

English version

Cold rolled flat products with higher yield strength for cold forming - Technical delivery conditions

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Foreword

This document (prEN 10268) has been prepared by 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 10268:1998

1 Scope

This European Standard applies to cold -rolled non-coated steel flat products for cold forming with higher yield strength. 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*

ENV 606, *Bar coded transport and handling labels for steel products*

CR 10260, *Steel designation systems - Additional symbols*

Euronorm 18, *Selection and preparation of samples and test pieces for steel and iron and steel products¹⁾*

Euronorm 49, *Roughness measurement of cold rolled uncoated steel sheet and strip¹⁾*

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*

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

1) Until these Euronorms are transformed into European Standards reference can be made to the corresponding national standards

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

bake-hardening steels (B)

steels that demonstrate an increase in proof strength following heating in the region of 170 °C for 20 minutes

3.2

rephosphorized steels (P)

steels that contain up to 0,12% P and achieve the required proof strength levels

3.3

low alloy / micro-alloyed steels (LA)

steels containing one or more of alloys Nb, Ti and V to achieve required proof strength levels

3.4

interstitial free steels (Y)

steels whose composition is controlled to achieve improved plastic strain ratio (r) and strain hardening exponent (n) values

3.5

steels with other mechanical properties (G1)

steels with limited plastic strain ratio (r) value for specific applications

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 letters "LA" (low alloy) are not covered by CR 10260 but refer to the fact that some steels covered by this standard are micro-alloyed.

The designation consist 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 10268;
- the steel name or number of the steel grade according to Table 1 or Table 2;
- if applicable the symbol relating to the surface finish (see Table 4).

EXAMPLE 1 Designation of sheet made of steel grade H260P, surface quality A, surface finish normal(m):
Sheet EN 10268-H260P-A-m
or
Sheet EN 10268 - XXXX -A-m

EXAMPLE 2 Designation of coil made of steel grade H220B, surface quality B, surface finish normal(m):
Coil EN 10268-H220B-B-m
or
Coil EN 10268- XXXX-B-m

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 purchase 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 ladle analysis shall be as given in Table 1.

Table 1 — Ladle analysis chemical composition (% by mass)

Designation according to EN 10027-1	Designation according to EN 10027-2	C% max	Si% max	Mn% max	P% max	S% max	Al% min	Ti% Max a b	Nb% Max a b
H180Y		0,01	0,3	0,7	0,06	0,025	0,01	0,12	
H180P		0,05	0,4	0,6	0,06	0,025	0,015		
H180B		0,05	0,5	0,7	0,06	0,025	0,015		
H220Y		0,01	0,3	0,9	0,08	0,025	0,01	0,12	
H220G1		0,07	0,5	0,5	0,05	0,025	0,015	0,05	
H220P		0,06	0,5	0,7	0,08	0,025	0,015		
H220B		0,06	0,5	0,7	0,08	0,025	0,015		
H260Y		0,01	0,3	1,6	0,1	0,025	0,01	0,12	
H260G1		0,07	0,5	0,5	0,05	0,025	0,015	0,05	
H260P		0,08	0,5	0,7	0,1	0,025	0,015		
H260B		0,08	0,5	0,7	0,1	0,025	0,015		
H260LA		0,1	0,5	0,6	0,025	0,025	0,015	0,15	0,09
H300G1		0,08	0,5	0,7	0,08	0,025	0,015	0,05	
H300P		0,1	0,5	0,7	0,12	0,025	0,015		
H300B		0,1	0,5	0,7	0,12	0,025	0,015		
H300LA		0,1	0,5	1	0,025	0,025	0,015	0,15	0,09
H340LA		0,1	0,5	1	0,025	0,025	0,015	0,15	0,09
H380LA		0,1	0,5	1,4	0,025	0,025	0,015	0,15	0,09
H420LA		0,1	0,5	1,4	0,025	0,025	0,015	0,15	0,09

^a These additional elements may be used individually or in combination where they appear in the definition of the steel within the composition limits indicated. Vanadium and boron may also be added. The sum of the contents of these four dispersoidal elements shall not exceed 0,22 % however.

^b For all interstitial free (Y) grades, Nb may be added alternatively or in combination with Ti. For all grades containing "G1" in its designation, Ti can be substituted by Nb or B.

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.

Table 2 — Mechanical properties

Designation		0,2% proof strength a f	Increase in proof strength after heating ^b	Tensile strength ^f	Elongation ^{c f}	Plastic strain ratio	Plastic strain ratio ^{b d e}	Strain hardening exponent ^d
Steel name	Steel number	R _{p0,2} N/mm ²	BH ₂ N/mm ² min.	R _m N/mm ²	A ₈₀ (%) min.	r max.	r min.	n min.
		(trans.)	(trans.)	(trans.)	(trans.)	(trans.)	(trans.)	(trans.)
H180Y		180-230	-	340-400	36		1,7	0,19
H180P		180-230		280-360	34		1,6	0,17
H180B		180-230	40	300-360	34		1,6	0,17
H220Y		220-270		350-420	34		1,6	0,18
H220G1		220-270		300-380	34	1,4		0,18
H220P		220-270		320-400	32		1,5	0,16
H220B		220-270	35	320-400	32		1,5	0,16
H260Y		260-320		380-440	32		1,4	0,17
H260G1		260-310		320-400	32	1,4		0,17
H260P		260-320		360-440	29			
H260B		260-320	35	360-440	29			
H260LA		260-330		350-430	26			
H300G1		300-350		340-440	30	1,4		0,16
H300P		300-360		400-480	26			
H300B		300-360	30	400-480	26			
H300LA		300-380		380-480	23			
H340LA		340-420		410-510	21			
H380LA		380-480		440-560	19			
H420LA		420-520		470-590	17			

^a If the yield strength is pronounced, the values apply to the lower yield point (R_{eL}).

^b For thicknesses > 1,2 mm special agreements must be made.

^c 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.

^d The minimum values for r (trans.) and n (trans.) only apply to products of thickness equal to or greater than 0,5 mm.

^e For products with thickness over 2 mm the minimum r (trans.) value is reduced by 0,2.

^f For LA grades these values are supplied for information only.

Table 3 — Mechanical properties

Designation		0,2% proof strength a)	Tensile strength	Elongation
Steel name	Steel number	$R_{p0,2}$ N/mm ² (long.)	R_m N/mm ² (long.)	A_{80} (%) min. (long.)
H180Y H180P H180B				
H220Y H220G1 H220P H220B				
H260Y H260G1 H260P H260B H260LA		240-310	340-420	27
H300G1 H300P H300B H300LA		280-360	370-470	24
H340LA		320-410	400-500	22
H380LA		360-460	430-550	20
H420LA		400-500	460-580	18
<p>a If the yield strength is pronounced, the values apply to the lower yield point (R_{eL}).</p> <p>b For thicknesses > 1,2 mm special agreements must be made.</p> <p>c 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.</p> <p>d The minimum values for r (trans.) and n (trans.) only apply to products of thickness equal to or greater than 0,5 mm.</p> <p>e For products with thickness over 2 mm the minimum r (trans.) value is reduced by 0,2.</p> <p>f For LA grades these values are supplied for information only.</p>				

6.5 Weldability

Suitability for the welding process used in industry is guaranteed. However, the welding process should be specified at the time of enquiry and order : this is essential in the case of gas welding.

6.6 Surface properties

6.6.1 General

The surface properties cover surface appearance and surface finish.

6.6.2 Surface quality

6.6.2.1 Products of rolled width ≥ 600 mm

The products are supplied with one of the surface qualities A or B as defined in EN 10130 except for LA grades for which only surface quality A applies.

6.6.2.2 Products of rolled width < 600 mm

The requirements of EN 10139 apply.

6.6.3 Surface finish

6.6.3.1 Products of rolled width ≥ 600 mm

The requirements of EN 10130 apply.

6.6.3.2 Products of rolled width < 600 mm

The requirements of EN 10139 apply.

6.7 Suitability for surface coatings

The products may be intended to have metallic coatings applied by hot dipping or electrodeposition and/or organic or other coatings. If such a coating is specified, this shall be agreed at the time of enquiry and order

7 Tests

7.1 General

7.1.1 The purchaser shall specify at the time of enquiry and order what he requires with regards to :

- the type of test, in accordance with EN 10021;
- the type of material test document, in accordance with EN 10204.

7.1.2 The tests shall be carried out in conformity with the requirements of 7.2 to 7.7.

7.2 Test units

7.2.1 Products of rolled width ≥ 600 mm

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

7.2.2 Products of rolled width < 600 mm

The test unit is 5 t or fraction of 5 t of product of the same steel grade, same heat treatment with the same surface properties and same nominal thickness. Coils of mass exceeding 5 t shall be considered as comprising a single test unit.

7.3 Number of tests

For each test unit, a tensile test and, where appropriate, a determination of n and r (see Table 2) in the as-delivered state shall be carried out. In the case of Bake Hardening steels, other tensile tests shall be carried out (see 7.5.3). If specified at the time of enquiry and order, a product analysis shall be carried out (the values mentioned in Table 1 apply).

7.4 Sampling

The requirements of EURONORM 18 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 wide strip and slit wide strip, the sample should preferably be taken from the outer end.

Except for LA grades, the test pieces for the tensile test shall be taken perpendicular to the direction of rolling if the width of the product permits.

7.5 Test methods

7.5.1 The tensile test shall be carried out according EN 10002-1 using type 2 test pieces (initial gauge length $L_0 = 80$ mm, width $b = 20$ mm) as described in annex A of EN 10002-1.

7.5.2 The determination of the plastic strain ratio r and the strain hardening exponent n shall be carried out in accordance with ISO 10113 and ISO 10275.

The strain ratio r and the strain hardening exponent n are determined within the strain range 10% to 20%. As the determination shall be carried out in the range of homogeneous deformation, then if the uniform elongation of the tested material is lower than 20%, values for the upper limit of the strain range of 15% to 20% can be applied.

7.5.3 As long as no European Standard for the measurement of BH-values is available, the method of testing shall be agreed at the time of enquiry and order. The method mentioned in Annex A is for information purposes only.

7.6 Chemical analysis

For the determination of the chemical composition, ISO 14284 and the corresponding European Standards and Euronorms shall apply.

7.7 Retests

The requirement of EN 10021 shall apply.

7.8 Inspection documents

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

8 Marking

8.1 Products of rolled width ≥ 600 mm

Unless otherwise agreed at the time of ordering, marking shall be carried out on the inspected surface by means of an easily removed non-corrosive ink. Slit wide strip products are not marked unless otherwise agreed at the time of ordering.

8.2 Products of rolled width < 600 mm

Marking of the products in line with the specifications of EN 10021 may be agreed at the time of ordering.

9 Packing

The packing requirements shall be agreed when ordering.

10 Disputes

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

11 Information to be supplied by the purchaser at the time of enquiry and order

To permit the manufacturer to supply products conforming to this standard the following information should be given in the order:

- a) the full designation as given in clause 5;
- b) nominal dimensions and quantities;
- c) if the products are to be delivered with mill edges or shared edges;
- d) limits on mass and sizes of coils and individual bundles;
- e) intended application of the products, including surface coatings;
- f) if the products are to be welded, indication of the method to be used;
- g) if the products are to be supplied as suitable for making a specific part;
- h) if inspection documents are required and type;
- i) if an external inspection is to be carried out at the manufacturer's works;
- j) if oiling is not required;
- k) if other protective coatings are required;
- l) detailed description of all other special requirements;
- m) any special requirements for packing and marking;
- n) the position of the surface of better surface quality;
- o) the method of determining the BH-value (see 7.5.3).

Annex A (informative)

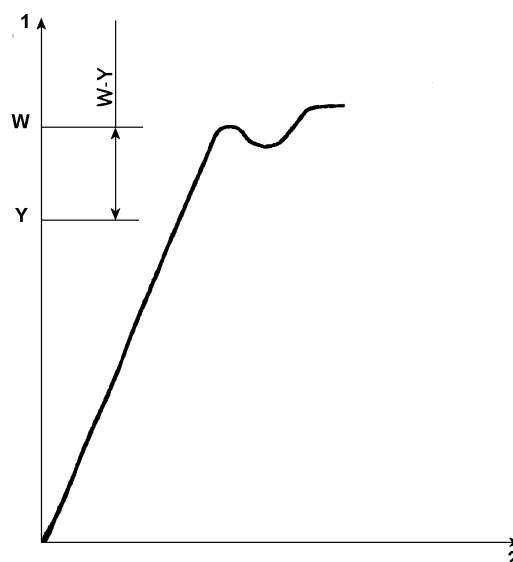
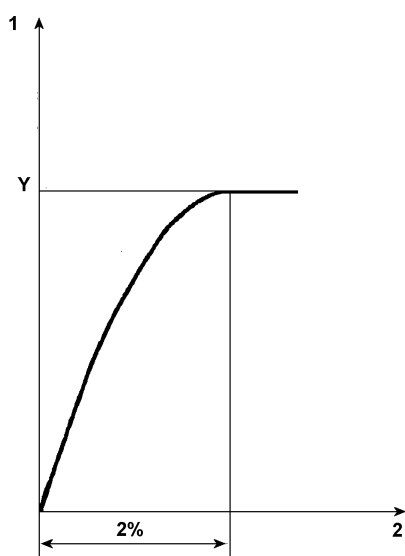
Bake hardening test method

A tensile test is performed with 2% plastic elongation (preliminary strain), then the load is removed. The proof strength Y N/mm² is measured (see figure A.1).

The test piece to which a preliminary strain has been applied is heat-treated at 170°C for 20 minutes.

A new tensile test is performed on this test piece giving the proof strength W N/mm² (see figure A.2).

The BH-value is the difference between W and Y : BH-value = $W - Y$.



Key

1 Stress

2 Elongation

Figure A.1 — Strain aging yield load

Figure A.2 — Tensile test on prestrained and heat-treated test piece

The BH-value is referred to as BH₂ because the preliminary strain is 2%.

