DEUTSCHE NORM February 2007

DIN EN 10130

ICS 77.140.50

Supersedes
DIN EN 10130:1999-02

Cold rolled low carbon steel flat products for cold forming – Technical delivery conditions
English version of DIN EN 10130:2007-02

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Kaltumformen – Technische Lieferbedingungen
Englische Fassung DIN EN 10130:2007-02

Document comprises 14 pages

English price group 9
www.din.de
www.beuth.de

05.07 9841474

National foreword

This standard has been prepared by ECISS/TC 13 “Flat products for cold working — Qualities, dimensions, tolerances and specific tests” (Secretariat: Belgium).

The responsible German bodys involved in its preparation was the *Normenausschuss Eisen und Stahl* (Steel and Iron Standards Committee), Technical Subcommittee 01/1 *Flacherzeugnisse aus Stahl zum Kaltumformen.*

Amendments

This standard differs from DIN EN 10130:1999-02 as follows:

a) Steel grade DC07 has been included.

b) The specifications for the mechanical properties of steel grade DC06 (1.0873) have been modified.

c) Annexes A (Determination of the plastic strain ratio) and B (Determination of the tensile strain hardening exponent) have been replaced by references to the International Standards ISO 10113 and ISO 10275.

d) Annexes C and D have been deleted.

e) The normative references have been updated.

f) The standard has been editorially revised.

Previous editions

DIN 1623: 1932-05
DIN 1623-1: 1972-11, 1983-02
DIN EN 10130: 1991-10, 1999-02

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10130

December 2006

ICS 77.140.50

Supersedes EN 10130:1991 + A1:1998

English Version

Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions

Produits plats laminés à froid, en acier à bas carbone pour formage à froid - Conditions techniques de livraison

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Kaltumformen - Technische Lieferbedingungen

This European Standard was approved by CEN on 28 October 2006.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 10130:2006: E

Contents

Page

Foreword

This document (EN 10130:2006) 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/BIN.

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 June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document supersedes EN 10130:1991 + A1:1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard applies to cold rolled uncoated low carbon steel flat products in rolled widths equal to or over 600 mm for cold forming, with a minimum thickness of 0,35 mm and, unless otherwise agreed at the time of inquiry and order, equal to or less than 3 mm, delivered in sheet, coil, slit coil, or cut lengths obtained from slit coil or sheet.

It does not apply to cold rolled narrow strip (rolling width < 600 mm) nor to flat cold rolled products for which there is a specific standard, in particular the following:

— cold rolled non-grain oriented magnetic steel sheet and strip (EN 10106);

— semi-processed steel strip for the construction of magnetic circuits (EN 10126 and EN 10165);

— blackplate in coils (EN 10205);

— cold rolled flat products in high yield strength steels for cold forming (EN 10268);

— cold rolled uncoated non-alloy mild steel narrow strip for cold forming (EN 10139);

— cold rolled low carbon steel flat products for vitreous enamelling (EN 10209).

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.

EN 10002-1, *Metallic materials – Tensile testing – Part 1: Method of test at ambient temperature*

EN 10020, *Definition and classification of grades of steel*

EN 10021, *General technical delivery requirements for steel and iron products*

EN 10027-1, *Designation systems for steels – Part 1: Steel names*

EN 10027-2, *Designation systems for steels – Part 2: Numerical system*

EN 10049, *Measurement of roughness average Ra and peak count RPc on metallic flat products*

EN 10079:1992, *Definition of steel products*

EN 10131, *Cold rolled uncoated and zinc or zinc-nickel electrolytically coated low carbon and high yield strength steel flat products for cold forming – Tolerances on dimensions and shape*

EN 10204, *Metallic products – Types of inspection documents*

EN ISO 377, *Steel and steel products – Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

EN ISO 14284, *Steel and iron – Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996)*

ISO 10113, *Metallic materials – Sheet and strip – Determination of plastic strain ratio*

ISO 10275, *Metallic materials – Sheet and strip – Determination of tensile strain hardening exponent*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions of the cold rolled flat products listed in clause 1 are those given in EN 10079:1992.

4 Designation

The steel names are in compliance with EN 10027-1; the steel numbers, with EN 10027-2.

The designation consists of the word "sheet", "coil", "slit coil" or "cut length", followed in order by:

— reference of this European Standard (EN 10130);

— steel name or the steel number (see Table 2);

— symbol concerning the surface quality (A for surface quality A or B for surface quality B);

— if applicable, the symbol relating to the surface finish (see Table 1).

EXAMPLE 1 Designation of sheet made of steel grade DC01 (1.0330), surface quality A, surface finish normal (m):

Sheet EN 10130–DC01–A–m
or
Sheet EN 10130–1.0330–A–m

EXAMPLE 2 Designation of coil made of steel grade DC06 (1.0873), surface quality B, surface finish semi-bright (g):

Coil EN 10130–DC06–B–g
or
Coil EN 10130–1.0873–B–g

5 Requirements

5.1 Steelmaking and manufacturing processes

Unless otherwise agreed at the time of enquiry and order the steelmaking and manufacturing processes are left to the discretion of the manufacturer.

The purchaser shall be informed of these processes if he or she specifies.

5.2 Deoxidation

For grade DC01, the method of deoxidation shall be at the manufacturer's discretion. Grades DC03, DC04, DC05, DC06 and DC07 shall be aluminium fully killed.

5.3 Chemical composition

The chemical composition based on ladle analysis shall be as given in Table 2.

5.4 Delivery conditions

5.4.1 The products are normally supplied in the skin-passed condition, however if by agreement at the time of the enquiry and order, non-skin-passed products may be supplied.

5.4.2 The products are normally delivered oiled. In this case, both sides are corrosion protected by a layer of neutral non-drying oil, free of foreign bodies and uniformly spread in such a way that for 6 months starting from the availability at the manufacturer's works, the product will not show either corrosion or oil drying with respect to conditions of packing, transportation, handling and storage. The modification of the guarantee duration may be the subject of a special agreement.

The layer of oils shall be capable of being removed by alkaline solutions or normal solvents.

The choice of protective oils and oil quantities may be the subject of a special agreement.

If the purchaser does not require the surfaces to be oiled, this shall be clearly indicated at the time of enquiry and order.

If the conditions of transportation or storage are such that special protection against corrosion is required, the purchaser shall inform the manufacturer at the time of enquiry and order.

NOTE If the order is for non-oiled products, the manufacturer is not responsible for the risk of corrosion. The purchaser is also advised that there is a greater risk of the appearance of light scratches during handling, transportation, and application.

5.5 Mechanical properties

The mechanical properties given in Table 2 apply only to skin-passed products (see 5.7.2). The mechanical properties are valid for the period specified in Table 2 from the date on which the products are made available.

The validity of mechanical properties is not guaranteed for DC01 and is guaranteed for 6 months for DC03 to DC07, starting from the availability date at the manufacturer's works.

For non-skin-passed products (see 5.7.3) the mechanical properties shall be agreed at the time of enquiry and order.

The purchaser shall be notified of the date of availability with reasonable prior notice compatible with the validity of the mechanical properties. Prolonged storage of products of grade DC01 could result in some change in the mechanical properties leading to a reduction in formability.

5.6 Surface characteristics

5.6.1 General

The surface characteristics consist of the surface quality and the surface finish.

The surface quality and finish shall be specified by the purchaser at the time of enquiry and order.

For non-skin-passed products, surface quality B is not applicable and no requirement for a particular surface finish can be made.

5.6.2 Surface quality

The products are supplied with either of the surface qualities A or B.

— Surface quality A

Defects such as pores, slight indentations, small marks, minor scratches and slight colouring that do not effect formability or the application of surface coatings are permitted.

— Surface quality B

The better surface shall be free from defects which might affect the uniform appearance of a quality paint or an electrolytic coating (see 5.8). The other surface shall conform at least to surface quality A.

NOTE On the first wraps of the bore of a coil one must expect a mark coming from the first wrap's displacement in height.

In the case of delivery of coil and slit coil, the percentage of defects may be greater than in the case of delivery in sheet or cut lengths. This shall be taken into account by the purchaser and the percentage of admissible surface defects shall be agreed at the time of enquiry and order.

Unless otherwise agreed, a single surface of the product shall comply with the specified requirements. The other surface shall be such that during subsequent treatment it does not have a deleterious effect on the better surface.

5.6.3 Surface finish

The surface finish may be bright, semi-bright, normal or rough. In the absence of a requirement on the order, products shall be supplied with the normal finish.

The limiting figures for average surface roughness for the four types of finish are given in Table 1. The measurement shall be made in accordance with EN 10049.

By agreement at the time of enquiry and order, other ranges for surface roughness may be specified for specific and uses.

Table 1 — Surface finish and roughness values

Surface finish	Symbol	Roughness (cut off: 0,8 mm)
Bright	b	$R_a \leq 0{,}4$ µm
Semi-bright	g	$R_a \leq 0{,}9$ µm
Normal	m	0,6 µm < $R_a \leq 1{,}9$ µm
Rough	r	$R_a > 1{,}6$ µm

NOTE: For measurements in sheet for automotive applications the cut off value 2,5 mm is also possible (see EN 10049), roughness ranges have than to be specified at the moment of enquiry and order.

5.7 Stretcher strain marks

5.7.1 General

All products are generally subjected to a light skin-pass after annealing at the manufacturer's works, to avoid the formation of stretcher strain marks during subsequent forming.

The tendency to form such marks may reappear a certain time after the skin-pass. It is therefore in the purchaser's interest to form the products as soon as possible.

Products of grade DC06 and DC07 do not exhibit stretcher strain marks, whether delivered skin-passed or non-skin-passed.

5.7.2 Skin-passed products

The manufacturer shall ensure the absence of stretcher strain marks:

— for 6 months after products of grades DC03, DC04 and DC05 are made available by the manufacturer for surface qualities A and B;

— for 3 months after products of grade DC01 are made available by the manufacturer for surface quality B.

5.7.3 Non-skin-passed products

Stretcher strain marks are permitted in the condition of delivery and on drawn items.

5.8 Suitability for surface coating

Products may be intended for metallic coating by the hot dipping or electrode position and/or organic or other coatings. When such a coating is required, it shall be specified at the time of enquiry and order.

5.9 Weldability

Products are suitable for standard welding processes; however, the welding process should be specified at the time of enquiry and order, essentially in the case of gas welding.

5.10 Tolerances on dimensions and shape

Tolerances for dimensions and shape are given in EN 10131.

6 Tests

6.1 General

The purchaser shall specify at the time of enquiry and order his or her requirements for:

— type of inspection and testing, specific or non specific, see EN 10021;

— type of inspection document, see EN 10204.

Specific inspection and testing shall be carried out in accordance with 6.2 to 6.6.

Specific inspection and testing may not be specified either for the product analysis or for the surface finish.

6.2 Inspection units

The inspection unit is 30 t or a fraction of 30 t for products of the same grade and nominal thickness. When a coil exceeds 30 t it constitutes a single inspection unit, as do its products.

6.3 Number of tests

A tensile test shall be carried out for each inspection unit, and where appropriate, determination of the plastic strain ratio *r* and the tensile strain hardening exponent *n* (see Table 2).

6.4 Sampling

The requirements of EN ISO 377 and EN 10021 are supplemented by the following specific requirements:

— sheet and cut lengths: the selection of products to be tested and the position of the samples in the products is left to the discretion of the inspection representative;

— wide strip and slit wide strip: the sample should be taken from the outer end.

If the width of the product permits, the test pieces for the tensile test shall be taken perpendicular to the direction of rolling.

6.5 Test methods

6.5.1 The products shall be tested in the condition of delivery. The tests shall be carried out at ambient temperature.

6.5.2 The tensile test shall be carried out as described in EN 10002-1 using type 2 test pieces (initial gauge length L_o = 80 mm, width b = 20 mm).

6.5.3 Surface roughness shall be determined in accordance with EN 10049.

6.5.4 Determination of the plastic strain ratio r and the tensile strain hardening exponent n shall be carried out in accordance with ISO 10113 and ISO 10275.

6.5.5 To determine the chemical composition EN ISO 14284 and the corresponding European Standards shall apply.

6.6 Re-tests

The requirements of EN 10021 shall apply.

In the event of disputed test results for coils, samples for retests shall be taken at intervals of at least one lap, but also at a maximum distance of 20 m from the appropriate end.

6.7 Inspection document

By agreement at the time of enquiry and order, an inspection document chosen from those given in EN 10204 shall be supplied.

7 Marking

Unless otherwise agreed at the time of enquiry and order, marking shall be carried out on the inspected surface by an easily removed non-corrosive ink.

8 Packing

The packing requirements shall be agreed at the time of enquiry and order.

9 Disputes

With regard to any claims and any action arising there from, EN 10021 shall apply.

10 Information to be provided by the purchaser at the time of enquiry and order

The following information shall be provided by the purchaser at the time of enquiry and order to allow the manufacturer to supply products conforming to this European Standard::

a) full designation as given in clause 4;

b) nominal dimensions and tolerances according to the dimensional standard (see EN 10131) and the ordered quantities;

c) if the product has to be delivered with mill edges or trimmed edges;

d) if products are to be supplied non-skin-passed;

e) limits on the mass and size of the coils and the individual bundles;

f) intended application of products, including the surface coating;

g) if the products are to be welded, an indication of the method to be used;

h) if the products are to be supplied as suitable for making a specific part;

i) if inspection documents are required, and their type;

j) if an external inspection is to be carried out at the manufacturer's works;

k) if oiling is not required;

l) if other protective coatings are required;

m) detailed description of all other special requirements;

n) any special requirements for packing and marking (e. g. bar coding, see EN 606);

o) position of the surface of better surface quality.

Table 2 — Characteristics of the skin-passed products

Steel name	Steel number	Classification according to EN 10020	Surface quality	Absence of stretcher strain marks	R_e [a]	R_m	A_{80} [b]	r_{90} [c d]	n_{90} [c]	Ladle analysis chemical composition				
					MPa	MPa	min. %	min.	min.	C max. %	P max. %	S max. %	Mn max. %	Ti max. %
DC01[e]	1.0330	Non-alloy quality steel[f]	A	-	-/280[g i]	270/410	28	-	-	0,12	0,045	0,045	0,60	-
			B	3 months										
DC03	1.0347	Non-alloy quality steel[f]	A	6 months	-/240[g]	270/370	34	1,3	-	0,10	0,035	0,035	0,45	-
			B	6 months										
DC04	1.0338	Non-alloy quality steel[f]	A	6 months	-/210[g]	270/350	38	1,6	0,180	0,08	0,030	0,030	0,40	-
			B	6 months										
DC05	1.0312	Non-alloy quality steel[f]	A	6 months	-/180[g]	270/330	40	1,9	0,200	0,06	0,025	0,025	0,35	-
			B	6 months										
DC06	1.0873	Alloy quality steel	A	No limit	-/170[h]	270/330	41	2,1	0,220	0,02	0,020	0,020	0,25	0,3[j]
			B	No limit										
DC07	1.0898	Alloy quality steel	A	No limit	-/150[h]	250/310	44	2,5	0,230	0,01	0,020	0,020	0,20	0,2[j]
			B	No limit										

NOTE 1 MPa = 1 N/mm^2.

[a] The values of yield strength are 0,2 % proof strength for products which do not present a definite yield point, and the lower yield strength R_{eL} for the others. When the thickness is less than or equal to 0,7 mm and greater than 0,5 mm, the value for yield strength is increased by 20 MPa. For thicknesses less than or equal to 0,5 mm, the value is increased by 40 MPa.

[b] When the thickness is less than or equal to 0,7 mm and greater than 0,5 mm, the minimum value for elongation is reduced by 2 units. For a thickness less than or equal to 0,5 mm, the minimum value is reduced by 4 units.

[c] The values of r_{90} and n_{90} only apply to products with a thickness equal to or greater than 0,5 mm.

[d] When the thickness is over 2 mm, the value for r_{90} is reduced by 0,2.

[e] It is recommended that products in grade DC01 should be formed within 6 weeks from the time of their availability.

[f] Unless otherwise agreed at the time of enquiry and order, grades DC01, DC03, DC04 and DC05 may be supplied as alloy steels (for example with boron or titanium).

[g] For design purposes the lower limit of R_e for grades DC01, DC03, DC04 and DC05 may be assumed to be 140 MPa.

[h] For design purposes the lower limit of R_e for grade DC06 may be assumed to be 120 MPa and 100 MPa for grade DC07.

[i] The upper limit of R_e of 280 MPa for grade DC01 is valid only for 8 days from the time of the availability of the product.

[j] Titanium may be replaced by niobium. Carbon and nitrogen shall be completely bound.

Bibliography

EN 606, *Bar coding – Transport and handling labels for steel products*

EN 10049, *Measurement of roughness average Ra and peak count RPc on metallic flat products*