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

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

Produits plats laminés à froid, en acier doux pour emboutissage au pliage à froid - Conditions techniques de livraison

Kaltgewalzte Flacherzeugnisse aus weichen Stählen zum Kaltumformen - Technische Lieferbedingungen

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN 10130:2004) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 10130:1991

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 the 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);

— steel sheet and strip for welded gas cylinders (EN 10120);

— cold rolled flat products in high yield strength steels for cold forming (prEN 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 products.*

prEN 10027-1, *Designation systems for steel – Part 1: Steel names, principal symbols.*

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

EN 10079, *Definition of steel products.*

EN 10131, *Cold rolled uncoated 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.*

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

EN ISO 377, *Steel and steel products – Location and preparation of samples and test pieces for mechanical testing.*

EN ISO 14284, *Steel and iron – Sampling and preparation of samples for the determination of chemical composition.*

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 Definitions

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

4 Designation

The symbolic designation of the steel grades in this European Standard is in conformity with prEN 10027-1; the numerical designation is allocated in conformity with EN 10027-2.

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

— the reference of this European Standard EN 10130;

— the symbol DC;

— the grade designation (01 – 03 – 04 – 05 – 06 or 07 or the numerical designation);

— the 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, surface quality A (A), surface finish normal (m): Sheet EN 10130 DC01 (1.0330) – A – m.

EXAMPLE 2 Designation of coil made of steel grade DC06, surface quality B (B), surface finish semi-bright (g): Coil EN 10130 DC06 (1.0312) – B – g.

5 Requirements

5.1 Steelmaking and manufacturing processes

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

The purchaser shall be informed of these processes, if he specifies it.

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 fully killed.

5.3 Chemical composition

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

5.4 Delivery condition

5.4.1 Products specified in this standard are normally supplied in the skin-passed condition. 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 the surfaces are preserved by a layer of neutral non-drying oil, free of foreign bodies and uniformly spread in such a way that under normal conditions of packing, transportation, handling and storage the products will show no corrosion for up to 3 months

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 the order.

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

The choice of protective oils may be the subject of special agreement.

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

NOTE If the order is for unoiled products, the manufacturer is not responsible for the risk of rust. The purchaser is also advised that there is a greater risk of the appearance of light scratches during handling, transportation, and putting into application.

5.5 Choice of properties

The products covered by this European Standard shall comply with the requirements of Tables 1 and 2. By agreement, they may be delivered as suitable for making a particular part; in this case a maximum percentage of scrap may be agreed and acceptance on the basis of mechanical properties is not applicable.

5.6 Mechanical properties

The mechanical properties given in Table 2 apply only to skin-passed products (see 5.8.2). The mechanical properties are valid for the period specified in Table 2 from the date on which the products are made available.

For non-skin-passed products (see 5.8.3) the mechanical properties shall be agreed at the time of enquiry and order.

The date of availability shall be notified to the purchaser 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.

5.7 Surface characteristics

5.7.1 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 the order.

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

5.7.2 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 which do not effect formability or the application of surface coatings are permitted.

— Surface quality B

The better surface shall be free of defects which might affect the uniform appearance of a quality paint or an electrolytic coating (see 5.9). The other surface shall at least conform to surface quality A. For thickness ≥ 0,9 mm one must expect wrench works when starting coiling.

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 the 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.

5.7.3 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 prEN 10049.

By agreement at the time of the 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
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

5.8 Stretcher strain marks

5.8.1 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.

5.8.2 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, for surface qualities A and B;

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

5.8.3 Non-skin-passed products

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

5.9 Suitability for surface coating

The products may be intended for metallic coating by the hot-dip coating, or other coating process, and/or organic or other coatings. When such a coating is required, it shall be specified at the time of ordering.

5.10 Weldability

The material is specified as suitable for normal welding procedures. It is, however, desirable to state the welding procedure at the time of ordering, and essential to do so in the case of gas welding.

5.11 Tolerances on shape and dimensions

Tolerances on shape and dimensions are given in European Standard EN 10131.

6 Tests

6.1 General

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

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

— the 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 of 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

For each inspection unit, a tensile test shall be carried out and, where appropriate, a determination of *n* and *r*.

6.4 Sampling

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

— for 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;

— in the case of coil and slit coil, the sample should preferably 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.