



**SLOVENSKI STANDARD**  
**SIST EN 10203:1997**  
**01-december-1997**

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Cold reduced electrolytic tinplate

Kaltgewalztes elektrolytisch verzinnertes Weißblech

Fer blanc électrolytique

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EUROPEAN STANDARD

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English version

Cold reduced electrolytic tinfoil

Fer blanc électrolytique

kaltgewalztes elektrolytisch verzinnertes  
Weißblech

This European Standard was approved by CEN on 1991-08-21. 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.

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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.

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CEN

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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

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Foreword

This draft European Standard has been drawn up by ECISS/TC26 'Tinplate and blackplate' whose Secretariat is held by BSI.

It will replace the following Euronorms published under the European Coal and Steel Community.

EU 145: 1978 Tinplate and blackplate in sheet form;

EU 146: 1980 Tinplate and blackplate in coil form;

EU 158: 1983 Double reduced electrolytic tinplate sheet;

EU 159: 1986 Double reduced electrolytic tinplate coil.

The Coordinating Commission (COCOR) of ECISS agreed in November 1989 to submit this draft European Standard to the CEN formal vote.

This European Standard EN 10203 was approved by CEN on 1991-04-16.

According to the Common CEN/CENELEC Rules, 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 United Kingdom.

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## 1 Scope

This draft European Standard specifies requirements for single and double cold reduced low carbon mild steel electrolytic tinplate in the form of sheets or coils for subsequent cutting into sheets.

Single reduced tinplate is specified in nominal thicknesses that are multiples of 0,005 mm from 0,17 up to and including 0,49 mm. Double reduced tinplate is specified in nominal thicknesses that are multiples of 0,005 mm from 0,14 mm up to and including 0,29 mm.

This standard applies to coils and sheets cut from coils in nominal minimum widths of 600 mm.

Annex D lists the relevant clauses for the selected products.

## 2 Normative References

- EU 109: Conventional Rockwell hardness test. Rockwell scales HRN and HRT Rockwell scales HRBm and HR30Tm for thin products.
- EN 10 002-1: Metallic materials - Tensile testing.  
Part 1: Methods of test (at ambient temperature)

## 3 Definitions

For the purposes of this standard the following definitions apply:

- 3.1 electrolytic tinplate: Low carbon mild steel sheet or coil coated on both surfaces with tin that is applied in continuous electrolytic operation.  
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- 3.2 differentially coated electrolytic tinplate: Cold reduced electrolytic tinplate, one surface of which carries a heavier tin coating than the other.
- 3.3 single cold reduced: A term used to describe those products where the steel substrate has been reduced to the desired thickness in a cold reduction mill and subsequently annealed and temper rolled.
- 3.4 double cold reduced: A term used to describe those products in which the steel base has had a second major reduction after annealing.
- 3.5 standard grade tinplate: Material in sheet form which is the product of line inspection. It is suitable under normal conditions of storage, for established lacquering and printing over the entire surface of the sheet and does not contain any of the following:
- pinholes i.e. any perforation through the whole thickness of the material;
  - thickness outside the tolerance range specified in 10.3;
  - surface defects which render the material unsuitable for the intended use;
  - damage or shape related defects which render the material unsuitable for the intended use.

**3.6 second grade tinplate:** Material which represents the best sheets rejected from the standard grade but may contain sheets exhibiting defects in surface appearance and shape of limited extent. Suitability for established lacquering and printing over the entire surface of the sheet is not assured.

**3.7 batch (box) annealed (BA):** Annealed by the process in which the cold reduced strip is annealed in tight coil form, within a protective atmosphere, for a predetermined time-temperature cycle.

**3.8 continuously annealed (CA):** Annealed by the process in which cold reduced coils are unwound and annealed in strip form within a protective atmosphere.

**3.9 finish.** The surface appearance of tinplate is determined by the surface characteristics of the steel base together with the condition of the tin coating which can be either flow melted or unflow-melted.

**3.9.1 bright finish:** A finish resulting from the use of temper mill work rolls that have been ground to a high degree of polish together with a flow-melted tin coating.

**3.9.2 stone finish:** A finish on flow-melted tinplate characterized by a directional pattern, resulting from the use of final mill work rolls that have been ground to a lower degree of polish than those used for the smooth finish, together with a flow-melted tin coating.

**3.9.3 silver finish:** A finish resulting from the use of temper mill work rolls that have been shot blasted, together with a flow-melted tin coating.

**3.9.4 matt finish:** A finish resulting from the use of temper mill work rolls which have been shot blasted together with an unflow-melted tin coating.

**3.10 coil:** A rolled flat strip product which is wound into regularly superimposed laps so as to form a coil with almost flat sides.

**3.11 bow**

**3.11.1 longitudinal (line) bow:** Residual curvature in the strip remaining along the direction of rolling.

**3.11.2 transverse (cross) bow:** A mode of curvature in the sheet such that the distances between its edges parallel to the rolling direction is less than the sheet width.

**3.12 centre buckle (full centre):** An intermittent vertical displacement or wave in the strip occurring other than at the edges.

**3.13 edge wave:** An intermittent vertical displacement occurring at the strip edge when the strip is laid on a flat surface.

**3.14 feather edge (transverse thickness profile):** The variation in thickness, characterized by a reduction of thickness close to the edges, at right angles to the rolling direction.

**3.15 burr:** Metal displaced beyond the plane of the surface of the strip by shearing action.

**3.16 rolling width:** The width of the strip perpendicular to the rolling direction.

**3.17 consignment:** A quantity of material of the same specification made available for despatch at the same time.

**3.18 bulk package, or bulk:** A packaging unit comprising a base platform or pallet, the sheets and packaging material. (See pallet.)

**3.19 pallet:** Base platform on which a coil is placed to facilitate ready transportation.

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**3.20 stillage platform:** A base platform on which sheets are stacked to facilitate packing and ready transportation.

**3.21 sample unit:** 750 m of coil cut into sheets, for the purposes of sampling.

**3.22 line inspection:** The final inspection of the finished product performed by instruments and/or by visual examination at normal production line speeds.

**3.23 anvil effect:** The effect which a hard anvil can produce on the numerical hardness value obtained when a hardness test is performed on very thin sheet supported on such an anvil.

## 4 Information to be supplied by the purchaser

### 4.1 General

The following information shall be given on the enquiry and order to assist the manufacturer in supplying the correct material:

- a) the designation as given in clause 5;
- b) the quantity expressed as an area or mass basis;
- c) for single reduced tinplate - the finish required, (see 6.2.1);
- d) marking requirements for differentially coated tinplate (see clause 12);
- e) any further special requirements.



NOTE. Appropriate classifications are suitable for shaping operations such as stamping, drawing, folding, beading and bending and assembly work such as joint forming, soldering and welding although for tin coatings less than 2,8 g/m<sup>2</sup> high speed soft soldering cannot be guaranteed. Welding, for coatings less than 1,4 g/m<sup>2</sup>, cannot be guaranteed. The end use should be borne in mind when the classification is selected.

#### 4.2 Options

In the event that the purchaser does not indicate his wish to implement any of the options included in this standard and does not specify his requirements at the time of the enquiry and order, the product shall be supplied on the following basis:

- a) with cathodic surface passivation treatment using a dichromate salt of an alkali metal (see 6.3);
- b) where differential tin coatings are ordered the heavier coated surface shall be indicated by continuous parallel lines spaced at 75 mm intervals (see clause 12);
- c) for double reduced tinplate - with a stone surface finish (see 6.2.2);
- d) for coils - the location of each joint shall be indicated by a piece of non-rigid material and a punched hole (see 11.3);
- e) for coils - the coils shall be dispatched with their cores vertical (see 16.1);
- f) for sheets - the direction of the runners of the stillage platform is at the discretion of the producer but shall be consistent within a consignment (see 16.2);
- g) for sheets - the rolling width shall be either of the two specified dimensions (see note to 4.3);
- h) with a coating of DOS (see 6.3).

#### 4.3 Additional information

In addition to the information in 4.1 and 4.2 the purchaser may wish to provide further information to the supplier to ensure that the order requirements are consistent with the end use of the product.

The purchaser shall inform the supplier of any modifications to his fabrication operations that will significantly affect the way in which the tinplate is used.

NOTE. When ordering double cold reduced tinplate, the purpose of manufacture for which the material is intended should be stated. It should be noted that double cold reduced tinplate is relatively less ductile than single cold reduced tinplate and has very distinct directional properties, so for some uses e.g. for built-up can bodies, the direction of rolling should be stated. When double cold reduced tinplate is used for built-up can bodies, the rolling direction should be around the circumference of the can so as to minimize the hazard of flange cracking.

## 5 Designation

### 5.1 Single reduced tinplate

For the purposes of this standard single reduced tinplate is designated in terms of a temper classification based on the Rockwell 30 Tm hardness values as given in table 2.

Single reduced material covered by this European Standard shall be designated by the following characteristics in the given sequence:

- a) a description of the material (either tinplate coil or sheet);
- b) the number of this standard (EN 10 203);
- c) the temper designation in accordance with table 2;
- d) the type of annealing if specified by the user (see 9.1);
- e) the type of finish (see 3.9);
- f) the coating masses and their combinations, E (for equally coated) or D (for differentially coated) together with numbers representing the nominal coating mass on each surface as described in clause 12;
- g) the dimensions in mm
  - for coils, strip thickness x width
  - for sheets thickness x width x length;

example: single cold reduced tinplate sheet in accordance with this standard of steel grade T61 continuously annealed (CA), stone finish, equally coated with a coating mass of 2,8 g/m<sup>2</sup>, with a thickness of 0,22 mm, a width of 800 mm and a length of 900 mm shall be designated:

tinplate sheet EN 10 203 - T61 - CA - stone - E2,8/2,8 - 0,22 x 800 x 900.

### 5.2 Double reduced tinplate

For the purposes of this standard the mechanical properties in which double reduced tinplate complying with this standard is supplied are designated in terms of a system of mechanical property classifications based on the 0.2 % proof stress as given in table 3.

Double reduced material covered by this European Standard shall be designated by the following characteristics in the given order:

- a) a description of the material (either tinplate coil or sheet);
- b) the number of this standard (EN 10 203);
- c) the mechanical property designation (see table 3);
- d) the type of annealing if specified by the user (see 9.1).

e) the coating masses and their combinations, E (for equally coated) or D (for differentially coated) together with numbers representing the nominal coating mass on each surface (see clause 12);

f) the dimensions in mm.

- for coils, strip thickness x width;
- for sheets thickness x width x length;

example: double cold reduced tinplate coil in accordance with this standard of steel grade DR 620, continuously annealed, differentially coated with coating masses of 8,4 g/m<sup>2</sup> and 5,6 g/m<sup>2</sup> with a thickness of 0,18 mm and a width of 750 mm shall be designated.

tinplate coil EN 10 203 - DR 620 - CA - D8,4/5,6 - 0,18 x 750.

## 6 Manufacturing features

### 6.1 Manufacture

The purity of tin used to produce the coating shall be not less than 99.85 %.

The methods of manufacture of tinplate are the province of the manufacturer and are not specified in this standard.

The purchaser shall be informed if any alteration is made to the method of manufacture that will affect the properties of the tinplate.

NOTE. It is recommended that the manufacturer supplies to the purchaser such details of the manufacturing process as may assist the purchaser in his efficient use of the tinplate.

### 6.2 Finish

#### 6.2.1 Single reduced tinplate

Single reduced tinplate can be supplied with either a bright, silver, stone or matt finish, and the finish required shall be specified at the time of order (see 4.1 c).

The appearance is governed by:

- a) the surface characteristics of the steel base which principally result from controlled preparation of the work rolls used during the final stages of temper rolling;
- b) the mass of the coating applied; and
- c) whether the tin layer is flow-melted or unflow-melted.

#### 6.2.2 Double reduced tinplate

Double cold reduced tinplate is usually supplied with a stone surface finish and a flow brightened tin coating.

### 6.3 Passivation and oiling

The surface of electrolytic tinplate is normally subjected to a passivation treatment and to oiling. Passivation, produced either by a chemical treatment or by an electrochemical treatment, gives a surface with an improved resistance to oxidation and improved suitability for lacquering and printing. The usual passivation procedure is a cathodic treatment in a solution of a dichromate salt of an alkali metal.

Under normal conditions of transport and storage, electrolytic tinplate shall be suitable for surface treatments such as established lacquering and printing operations.

Tinplate coils and sheets are supplied with an oil coating. The oil shall be one that is recognized (i.e. by the relevant national or international authority) as being suitable for food packaging. Unless otherwise agreed at the time of order (see 4.2 h) DOS (dioctyl sebacate) shall be used.

### 6.4 Defects

#### 6.4.1 Coils

The producer is expected to employ his normal quality control and line inspection procedures to ensure that the tinplate manufactured is in accordance with the requirements of this standard. However, the production of tinplate coils in continuous strip mill operations does not afford the opportunity for removal of all tinplate that does not comply with the requirements of this standard.

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At the time of shearing, sheets not conforming to the standard grade shall be set aside by the purchaser or his agent.

NOTE 1. The amount of sheets complying with this standard should be at least 85 % of any one coil.

NOTE 2. Items c) and d) in 3.5 cannot be verified by specific tests and should be the subject of special agreement between producer and user.

If, when processing tinplate coil, the purchaser (or his agent) encounters recurring defects which in his opinion seem excessive, it is essential - where practicable - that he stops processing the coil and advises the supplier.

The purchaser is expected to have adequate handling, roller levelling and shearing equipment and to take reasonable care during these operations.

#### 6.4.2 Sheets

Sheets shall not contain any defects as defined in 3.5, when sampled as described in 13.2.