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Kaltgewalzte Flacherzeugnisse aus Mehrphasenstählen zum Kaltumformen - Technische Lieferbedingungen

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Foreword

This document (prEN 10338:2004) 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.

1 Scope

This European Standard applies to cold rolled non-coated steel flat products made of multiphase steels for cold forming. The thickness is equal to or less than 3 mm.

These products are delivered in sheet, wide strip, slit wide strip, narrow strip or cut lengths obtained from slit wide strip, narrow strip or sheet.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places 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 (including amendments).

EN 10002-1, *Metallic materials - Tensile test - 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 (principal symbols)*

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

EN 10079, *Definition of steel products*

EN 10130+A1, *Cold rolled low carbon steel flat products for cold forming - Technical delivery conditions*

EN 10131, *Cold rolled non-coated flat products in low carbon steel for cold forming - Tolerances on dimensions and shape*

EN 10139, *Cold rolled uncoated mild steel narrow strip for cold forming - Technical delivery conditions*

EN 10140, *Cold rolled narrow steel strip - Tolerances on dimensions and shape*

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

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

CR 10260, *Steel designation systems - Additional symbols*

CR 10261, *ECISS Information circular 11 – Iron and steel – Review of available methods of chemical analysis*

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

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

prEN 10325, *Steel – Determination of yield strength increase by the effect of heat treatment (Bake-Hardening-Index)*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 10020, EN 10021, EN 10079 and EN 10204 and the following apply.

3.1
DP (Dual phase) steel
steel with a ferritic matrix containing a martensitic second phase (up to about 25% by volume) present in the form of islands. According to their high tensile strength levels, dual phase steels show a low yield strength ratio and a high work hardening rate

3.2
TRIP (Transformation induced plasticity) steel [RA (retained austenite) steel]
steels with a mainly ferritic matrix containing retained austenite. During the forming process retained austenite can transform to martensite (TRIP effect). Due to its high work-hardening rate the steel reaches high uniform elongation values and high tensile strength levels

3.3
PM (Partially martensitic) steel
steel containing an amount of martensite in a multiphase microstructure. Besides martensite and also bainite can be present. In comparison to dual phase steels, PM steels show significantly higher yield strength values at equal tensile strength levels

4 Dimensions and tolerances

The tolerances on dimensions and shape of products in rolled widths ≥ 600 mm are those given in EN 10131; those of products in rolled widths < 600 mm are given in EN 10140.

5 Designation

The steel names in this European Standard are in compliance with EN 10027-1 and CR 10260; the steel numbers are assigned in accordance with EN 10027-2.

The steel grades covered by this standard are classified in accordance with their increasing minimum tensile strength (R_m) (see Tables 1 and 2).

The designation consists of the word "sheet", "cold rolled wide strip", "cold rolled narrow strip", "slit cold rolled wide strip" or "cut length" followed in order by:

— the reference to this European Standard EN 10338;

— the steel name or number of the steel grade according to Table 1 or Table 2.

EXAMPLE 1 Strip delivered with nominal thickness of 1,20 mm, nominal width of 1500 mm in accordance with EN 10131, made of steel HCT800C in accordance with EN 10338:

Strip EN 10131-1.20x1500 steel EN 10338-HCT800C (or 1.0...)

EXAMPLE 2 Narrow strip delivered with nominal thickness of 0.4 mm, nominal width of 400 mm, fine tolerances (B) on thickness in accordance with EN 10140, made of steel grade HCT450X in accordance with EN 10338:

Narrow strip EN 10140-0.4Bx400 steel EN 10338-HCT450X (or 1.0...)

6 Technical requirements

6.1 Steelmaking and product manufacturing process

Unless otherwise agreed at the time of enquiry or order, the steel manufacturing and production process shall be at the manufacturer's option.
They shall be reported to the purchaser if he so requests.

6.2 Delivery conditions

6.2.1 The products covered by this standard are supplied in the skin-passed condition only.

6.2.2 The products are normally supplied oiled. In this case, both sides are corrosion protected by a coat of non-drying neutral oil, free of foreign bodies and spread uniformly so that under the normal packing, transportation, loading and storage conditions, there will be no corrosion for up to three 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 surfaces to be oiled, this shall be clearly indicated at the time of 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.

6.3 Chemical composition

The chemical composition based on cast analysis shall be as given in Table 1.

Table 1 — Chemical composition (cast analysis)

Steel grade		% by mass									
Steel name	Steel number	C max.	Si max.	Mn max.	P max.	S max.	AL_{total}	Cr + Mo max.	Nb + Ti max.	V	B max.
DP steels											
HCT450X	1.09...	0,14	0,80	2,00	0,080	0,015	0,015 to 2,00	1,00	0,15	0,20	0,005
HCT500X	1.09...	0,14		2,00							
HCT600X	1.09...	0,17		2,20							
HCT800X	1.09...	0,17		2,20							
HCT1000X	1.0...	0,23		2,20							
TRIP steels											
HCT600T	1.0...	0,25	2,20	2,50	0,080	0,015	0,015 to 2,00	0,60	0,20	0,20	0,005
HCT700T	1.0...	0,32									
HCT800T	1.0...	0,32									
HCT1000T	1.0...	0,45									
PM steels											
HCT600C	1.0...	0,23	0,80	2,20	0,080	0,015	0,015 to 2,00	1,00	0,15	0,20	0,005
HCT800C	1.0...										
HCT900C	1.0...										
HCT1000C	1.0...										

6.4 Mechanical properties

Products specified in this European Standard shall comply with the requirements of Table 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.

The mechanical properties given in Table 2 are valid for a period of at least 6 months from the date on which the products are made available.

By agreement, special formability criteria can be defined between producer and purchaser.

The values for the tensile test apply for longitudinal pieces.

Table 2 — Mechanical properties

Steel grade		Yield strength $R_{po.2}$ MPa[a]	Tensile strength R_m MPa[a]	Elongation A_{80} %	Strain hardening exponent $n_{10\text{-}UE}$	Bake hardening value BH_2 MPa[a]
Steel name	Steel number		min.	min.	min.	min.
DP steels						
HCT450X	1.09...	250 to 330	450	27	0,16	30
HCT500X	1.09...	290 to 370	500	24	0,15	30
HCT600X	1.09...	330 to 410	600	21	0,14	30
HCT800X	1.09...	420 to 550	780	15	0,11	30
HCT1000X	1.09...	550 to 700	980	10		30
TRIP steels						
HCT600T	1.0...	380 to 480	600	26	0,20	40
HCT700T	1.0...	410 to 510	700	24	0,19	40
HCT800T	1.0...	440 to 560	780	22	0,18	40
HCT1000T	1.0...	b	980	18	0,14	40
PM steels						
HCT600C	1.0...	350 to 470	600	16	-	-
HCT800C	1.0...	500 to 640	780	10	-	-
HCT900C	1.0...	580 to 740	880	8	-	-
HCT1000C	1.0...	660 to 860	980	6	-	-

a 1 MPa = 1 N/mm²

b Due to lack of significant industrial experience, the yield strength range will be discussed during public enquiry.