SEW 087)	(E 36 W)	(NF A 35-502)
S355	EN 10149-2 EN 10149-3	(QStE340)	(SEW 092)	(E 3550)	(NF A 36-231)
S355	EN 10113	(StE355. RStE355TM)	(DIN 17 102; SEW 083)	(E 355)	(NF A 36-201)
P295; P355	EN 10028-2	(17 Mn 4; 19 Mn 5)	(DIN 17 155)	(A 48; A 52)	(NF A 36-205)
C35	EN 10083-2	(C 35)	(DIN 17 200)	(AF 55 C 35)	(NF A 35-101)
C35E	EN 10083-1	(Ck 35)	(DIN 17 200)	(XC 38)	(NF A 35-553)
C36	EU 86-70	Cf 35	DIN 17 212	XC 38 TC	not standardized
C45	EN 10083-2	(C 45)	(DIN 17 200)	(AF 65 C 45)	(NF A 35-101)
C45E	EN 10083-1	(Ck 45)	(DIN 17 200)	(XC 45)	(NF A 35-553)
-	-	C 45 W	DIN 17 350	-	
C46	EU 86-70	Cf 45	DIN 17 212	(XC 42 H 1)	(NF A 35-552)
C50	EN 10083-2	(C 50)	(DIN 17 200)		
C50E	EN 10083-1	(Ck 50)	(DIN 17 200)	(XC 50)	(NF A 35-553)
16Mo3	EN 10028-2	(15 Mo 3)	(DIN 17 155)	(15 D 3)	(NF A 36-206)
20MnB5	EN 10083-3	(19 MnB 4)	(DIN 1654 T4)	(20 MB 5)	(NF A 35-556)
30MnB5	EN 10083-3	-	-	-	-
38MnB5	EN 10083-3	-	-	(38 MB 5)	(NF A 35-556)
28Mn6	EN 10083-1	(28 Mn 6)	(DIN 17 200)	-	-
27MnCrB5-2	EN 10083-3	-	-	-	-
33MnCrB5-2	EN 10083-3	-	-	-	-
39MnCrB6-2	EN 10083-3	-	-	-	-
-	-	(32 Cr 2)	(DIN 17 200)	-	-
38Cr2	EN 10083-1	(38 Cr 2)	(DIN 17 200)	(38 C 2)	(NF A 35-552)
46Cr2	EN 10083-1	(46 Cr 2)	(DIN 17 200)	-	-
-	-	(28 Cr 4)	(DIN 17 200)	-	
34Cr4	EN 10083-1	(34 Cr 4)	(DIN 17 200)	(32 C 4)	(NF A 35-552)
41 Cr4	EN 10083-1	(41 Cr 4)	(DIN 17 200)	(42 C 4)	(NF A 35-552)
-	-	17 Cr 3	DIN 17 210	-	-
-	-	20 Cr 4	DIN 17 210	-	-
45 Cr2	EU 86-70	45 Cr 2	DIN 17 212	(42 C 2)	(NF A 35-552)
38 Cr4	EU 86-70	38 Cr 4	DIN 17 212	-	-
	-	42 Cr 4	DIN 17 212	(42 C 4)	(NF A 35-552)
16 MnCr5	prEN 10084	16 MnCr 5	DIN 17 210	16 MC 5	NF A 35-551
	-	20 MnCr 5	DIN 17 210	20 MC 5	NF A 35-551
-	-	22 CrMoS 35	DIN 17 210	-	-
13CrMo4-5	EN 10028-2	(13 CrMo4 4)	(DIN 17 155)	(15 CD 2.05) (15 CD 4.05)	(NF A 36-206) (NF A 36-206)
10CrMo9-10	EN 10028-2	(10 CrMo 9 10)	(DIN 17 155)	(12 CD 9.10)	(NF A 36-210) (NF A 36-206)
All ferritic and martensitic stainless steels	EN 10088-2	All ferritic and martensitic stainless steels	(DIN 17 440)	All ferritic and martensitic stainless steels	(NF A 35-573)

Table A.1 : Corresponding national designations and standards for category B (10% increase) (Continued)

Europe		United Kingdom		Italy	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
E295; E335; E360	EN 10025	-	-	(Fe 490; Fe 590; Fe 690)	(UNI 7070-82)
S355	EN 10025	(50C; 50D)	(BS 4360)	(Fe 510)	(UNI 7070-82)
S355	EN 10155	(WR50A)	(BS 4360)	-	-
S355	EN 10149-2	(43F35)	(BS 1449 : Part 1)	(Fe E 355)	(UNI 8890-87)
S355	EN 10113	-	-	(Fe E 355)	(UNI 7382-75)
P295; P355	EN 10028-2	-	-	(Fe E 295; Fe E 355)	(UNI EU 28-88)
C35	EN 10083-2	-	-	(1 C 35)	(UNI 8373-82)
C35E	EN 10083-1	(080M36)	(BS 970 : Part 1)	(C 35)	(UNI 7845-78; UNI 7874-79; UNI 8787-85)
C36	EU 86-70	060A32	BS 970 : Part 1	C 36	UNI 7847-79; UNI 8551-84
C45	EN 10083-2	-		(1 C 45)	(UNI 8373-82)
C45E	EN 10083-1	(080M46)	(BS 970 : Part 1)	(C 45)	(UNI 7845-78; UNI 7874-79; UNI 8787-85)
-	-	-	-	-	-
C46	EU 86-70	080M46	BS 970 : Part 1	C 46	UNI 7847-79; UNI 8551-84
C50	EN 10083-2	-	-	(1 C 50)	(UNI 8373-82)
C50E	EN 10083-1	(080M50)	(BS 970 : Part 1)	(C 50)	(UNI 7845-78; UNI 8787-85; UNI 7874-79)
16Mo3	EN 10028-2	(243)	(BS 1501 : Part 2)	(16 Mo 3)	(UNI EU 28-88)
20MnB5	EN 10083-3	(170H20)	(BS 970 : Part 1)	-	-
30MnB5	EN 10083-3	-	-	-	-
38MnB5	EN 10083-3	(170H41)	(BS 970 : Part 1)	-	-
28Mn6	EN 10083-1	(150H19)	(BS 970: Part 1)	(C 28 Mn)	(UNI 7874-79)
27MnCrB5-2	EN 10083-3	-	-	-	-
33MnCrB5-2	EN 10083-3		-	-	-
39MnCrB6-2	EN 10083-3	(185H40)	(BS 970 : Part 1)	-	-
-	-	-	-	-	-
38Cr2	EN 10083-1	-	-	(38 Cr 2)	(UNI 7874-79)
46Cr2	EN 10083-1	-	-	-	-
-	-	(580A30)	(BS 970 : Part 1)	-	-
34Cr4	EN 10083-1	(530H32)	(BS 970 : Part 1)	(34 Cr 4)	(UNI 7874-79)
41 Cr4	EN 10083-1	(530M40)	(BS 970 : Part 1)	(41 Cr 4)	(UNI 7874-79; UNI 8787-85; UNI 7845-78)
-	-	-	-	-	-
-	-	-	-	-	-
45 Cr2	EU 86-70	-	-	45 Cr 2	UNI 7847-79; UNI 8551-84
38 Cr4	EU 86-70	-		38 Cr 4	UNI 7874-79; UNI 8551-84
-	-	530A40	BS 970 : Part 1	41 Cr 4	UNI 7847-79
16 MnCr5	prEN 10084	527M17	-	16 MnCr 5	UNI 7846-78; UNI 8550-84; UNI 8788-85
-	-	-	-	20 MnCr 5	UNI 7846-78; UNI 8550-84; UNI 8788-85
-	-	-		-	-
13CrMo4-5	EN 10028-2	(620)	(BS 1501 : Part 2)	(14 CrMo 4 5)	(UNI EU 28-88)
10CrMo9-10	EN 10028-2	(622)	(BS 1501 : Part 2)	(10 CrMo 9 10)	(UNI EU 28-88)
All ferritic and martensitic stainless steels	EN 10088-2	All ferritic and martensitic stainless steels	(BS 1449: Part 2)	All ferritic and martensitic stainless steels	(UNI 6900) (UNI 6901) (UNI 8317)

Table A.2 : Corresponding national designations and standards for category C (20% increase)

Europe		Germany		France	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
L360; L415; L445	EN 10208-2	(StE 360 7; StE 385.7 StE 415.7; StE 445-7)	(DIN 17 172)	-	-
S420; S460	EN 10113-2; -3	(StE 380; StE 420; StE 460; StE 500) (BStE 420; BStE 460; BStE 500; BStE 550)	(DIN 17 102) (SEW 083)	(E 420; E 460)	(NF A 36-201)
S420; S460	EN 10149-2; -3	(QSt E 380; QSt E 420; QST E 460)	(SEW 092)	-	-
P460	prEN 10028-6; EN 10028-3	-	-	-	-
S460	EN 10137-2	-	-	(E 460 T)	(NF A 36-204)
C 53	EU 86-70	Cf 53	DIN 17 212	XC 48 TS	not standardized
C 55	EN 10083-2	(C 55)	(DIN 17 200)	(AF 70 C 55)	(NF A 33-101)
C55E	EN 10083-1	(Ck 55)	(DIN 17 200)	(XC 54)	(NF A 35-553)
1 CS 55	EU 132-79	C 55	DIN 17 222	(42 C 2)	(NF A 35-552)
C60	EN 10083-2	(C 60)	(DIN 17 200)	-	-
C60E	EN 10083-1	(Ck 60)	(DIN 17 200)	(XC 60)	(NF A 35-553)
1 CS 60	EU 132-79	C 60	DIN 17 222	AF 70 C 55	NF A 33-101
-	-	C 60 W	DIN 17 350	-	-
1 CS 67	EU 132-79	C 67	DIN 17 222	-	-
25CrMo4	EN 10083-1	(25 CrMo 4)	(DIN 17 200)	(25 CD 4)	(NF A 35 553)
34CrMo4	EN 10083-1	(34 CrMo 4)	(DIN 17 200)	(35 CD 4)	(NF A 35-553)
41 Cr Mo 4	EU 86-70	41 Cr Mo 4	DIN 17 212	42 CD 4	NF A 35-553
42CrMo4	EN 10083-1	(42 CrMo 4)	(DIN 17 200)	(42 CD 4)	(NF A 35-553)
14 CrNi 6	prEN 10084	15 CrNi 6	DIN 17 210	-	-
20 NiCrMo 2	prEN 10084	21 NiCrMo 2	DIN 17 210	(20 NCD 2)	(NF A 35-553)
17 CrNiMo 7	prEN 10084	17 CrNiMo 7	DIN 17 210	18 NCD 6	not standardized
All non-Mo-alloyed austenitic tainless steels	EN 10088-2	All non-Mo-alloyed austenitic stainless steels	(DIN 17 440)	All non-Mo-alloyed austenitic stainless steels	(NF A 35-573) (NF A 36-209)

Table A.2 : Corresponding national designations and standards for category C (20% increase) (continued)

Europe		United Kingdom		Italy	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
L360; L415; L445 S420; S460	EN 10208-2	-	-	-	-
S420, S460	EN 10113 2; - 3	(55EE)	(BS 4360)	(Fe E 390; Fe E 460)	(UNI 7382 75)
P460	EN 10149 2; - 3	-	-	(Fe E 380; Fe E 420; Fe E 460) Fe E 460	(UNI 8890-87) UNI EU 137-89
S460	prEN 10028-6; EN 10028-3 EN 10137-2	-	-	(Fe E 460)	(UNI EU 137-89)
C 53	EU 86-70	070M55	BS 970 : Part 1	C53	UNI 7847-79; UNI 8551-84
C 55	EN 10083-2	-	-	(1 C 55)	(UNI 8373-82)
C55E	EN 10083-1	(070M55)	(BS 970 : Part 1)	(C 55)	(UNI 7895-78. UNI 7874-79; UNI 8787-85)
1 CS 55	EU 132-79	070M55	BS 970 : Part 1	C 55	UNI 7064-82;
C60	EN 10083-2	-	-	(1 C 60)	(UNI 8373-82)
C60E	EN 10083-1	(070M60)	-	(C 60)	(UNI 7845-78; UNI 7874-79; UNI 8787-85)
1 CS 60	EU 132-79	080A57	BS 970 . Part 1	C 60	UNI 7064-82
-	-	-	-	-	-
1 CS 67	EU 132-79	080A67	-	C 67	UNI 7064-82
25CrMo4	EN 10083-1	(708A25	(BS 970 : Part 1)	(25 CrMo 4)	UNI 7845-78; UNI 7874-79; UNI 8787-85)
34CrMo4	EN 10083-1	(708A30)	(BS 970 : Part 1)	(35 CrMo 4)	(UNI 7845-78; UNI 7874-79; UNI 8787-85)
41 Cr Mo 4	EU 86-70	708M40	BS 970 : Part 1	41 CrMo 4	UNI 7847-79; UNI 8551-84
42CrMo4	EN 10083-1	(708M40)	(BS 970 : Part 1)	(42 CrMo 4)	(UNI 7845-78; UNI 7874-79; (UNI 8787 85)
14 CrNi 6	prEN 10084	-	-	-	-
20 NiCrMo 2	prEN 10084	805M20	BS 970 : Part 1	20 NiCrMo 2	UNI 7846-78; UNI 8550-84; UNI 8788-85
17 CrNiMo 7	prEN 10084	820A16	BS 970 : Part 1	(18 NiCrMo 7)	UNI 7846-78; UNI 8550-84; UNI 8788-85
All non-Mo-alloyed austenitic stainless steels	EN 10088-2	All non-Mo-alloyed austenitic stainless steels	(BS 1449 . Part 2) (BS 1501 : Part 3)	All non-Mo-alloyed austenitic stainless steels	(UNI 6900) (UNI 6901) (UNI 7500) (UNI 8317)

Table A.3 : Corresponding national designations and standards for category D (30% increase)

Europe		Germany		France	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
L480; L550 S500; S550; S600; S650 S700	EN 10208-2 EN 10149-2	(StE 480.7) (QStE 500; QStE 550)	(DIN 17 172) (SEW 092)	- -	- -
S500; S550; S620; S690; S890; S960	EN 10137-2	-	-	(E500 T, E 550 T, E 620 T; E 690 T)	(NF A 36-204)
P500; P550; P620; P690	prEN 10028-6	-	-	-	
CT 70	EU 96-79	C 70 W 2	DIN 17 350	-	
1 CS 75	EU 132-79	C 75	DIN 17 222	C 75	NF A 37-502
CT 80	EU 96-79	C 80 W 1	DIN 17 350	-	-
-	-	C 85 W	DIN 17 350		
2 CS 85	EU 132-79	Ck 85	DIN 17 222	XC 90	NF A 37-502; NF A 35 533
2 CS 100	EU 132-79	Ck 101	DIN 17 222	XC 100	NF A 37-502; NF A 35-533
CT 105	EU 96-79	C 105 W 1	DIN 17 350	-	-
CT 120	EU 96 79	C 125 W	not standardized	-	-
50CrMo4	EN 10083-1	(50 CrMo 4)	(DIN 17 200)	-	-
36CrNiMo4	EN 10083-1	(36 CrNiMo 4)	(DIN 17 200)	(40 NCD 3)	not standardized
34CrNiMo6	EN 10083-1	(34 CrNiMo 6)	(DIN 17 200)	(35 NCD 6)	-
30CrNiMo8	EN 10083-1	(30 CrNiMo 8)	(DIN 17 200)	(30 CND 8)	(NF A 35-552)
-	-	30 CrNiV 8	DIN 17 200	-	-
51CrV4	EN 10083-1	(50 CrV 4)	(DIN 17 200)	(50 CV 4)	(NF A 35-553)
all grades for instance	EU 85-70	all grades for instance	DIN 17 211	-	-
39 CrMoV 13	EU 85-70	39 CrMoV 13 9	DIN 17 211	-	-
31 CrMo 12	EU 85-70	31 CrMo 12	DIN 17 211	30 CD 12	(NF A 35-552)
34 CrAlMo 5	EU 85-70	34 CrAlMo 5	DIN 17 211	30 CA6.12	not standardized
41 CrAlMo 7	EU 85-70	41 CrAlMo 7	DIN 17 211	-	-
-	-	Cf 70	DIN 17 212	XC 70	not standardized
-	-	49 CrMo 4	DIN 17 212	-	-
all grades for instance	EU 89 71	all grades for instance	DIN 17 221	-	-
50 CrV 4	EU 89-71	50 CrV 4	DIN 17 221	50 CV 4	NF A 35-553
-	-	55 Si 7	DIN 17 222	55 S 7	NF A 35-553
-	-	71 Si 7	DIN 17 222	-	-
67 SiCr 5	EU 132-79	67 SiCr 5	DIN 17 222	-	-
50 CrV 4	EU 132-79	50 CrV 4	DIN 17 222	50 CV 4	NF A 35-571; NF A 35-553
All Mo-alloyed austenitic stainless steels	EN 10088-2	All Mo-alloyed austenitic stainless steels	(DIN 17 440)	All Mo-alloyed austenitic stainless steels	(NF A 35-573) (NF A 36-209)

Table A3 : Corresponding national designations and standards for category D (30% increase) (continued)

Europe		United Kingdom		Italy	
Designation	Standardized in	Designation	Standardized in	Designation	Standardized in
L480; L550 S500; S550; S600; S650 S700	EN 10208-2 EN 10149-2	- -	- -	- (Fe E 490; Fe E 560)	- (UNI 8890 - 84)
S500, S550; S620; S690; S890; S960	EN 10137-2	-	-	(Fe E 500; Fe E 550; Fe E 620; Fe E 690)	(UNI EU 137-89)
P500; P550; P620; P690	prEN 10028-6	-	-	(Fe E 500; Fe E550; Fe E 620; Fe E 690)	(UNI EU 137-89)
CT 70	EU 96-79	-	-	C 70 KU	UNI 2955/1 82
1 CS 75	EU 132-79	070A72	-	C 75	UNI 7064-82
CT 80	EU 96-79	-	-	C 80 KU	UNI 2955/1-82
-	-	-	-	-	-
2 CS 85	EU 132-79	-		C 85	UNI 7064-82
2 CS 100	EU 132-79	060A96	-	C 100	UNI 7064-82
CT 105	EU 96-79	-	-	C 100 KU	UNI 2955/1-82
CT120	EU 96-79	-	-	C 120 KU	UNI 2955/1-82
50CrMo4	EN 10083-1	(708M40)	(BS 970 : Part 1)	-	-
36CrNiMo4	EN 10083-1	(817M37)	-		-
34CrNiMo6	EN 10083-1	(817M40)	(BS 970 : Part 1)		-
30CrNiMo8	EN 10083-1	(823M30)	-	-	-
51CrV4	EN 10083-1	(735A51)	(BS 970 : Part 2)	(50 CrV 4)	(UNI 7845-78; UNI 7874-79; UNI 8787-85)
all grades for instance	EU 85-70	-	-	-	-
39 CrMoV 13	EU 85-70	-	-	-	-
31 CrMo 12	EU 85-70	722M24	BS 970 : Part 1	31 CrMo 12	UNI 8552-84; UNI 8077-80
34 CrAlMo 5	EU 85-70	-	-	-	-
41 CrAlMo 7	EU 85-70	-	-	41 CrAlMo 7	UNI 8552-84; UNI 8077-80
-	-	-	-	-	-
-	-	-	-	-	-
all grades for instance	EU 89 71	-	-	all grades for instance	UNI 3545-80
50 CrV 4	EU 89-71	735A51	BS 970 : Part 2	50 CrV 4	UNI 3545-80
-	-	251A58	BS 970 : Part 2	55 Si 7	UNI 3545-80
-	-	-	-	-	-
67 SiCr 5	EU 132-79	-	-	67 SiCr 5	UNI 7064-82
50 CrV 4	EU 132-79	735A51	BS 970: Part 2	50 CrV 4	UNI 7064-82
All Mo-alloyed austenitic stainless steels	EN 10088-2	All Mo-alloyed austenitic stainless steels	(BS 1449 : Part 2) (BS 1501 : Part 3)	All Mo-alloyed austenitic stainless steels	UNI 6900 UNI 6901 UNI 7500 UNI 8317

Annex B (informative)

List of national standards corresponding to the EURONORMS referred to (see clause 2)

Until the EURONORMS are transformed into European Standards, they can either be used or reference may be made to the corresponding National Standards, the list of which is given in table B.1.

Table B1 :EURONORMs and corresponding National Standards

EURONORM	Corresponding national standards in					
	Germany	France	United Kingdom	Spain	Italy	Belgium
85-1970	DIN 17211	NF A35-552	BS 970 Part 1		UNI 8552 UNI 8077	
86-1970	DIN 17212	NF A35-552 NF A35-553	BS 970 Part 1		UNI 7847 Uni 8551	
89-1971	DIN 17221	NF A35-553	BS 970 Part 2		UNI 3545	
96-1979	DIN 17 350	NF A 35-590	BS 4659	UNE 36-071 UNE 36-072/1-2	UNI 2955/1-2 NBN A 21-27	
132-1979	DIN 17222	NF A35-552 NF A33-101	BS 970 Part 1		UNI 7064	