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## Steel products — Vocabulary

*Produits en acier — Vocabulaire*

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## Foreword

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ISO 6929 was prepared by Technical Committee ISO/TC 17, Steel.

This second edition cancels and replaces the first edition (ISO 6929:1987), of which has been technically revised.

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# Steel products — Vocabulary

## 1 Scope

This International Standard defines terms for steel products according to their:

- a) stage of manufacture;
- b) shape and dimensions;
- c) appearance.

NOTE 1 Although the products are generally defined independently of their end uses or manufacturing processes, it has sometimes been necessary to make reference to these criteria.

NOTE 2 All dimensions given in this International Standard are nominal.

## 2 Terms and definitions

For the purposes of this document, the following terms and definitions apply. (See the list of terms and relevant sub clauses in Annex A):

### 2.1

#### liquid steel

steel in the liquid state ready for pouring and obtained from the melting of raw materials

### 2.2

#### ingots and semi finished products

##### 2.2.1

#### ingots

products obtained by pouring liquid steel into moulds of a shape appropriate to the subsequent processing into semi finished products, or flat or long products, generally by hot rolling or forging

NOTE 1 The shape generally resembles a truncated pyramid or truncated cone; the side surfaces may be corrugated and the corners more or less rounded. Depending on subsequent conversion requirements, ingots may be dressed and/or hot scarfed or cropped without altering their status as "ingots".

NOTE 2 According to the cross section a distinction is made between the following:

- Ingots, having a cross section that may be square, rectangular (of width up to twice the thickness), polygonal, round, oval or shaped according to the profile to be rolled; and
- Slab ingots, of rectangular cross section of width twice the thickness or over.

##### 2.2.2

#### semi finished products

products obtained by:

- continuous casting that may or may not be followed by rolling, forging or cutting;

- pressure casting;
- rolling, forging or cutting of ingots or large section continuous cast products and generally intended for conversion into flat or long products by hot rolling or forging, or for the manufacture of forgings

NOTE The cross sections may be of various shapes (see 2.2.2.1 to 2.2.2.5); the cross sectional dimensions are constant along the length with wider tolerances than those of the corresponding flat or long products and side corners more or less rounded. The side surfaces are sometimes slightly convex or concave, retaining rolling, forging or continuous casting marks and may be partly or totally dressed to remove surface defects, e.g. by cutting tool, torch or grinding.

#### 2.2.2.1

##### **semi finished products of square cross section**

semi finished products with sides of 50 mm or over, generally described as blooms if the sides are greater than 200 mm, or as billets if smaller

NOTE These dimensions may be less for certain types of steel, e.g. high speed steels.

#### 2.2.2.2

##### **semi finished products of rectangular cross section**

semi finished products of cross section area 2 500 mm<sup>2</sup> or over of width up to twice the thickness, generally described as blooms if the cross section area is greater than 40 000 mm<sup>2</sup>, or as billets if smaller

#### 2.2.2.3

##### **flat semi finished products**

products of thickness generally 50 mm or over of width twice the thickness or over, generally described as slabs

#### 2.2.2.4

##### **round semi finished products**

continuously cast or forged semi finished products of circular cross section

#### 2.2.2.5

##### **blanks for sections**

semi finished products intended for the manufacture of sections that have been preformed for that purpose

NOTE 1 The cross section area is generally over 2 500 mm<sup>2</sup>.

NOTE 2 In many countries the long products in question are obtained by rolling semi finished products of square or rectangular cross section.

#### 2.2.2.6

##### **blanks for tubes and pipes**

semi finished products, usually shaped as round bars, intended for the manufacture of tube and pipes that have been preformed for that purpose

#### 2.2.2.7

##### **VAR ingots**

semi finished products, usually shaped as round ingots or blooms, obtained by melting press-formed metallic raw material or by remelting ingots or blooms using a Vacuum Arc Remelting (VAR) furnace.

NOTE Vacuum arc remelting leads to products with improved chemical homogeneity and inclusion cleanliness.

#### 2.2.2.8

##### **ESR ingots**

semi finished products, usually shaped as round ingots or blooms, obtained by melting press-formed metallic raw material or by remelting ingots or blooms using an Electro Slag Remelting (ESR) furnace.

NOTE Electro slag remelting leads to products with improved chemical homogeneity and inclusion cleanliness.

## 2.3 flat products

### 2.3.1 general

products having almost rectangular cross sections, the width being much greater than the thickness

NOTE The surfaces are generally smooth except for certain products, e.g. floor plates, that show regular raised or indented surface patterns.

### 2.3.2 uncoated flat products

flat products without any coating or surface treatment

NOTE Flat products that have received a simple coating for the purpose of protection from corrosion or mechanical damage, e.g. passivation, organic coatings, paper, oil, lacquer etc. are defined as uncoated flat products.

#### 2.3.2.1 hot rolled uncoated flat products

flat products manufactured by hot rolling semi finished products, more rarely by hot rolling ingots

NOTE Hot rolled flat products include those that have been given a very light cold rolling pass, normally less than 5 % reduction, known as a "skin pass" or "dressing pass".

##### 2.3.2.1.1 wide flat

flat product of width over 150 mm up to and including 1 250 mm and thickness generally over 4 mm, always supplied in lengths, i.e. not coiled, and the edges are square i.e. hot rolled on the four sides (or in box passes)

##### 2.3.2.1.2 hot rolled sheet and plate

flat hot rolled product, the edges being allowed to deform freely, supplied flat and generally in square or rectangular shapes with a width of 600 mm or over; but also in any other shape, e.g. circular or according to a design sketch

NOTE 1 The edges may be as rolled or sheared, flame cut or chamfered. The product may also be delivered pre-curved. Hot rolled sheet and plate are defined as:

- sheet: thickness less than 3 mm;
- plate: thickness 3 mm or over.

NOTE 2 Sheet and plate may be produced:

- a) directly on a reversing mill (this product is generally known as quarto plate), or by cutting from a parent plate rolled on a reversing mill;
- b) by cutting from hot rolled wide strip; this product is generally known as hot rolled sheet or plate.

##### 2.3.2.1.3 hot rolled strip

hot rolled flat product that immediately after the final rolling pass or after pickling or continuous annealing, is wound into a regular coil

NOTE 1 As rolled, strip has slightly convex edges, but may also be supplied with sheared edges or slit from wider strip.

NOTE 2 Hot rolled strip is further defined as:

- a) hot rolled wide strip: width 600 mm or over;

- b) hot rolled slit wide strip: rolling width 600 mm or over, slit to widths less than 600 mm before supply;
- c) hot rolled narrow strip: rolling width less than 600 mm.

NOTE 3 After decoiling and transverse cutting, hot rolled strip may be supplied as cut lengths or sheet.

### 2.3.2.2

#### **cold rolled uncoated flat products**

uncoated flat products that have undergone a reduction in cross-section of 25 % or over by cold rolling

NOTE For flat products of rolling width less than 600 mm and for certain qualities of special steel, levels of reduction of cross-section less than 25 % may be included.

#### 2.3.2.2.1

##### **cold rolled sheet and plate**

cold rolled flat product, the edges being allowed to deform freely, supplied flat and generally in square or rectangular shapes with a width of 600 mm or over, but also in any other shape, e.g. circular or according to a design sketch

NOTE 1 Cold rolled sheet and plate are defined as:

- sheet: thickness less than 3 mm;
- plate: thickness 3 mm or over.

NOTE 2 The edges may be as rolled sheared, flame cut or chamfered.

#### 2.3.2.2.2

##### **cold rolled strip**

cold rolled flat product that immediately after the final rolling pass, or after pickling or annealing, is wound into a regular coil

NOTE 1 As rolled, strip has slightly convex edges, but may also be supplied with sheared edges or slit from wider strip.

NOTE 2 Cold rolled strip is further defined as:

- a) cold rolled wide strip: width 600 mm or over;
- b) cold rolled slit wide strip: rolling width 600 mm or over, slit to widths less than 600 mm before supply;
- c) cold rolled narrow strip: rolling width less than 600 mm.

NOTE 3 After decoiling and cutting to length, cold rolled strip may be supplied as cut lengths or sheet.

### 2.3.3

#### **electrical steels**

steels characterised by their magnetic properties, that are intended for use in magnetic circuits in electrical machines

NOTE 1 They are supplied in the form of cold rolled sheet or strip, generally less than 2 mm thick and of width up to and including 1 500 mm.

NOTE 2 There are also certain hot rolled flat products in thicknesses of 1,5 mm up to 5 mm with specified mechanical and magnetic properties.

NOTE 3 Electrical steels are defined by the following specified principal magnetic properties:

- a) specific total loss in  $W/kg$  at a specified level of peak magnetic flux density,  $T$  and frequency Hz;
- b) peak magnetic flux density,  $T$  at a specified level of peak magnetic field strength  $A/m$  and frequency Hz.



Electrical steels are further defined as follows:

### 2.3.3.1

#### **non oriented grain electrical steels**

non alloy steels and steels alloyed with silicon or silicon and aluminium that are essentially isotropic in their magnetic properties; i.e. the magnetic properties are similar both in the direction of rolling and in the transverse direction

NOTE They may be supplied either:

- a) in the semi processed state with the required specific total loss achieved after the material has been annealed by the user according to a reference heat treatment; or
- b) in the finally annealed state with specific total loss. The product may be supplied uncoated or with an insulating coating on one or both surfaces.

### 2.3.3.2

#### **grain oriented electrical steels**

steels alloyed with silicon that are anisotropic in that they possess a metallurgical structure that gives preferential magnetic properties in the direction of rolling

NOTE These steels are supplied with an insulating coating on both surfaces.

### 2.3.4

#### **tin mill and allied products for packaging**

#### 2.3.4.1

##### **blackplate**

non alloy, low carbon steel supplied in strip or sheet form that has been single or double cold reduced

NOTE 1 Single reduced blackplate is commonly supplied in thicknesses from 0,15 mm up to and including 0,60 mm, double reduced blackplate in thicknesses from 0,14 mm up to and including 0,36 mm.

NOTE 2 Blackplate is normally used to manufacture tinplate or electrolytic chromium coated sheet (ECCS), but in certain packaging applications it may be used as such. In such cases the product must be suitable for varnishing (lacquering) or printing.

#### 2.3.4.2

##### **tinplate**

non alloy, low carbon steel supplied in strip or sheet form that has been single or double cold reduced, and coated on both surfaces with tin in a continuous electrolytic process

NOTE 1 Single reduced tinplate is commonly supplied in thicknesses from 0,15 mm up to and including 0,60 mm, double reduced tinplate in thicknesses from 0,14 mm up to and including 0,36 mm. Tinplate is supplied normally with a passivation treatment and a protective coating of oil and is suitable for varnishing (lacquering) or printing.

NOTE 2 Tinplate may also be obtained by hot dipping in a bath of molten tin.

#### 2.3.4.3

##### **tinned sheet and strip**

non alloy, low carbon steel supplied in strip or sheet form of a thickness of 0,50 mm or over and tin coated on both surfaces

#### 2.3.4.4

##### **electrolytic chromium/chromium oxide coated steel (ECCS)**

non alloy, low carbon steel supplied in strip or sheet form that may have been single or double cold reduced; coated on both surfaces by a cathodic process with a duplex film of metallic chromium adjacent to the steel substrate with an outer layer of hydrated chromium oxide or hydroxide

NOTE Single reduced ECCS is commonly supplied in thicknesses from 0,17 mm up to and including 0,49 mm, double reduced ECCS in thicknesses from 0,14 mm up to and including 0,29 mm. ECCS is supplied normally with a protective coating of oil and is suitable for varnishing (lacquering) or printing.

**2.3.5 coated hot or cold rolled flat products**

hot or cold rolled products with a permanent coating other than those defined in **2.3.2**, **2.3.3** or **2.3.4** whether:

- a) on both surfaces of:
  - equal thickness on each surface;
  - different thickness: differential coating;
- b) on one surface only.

NOTE All figures for coatings shown below are nominal and relate to the current technology; they may change in future.

According to the type of coating, the products are classified as follows:

**2.3.5.1 metal coated sheet and strip**

**2.3.5.1.1 hot dipped metal coated sheet and strip**

flat products which have been metal coated by hot dipping in a molten bath, described by reference to the total coating mass, in  $g/m^2$ .

These include:

**2.3.5.1.1.1 zinc coated sheet and strip (galvanised sheet and strip)**

NOTE The total mass of the zinc varies in general between  $60 g/m^2$  and  $700 g/m^2$ . The coatings may have a spangle finish or be without spangle. After zinc coating, the surfaces may be passivated by chromating or phosphating or treatment with compounds of vanadium and/or titanium. This final surface treatment does not alter the definition of such products as "zinc coated flat products".

**2.3.5.1.1.2 aluminium zinc coated sheet and strip**

NOTE 1 The total mass of the alloy varies in general between  $80 g/m^2$  and  $450 g/m^2$ .

NOTE 2 According to the aluminium content a distinction is made between:

- aluminium zinc alloys (aluminium 50 % or over);
- zinc aluminium alloys (aluminium over 3 % but less than 50 %).

**2.3.5.1.1.3 aluminium or aluminium-silicon alloy coated sheet and strip**

NOTE Sheet and strip coated with aluminium or an aluminium silicon alloy: the total mass of the alloy varies in general between  $40 g/m^2$  and  $300 g/m^2$ .

**2.3.5.1.1.4 lead tin alloy coated sheet and strip (terne plate)**

sheet and strip coated with a lead tin alloy

NOTE In general, the highest nominal mass for the coating corresponds to a minimum of 120 g/m<sup>2</sup> including both surfaces.

### 2.3.5.1.2

#### **electrolytically metal coated sheet and strip**

flat products metal coated electrolytically, described by reference to the single surface coating thickness in  $\mu\text{m}$

These include:

#### 2.3.5.1.2.1

##### **electrolytically zinc coated sheet and strip (electrozinc sheet)**

sheet and strip coated electrolytically with zinc with coating thickness generally between 1  $\mu\text{m}$  and 10  $\mu\text{m}$  on each surface

NOTE This coating never shows a spangle finish. After zinc coating, the surfaces may be passivated by chromating or phosphating or treatment with compounds of vanadium and/or titanium. This final surface treatment does not alter the definition of such products as "zinc coated flat products".

#### 2.3.5.1.2.2

##### **electrolytically zinc nickel coated sheet and strip**

Sheet and strip coated electrolytically with zinc nickel alloy with coating thickness generally between 1  $\mu\text{m}$  and 8,5  $\mu\text{m}$  on each surface

#### 2.3.5.1.2.3

##### **electrolytically lead tin coated sheet and strip**

sheet and strip coated electrolytically with a lead tin alloy with coating thickness generally between 2,5  $\mu\text{m}$  and 10  $\mu\text{m}$  on each surface

### 2.3.5.2

#### **sheet and strip with organic coatings**

uncoated or metal coated (e.g. zinc coated) sheet and strip, subsequently coated with an organic material or a mixture of metal powder and organic material by one of the following continuous processes:

- a) by the application of one or more coats of paint or other type of product;

NOTE 1 After drying, the thickness of the coating varies according to its character from 2  $\mu\text{m}$  to 400  $\mu\text{m}$  on each surface.

- b) by the application of an adhesive film whether or not followed by a coating of organic materials

NOTE 2 The coating may have different surface designs and a thickness generally between 35  $\mu\text{m}$  to 500  $\mu\text{m}$  on each surface.

### 2.3.5.3

#### **sheet and strip with miscellaneous inorganic coatings**

sheet and strip coated with an inorganic material, e.g. vitreous enamel

### 2.3.6

#### **profiled sheet**

sheet usually manufactured from coated sheet, but also from uncoated sheet, with a width much greater than the height of the profile (see Figure 1)

NOTE A distinction is made between:

- a) corrugated sheet: products showing large or small longitudinal corrugations, mainly used for cladding, flooring and roofing (Figure 1a);
- b) ribbed sheet: products with rectangular or trapezoidal longitudinal ribs (Figure 1b).

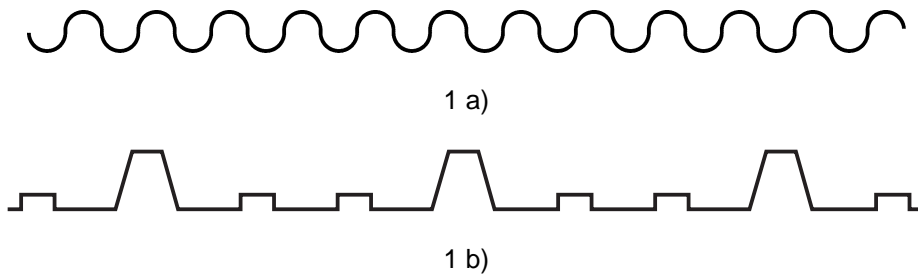


Figure 1 — Illustration of typical profiled sheet (see 2.3.6)

**2.3.7 composite products**  
products comprising:

- c) plate, sheet and strip clad with steels or alloys to resist for example wear, chemical corrosion or heat distortion. Bonding is usually achieved by rolling, spraying, welding or explosion;
- d) sandwich steel sheet formed from two sheets bonded together by means of a synthetic sound insulating plastic layer;
- e) sandwich panels fabricated from two ribbed sheets bonded by an insulating layer (see Figure 2)



Figure 2 — Illustration of typical sandwich panel [see 2.3.7 c)]

**2.4 long products**

**2.4.1 general**

those products that do not conform to the definition of flat products (see 2.3.1)

NOTE They have a constant cross-section that is usually defined by a standard that fixes the normal size ranges and the tolerances on shape and dimensions. The surface is generally smooth, but in certain cases, e.g. reinforcing bars, may have a regularly raised or indented pattern.

**2.4.2 rod**

hot rolled long product having a nominal size generally of 5 mm or above and wound into irregular coils

NOTE 1 The cross section may be round, oval, square, rectangular, hexagonal, octagonal, half round or of any similar shape. Its surface is smooth. Rod is generally intended to undergo further processing. It may also be used, with or without further processing, e.g. cold deforming, for the fabrication of welded mesh or for other elements used to reinforce concrete.

NOTE 2 Rod used for wire drawing purposes in coil form is generally named "wire rod".

**2.4.3 wire**

product of constant full cross section along its length, obtained by cold drawing rod through a reducing die or passing under pressure between rollers and rewinding the drawn product