UDC 669.14:001.4:003.62 September 1992

Designation systems for steels

Steel names and principal symbols

English version of DIN EN 10 027 Part 1

DIN EN 10 027 Part 1

Bezeichnungssysteme für Stähle; Kurznamen, Hauptsymbole

European Standard EN 10 027-1:1992 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 7.

The responsible German body involved in the preparation of this standard was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee 19/1 *Einteilung, Benennung und Benummerung von Stählen.*

The European system of designating steels comprises the steel names specified here, in connection with the ECISS Information Circular IC 10, and the material numbers specified in DIN EN 10 027 Part 2.

This standard specifies that steels be classified into two main groups, group 1 being those designated according to their application or their mechanical and physical properties, group 2 being those designated according to their chemical composition. The first draft of the present standard included a number of additional symbols which could also be used, since it is likely that the general symbols covered here will not be sufficient to unmistakeably identify a particular steel. The additional symbols are now covered in Standard DIN V 17 006 Part 100 (identical to IC 10*)), on the assumption that the new designation systems will be subject to revision before final publication.

It should be noted that the German representatives at ECISS were opposed to this decision, and rather preferred that a comprehensive designation system be covered in one document. The publication of IC 10 satisfies this preference, since it covers both general and additional symbols. It therefore seems that EN 10 027-1 is superfluous.

It should also be noted that Germany is not satisfied with the specifications given in subclause 4.3.2, which leaves open the possibility of steels being designated independently by national standards bodies. This could lead to confusion and problems when such steels are to be standardized at the European level.

With the publication of the present standard, in connection with IC 10, the following specifications have been superseded:

a) subclause 2.1 of the 1983 edition of *DIN-Normenheft* (Standardization booklet) 3;

b) the October 1949 edition of DIN 17 006 Part 4, which covers steel castings;

c) EURONORM 27-74.

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

European Standard	DIN Standard
EN 10 020	DIN EN 10 020
EN 10 027-2	DIN EN 10 027 Part 2
EN 10 079	DIN EN 10 079
IC 10	DIN V 17 006 Part 100

Standards referred to

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

DIN V 17 006 Part 100	(Preliminary standard) Designation systems for steel; additional symbols for steel names
DIN 17 006 Part 4	Iron and steel; designation system for steel castings, grey cast iron, white cast iron and malleable cast iron
DIN EN 10 020	Definition and classification of steel grades
DIN EN 10 027 Part 2	Designation systems for steel; numerical system
DIN EN 10 079	Definition of steel products

International Patent Classification

C 22 C 37/00
C 33 C 38/00

*) In the course of preparation.

Continued overleaf.
EN comprises 4 pages.

Editor's note

*This standard reproduces the official text of the English version of EN 10 027-1 as issued by CEN. In its preparation for publication as DIN EN 10 027 Part 1 (English version), certain points have been noted which we consider to be in need of correction. These have been marked *). The suggested amendments are given below and will be forwarded to the responsible CEN Secretariat for its consideration.*

In presentation, orthography, punctuation and hyphenation, the aim has been to implement the PNE Rules consistently. Obvious errors (e.g. redundancies and omissions) have been rectified without further reference.

Suggested amendments

1 *In accordance with the International System of Units, the term 'weight' should be replaced throughout by the term 'mass'.*

2 *For the sake of clarity, subclause 1.1 should read: '... characteristics (e.g. mechanical and physical properties, chemical composition), so as to ...'.*

3 *For ease of comprehension, subclause 4.3.2 should read: '... cooperate with the relevant national standards body regarding the consistency of steel names.'*

4 *For the sake of clarity, the last three words of subclause 4.4 should be deleted.*

5 *For the sake of clarity, the first paragraph of clause 5 should read: 'The complete designation of a steel product, where stated in orders or similar contractual documents, shall include the steel name and the reference document covering the technical delivery conditions with which it is to comply. In the case of standardized steels, the latter shall be the number of the relevant product standard.'*

6 *For the sake of consistency, 'steels for pressure purposes' should be replaced by 'pressure vessel steels' in subclause 7.2 a) (cf. DIN EN 10 027 Part 2, table 1).*

7 *For the sake of accuracy, the term 'linepipe' should be replaced by the correct technical term 'pipelines' in subclause 7.2 a).*

8 *For the sake of accuracy, the term 'reinforcing concrete' should be replaced by the correct technical term 'reinforced concrete' in subclause 7.2 b).*

9 *For the sake of accuracy, the term 'prestressing concrete' should be replaced by the correct technical term 'prestressed concrete' in subclause 7.2 c).*

10 *For ease of reading, the definition of symbol X in subclause 7.2 f) should read: 'for products where no particular type of rolling process has been specified'.*

11 *For the sake of clarity and to accurately reflect the German text, the definition of symbol T in subclause 7.2 g) should be supplemented to read: 'tin sheet, plate and strip and chrome-plated sheet and strip (for packaging purposes)'.*

12 *In subclause 7.2 h), item (1), the English text does not accurately reflect the German text. The information given in the latter translates as follows: '1,5 Tesla for normal, finally annealed/not finally annealed, non-oriented/grain-oriented steels' and '1,7 Tesla for low loss grain-oriented steels and for high permeability grain-oriented steels'.*

13 *In subclause 7.2 h), item (3), the letter specified to denote non-alloy semi-finished products is D in the German version.*

14 *For the sake of consistency, the term 'body' should be replaced by 'committee' in subclauses 7.3.2 a) and 7.3.3 b).*

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10 027-1

July 1992

UDC 669.14 : 001.4 : 003.62

Descriptors: Iron and steel products, steels, designation, symbols.

English version

Designation systems for steels
Part 1: Steel names, principal symbols

Systèmes de désignation des aciers. Partie 1: Désignation symbolique, symboles principaux

Bezeichnungssysteme für Stähle. Teil 1: Kurznamen, Hauptsymbole

This European Standard was approved by CEN on 1991-12-20. 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 United Kingdom.

CEN

European Committee for Standardization

Comité Européen de Normalisation

Europäisches Komitee für Normung

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

Ref. No. EN 10 027-1 : 1992 E

Contents

Foreword

This European Standard has been drawn up by ECISS/TC 7 'Designation of steel' whose Secretariat is held by UNSIDER (Ente Italiano di Unificazione Siderurgica).

It is the first Part of the European Standard 'Designation systems for steels', the second Part being 'Steel numbers'.

This European Standard was approved by CEN on 1991-12-20.

According to the CEN/CENELEC Internal Regulations, 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 Part of European Standard EN 10 027 sets out rules for designating steel by means of symbolic letters and numbers to express application and principal characteristics, e.g. mechanical, physical, chemical, so as to provide an abbreviated identification of steels.+)

In order to avoid ambiguity, it may be necessary to supplement the principal symbols established according to this European Standard by additional symbols identifying additional characteristics of the steel or steel product, e.g. suitability for use at high or low temperatures, surface condition, treatment condition, deoxidation. These additional symbols are covered in Information Circular IC 10[1]).

NOTE: In the English language, the designations covered by this European Standard, together with IC 10, are known as 'steel names', in the French language, as 'désignations symboliques', and in the German language, as 'Kurznamen'.

1.2 These rules apply to steels specified in European Standards, Harmonization Documents and CEN members' national standards.

1.3 These rules may apply to non-standardized steels.

1.4 A system of numerical designation of steels known as steel numbers is set out in EN 10 027-2.

[1]) In the course of preparation.

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 as follows. 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 10 020	Definition and classification of grades of steel
EN 10 027-2	Designation systems for steels. Part 2: Steel numbers
EN 10 079	Definition of steel products
IC 10[1])	Additional symbols for steel names covered in EN 10 027-1

3 Definitions

For the purposes of this European Standard, the definitions in EN 10 020 and EN 10 079 apply.

4 Principles

4.1 A unique steel name

There shall be one unique steel name for each steel.

4.2 Formulation of steel names

Unless otherwise specified in this European Standard or in IC 10, the symbols used in the steel name shall be written without spaces.

4.3 Allocation of steel names

4.3.1 For steels specified in European Standards or Harmonization Documents, steel names shall be allocated by the ECISS Technical Committee concerned.

4.3.2 For steels specified in CEN members' national standards and for other steels, steel names shall be allocated by or under the responsibility of the national standards body concerned.

So as to avoid a variety of steel names being assigned to essentially the same steel, the European Registration Office, as provided for in EN 10 027-2, shall, when a steel number is applied for, cooperate with the national standards body concerned to uniform steel names.+)

4.4 Consultation

Where there are difficulties or disputes in establishing steel names, ECISS/TC 7 shall be consulted and shall advise.+)

5 Reference to product standards

The complete designation of a steel product, where quoted in orders or similar contractual documents, shall include, in addition to the steel name, an indication of the technical delivery requirement in which the steel is specified. For steels specified in standards, this shall be the reference number of the relevant product standard.+)

Details of the structure of the steel name for the steel or steel product shall be provided in the relevant product or dimensional standard.

6 Classification of steel names

For the purposes of designation, steel names are classified into two main groups.

Group 1: Steels designated according to their application and mechanical or physical properties (see 7.2).

Group 2: Steels designated according to their chemical composition and further divided into 4 subgroups (see 7.3).

7 Structure of steel names

7.1 Initial symbol for steel castings

Where a steel is specified in the form of a steel casting, its steel name as specified in 7.2 and 7.3 shall be preceded by the letter G.

7.2 Steels designated according to their application and mechanical or physical properties (group 1)

The coding shall comprise the following principal symbols:

a) S = structural steels
P = steels for pressure purposes+)
L = steels for linepipe+)
E = engineering steels
} followed by a number being the specified minimum yield strength[2], in N/mm², for the smallest thickness range.

b) B = steels for reinforcing concrete,+)
followed by a number being the characteristic yield strength[2], in N/mm².

c) Y = steels for prestressing concrete,+)
followed by a number being the specified minimum tensile strength, in N/mm².

d) R = steels for or in the form of rails,
followed by a number being the specified minimum tensile strength, in N/mm².

e) H = cold rolled high strength steel flats for cold drawing,
followed by a number being the specified minimum yield strength[2], in N/mm², or where only the tensile strength is specified, the letter T, followed by a number being the minimum specified tensile strength, in N/mm².

f) D = flat products for cold forming (except those in 7.2.e)), followed by one of the following letters:

(1) C for cold rolled products;

(2) D for hot rolled products for direct cold forming;

(3) X for products the rolled condition of which is not specified;+) and by

(4) two symbols characterizing the steel allocated by the responsible body (see 4.3).

g) T = tinmill products (steel products for packaging),+) followed by:

(1) for single reduced products, the letter H, followed by a number being the specified average value of hardness to Rockwell HR 30 Tm;

(2) for double reduced products, a number being the specified nominal yield strength, in N/mm².

h) M = electrical steels,
followed by:

(1) a number being 100 × the specified maximum specific loss, expressed in W/kg, corresponding to the nominal product thickness, for a magnetic induction at 50 Hz of:

- 1,5 Tesla for semi-finished, non-oriented and normal grain-oriented steels;+)
- 1,7 Tesla for low loss or high permeability grain-oriented steels;+)

(2) a number being 100 × the nominal thickness of the product, in millimetres;

(3) a letter indicating the type of electrical steel, i.e.:

- A for non-oriented products
- B+) for non-alloy semi-finished (not finally annealed) products
- E for alloy semi-finished (not finally annealed) products
- N for normal grain-oriented products
- S for low loss grain-oriented products
- P for high permeability grain-oriented products.

NOTE 1: A hyphen shall separate symbols (1) and (2).

NOTE 2: The symbols to be indicated after the letter M concern electrical steels for use at a frequency of 50 Hz. For other uses, such as steel products for relays and high-frequency applications, the principal symbols are not yet established.

[2] The term 'yield strength' as used in this European Standard refers to upper or lower yield strength, R_{eH} or R_{eL}, or proof strength, R_p, or proof strength, total extension, R_t, depending on the requirement specified in the relevant product standard.

7.3 Steels designated according to chemical composition (group 2)

7.3.1 Non-alloy steels (except free-cutting steels) with an average manganese content <1 % (subgroup 2.1)

The coding shall comprise successively the following symbols:

a) the letter C;

b) a number being 100 × the specified average percentage carbon content[3]). Where the carbon content is not specified by a range, the technical committee responsible for the relevant product standard shall select a suitably representative value.

7.3.2 Non-alloy steels with an average manganese content ≥1 %, non-alloy free-cutting steels and alloy steels (except high speed steels) where the content, by weight, of every alloying element is <5 % (subgroup 2.2)

The coding shall comprise successively the following symbols.

a) A number being 100 x the specified average percentage carbon content[3]).

Where the carbon content is not specified by a range, the technical body+) responsible for the relevant product standard shall select a suitably representative value.

b) Chemical symbols indicating the alloy elements that characterize the steel.

The sequence of symbols shall be in decreasing order of the value of the content; where the values of contents are the same for two or more elements, the corresponding symbols shall be indicated in alphabetical order.

c) Numbers indicating the values of contents of alloy elements.

Each number represents, respectively, the average percentage content of the element indicated, multiplied by the factors given in table 1 and rounded to the nearest integer. The numbers referring to the different elements shall be separated by hyphens.

7.3.3 Alloy steels (except high speed steels) where the content, by weight, of at least one alloying element is ≥ 5 % (subgroup 2.3)

The coding shall comprise successively the following symbols.

a) The letter X.

b) A number being 100 × the specified average percentage carbon content[3]).

Where the carbon content is not specified by a range, the technical body+) responsible for the relevant product standard shall select a suitably representative value.

c) Chemical symbols indicating the alloy elements that characterize the steel.

The sequence of symbols shall be in decreasing order of the value of their content; where the values of contents are the same for two or more elements, the corresponding symbols shall be indicated in alphabetical order.

d) Numbers indicating the values of contents of alloy elements.

Each number represents, respectively, the average percentage content of the element indicated, rounded to the nearest integer. The numbers referring to the different elements shall be separated by hyphens.

7.3.4 High speed steels (subgroup 2.4)

The coding shall comprise the following symbols;

a) the letters HS;

b) numbers indicating the values of percentage contents of alloy elements indicated in the following order:

- tungsten (W)
- molybdenum (Mo)
- vanadium (V)
- cobalt (Co).

Each number shall represent the average percentage content of the respective element, rounded to the nearest integer. The numbers referring to the different elements shall be separated by hyphens.

Table 1: Factors for alloying elements for steels in subclause 7.3.2

Element	Factor
Cr, Co, Mn, Ni, Si, W	4
Al, Be, Cu, Mo, Nb, Pb, Ta, Ti, V, Zr	10
Ce, N, P, S	100
B	1000

[3]) To distinguish between two similar steel grades, the number indicating carbon content may be increased or decreased by one unit.