



SLOVENSKI STANDARD
oSIST prEN 10202:2021
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Hladno valjani jekleni izdelki za embalažo - Elektrolizno pokositreni in pokromani izdelki

Cold reduced tinmill products - Electrolytic tinplate and electrolytic chromium/chromium oxide coated steel

Kaltgewalzte Verpackungsblecherzeugnisse - Elektrolytisch verzinnter und spezialverchromter Stahl

Aciers pour emballage laminés à froid - Fer blanc électrolytique et fer chromé électrolytique

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ICS:

77.140.50	Ploščati jekleni izdelki in polizdelki	Flat steel products and semi-products
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NORME EUROPÉENNE
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Cold reduced tinmill products - Electrolytic tinplate and electrolytic chromium/chromium oxide coated steel

Aciers pour emballage laminés à froid - Fer blanc électrolytique et fer chromé électrolytique

Kaltgewalzte Verpackungsblecherzeugnisse - Elektrolytisch verzinnter und spezialverchromter Stahl

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 459/SC 9.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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prEN 10202:2021 (E)**European foreword**

This document (prEN 10202:2021) has been prepared by Technical Committee CEN/TC 459/SC 9 “Coated and uncoated flat products to be used for cold forming”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 10202:2001.

In comparison with the previous edition, the following technical modifications have been made:

- normative references have been updated;
- revision of the definition of electrolytic chromium coated steel with the addition of the symbol ECCS-RC which allows the use of a trivalent process;
- rewording of Clause 5 with the split into mandatory information (5.1) and options (5.2);
- modification of Clause 6 with the rewording of 6.1 and the addition of 6.2 and 6.3 about annealing and finish respectively;
- Table 1 has been updated;
- major modifications of 6.4 about passivation;
- addition of a new subclause 6.6 on imperfections that includes 6.6.1 and 6.6.2 for coils and sheets respectively;
- major modifications of Clause 7 about coatings including changes of Table 2, Table 3 and Table 4;
- major modifications of Clause 8 about mechanical properties with the addition of stress-strain curves for batch and continuous annealed material, curve showing the plateau height for continuous annealed material and stress-strain curves for the determination of the yield strength of some continuous annealed grades;
- removal of the tensile strength values from Table 5 and transfer into informative Annex J;
- modification of 9.4.6 about test method for centre fullness;
- modifications of the ordering of Annexes;
- new Annex I about tensile testing conditions in case of dispute;
- deletion of the Annex giving the previous designations.

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1 Scope

This document specifies requirements for tinmill products in the form of sheets or coils. Tinmill products consist of single and double reduced low carbon mild steel electrolytically coated with either tin (tinplate) or chromium/chromium oxide (ECCS) or (ECCS-RC) (see 3.3).

Single reduced tinmill products are specified in nominal thicknesses that are multiples of 0,005 mm from 0,16 mm up to and including 0,49 mm. Double reduced tinmill products are specified in nominal thicknesses that are multiples of 0,005 mm from 0,12 mm up to and including 0,29 mm.

NOTE 1 Other thicknesses can be ordered upon agreement.

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

NOTE 2 Standard width coils for specific uses, e.g. tabstock, can be slit into narrow strip for supply in coil form.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 610, *Tin and tin alloys - Ingot tin*

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

EN 10334, *Steel for packaging - Flat steel products intended for use in contact with foodstuffs, products and beverages for human and animal consumption - Non-coated steel (blackplate)*

EN ISO 6508-1, *Metallic materials - Rockwell hardness test - Part 1: Test method (ISO 6508-1)*

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EN ISO 6892-1:2019, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2019)*

3 Terms and definitions

For the purposes of this document the following terms and definitions apply:

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

electrolytic tinplate

cold reduced low carbon mild steel sheet or coil coated on both surfaces with tin that is applied in continuous electrolytic operation

3.2

differentially coated electrolytic tinplate

electrolytic tinplate, one surface of which carries a heavier tin coating than the other

Note 1 to entry: In some cases, one surface does not have any tin coating.

prEN 10202:2021 (E)**3.3****electrolytic chromium coated steel****ECCS or ECCS-RC**

cold reduced low carbon mild steel sheet or coil electrolytically treated to produce on both surfaces a duplex film of metallic chromium adjacent to the steel substrate with a top layer of hydrated chromium oxides or hydroxides

Note 1 to entry: This can either be produced by a hexavalent chromium process (ECCS) or by a trivalent chromium process (ECCS-RC).

3.4**blackplate**

cold-reduced low-carbon mild steel, applied for manufacturing electrolytic metallic coated plate

3.5**single reduced**

product in which the blackplate has been reduced to the desired thickness in a cold-reduction mill and subsequently annealed and temper rolled

3.6**double reduced**

product in which the blackplate has been reduced to the desired thickness in a cold-reduction mill and subsequently annealed and temper rolled mostly with the help of a water-based lubricant to achieve a higher gauge reduction often in excess of 5%

3.7**temper rolling**

secondary rolling process to obtain desired roughness and mechanical properties

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3.8**standard grade**

material in sheet or coil form that is suitable, under normal conditions of storage, for its ordered use

3.9**batch annealed**

box annealed

BA

process in which the cold reduced strip is heated in tight coil form, within a controlled atmosphere, for a pre-determined time/temperature cycle

3.10**continuously annealed****CA**

process in which cold reduced coils are unwound and heated in strip form within a controlled atmosphere for a pre-determined time/temperature cycle

3.11**finish**

surface appearance of tinmill products determined by the surface characteristics of the steel base together with the condition of the coating, either flow-melted or unflow-melted

3.11.1**flow-melting**

process by which the 'as deposited' tin is heated above its melting point of 232 °C and is quickly quenched in cool water resulting in a composite coating iron/tin alloy and free tin which exhibits a bright reflective appearance

3.11.2**bright finish**

finish resulting from the use of temper mill work rolls that have been ground to a high degree of polish and, in the case of tinplate, together with a flow-melted tin coating

3.11.3**stone finish**

fine stone finish

finish 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 bright finish, in the case of tinplate together with a flow-melted tin coating

3.11.4**silver finish**

finish resulting from the use of temper mill work rolls with surface textured by shot blast, electro discharge texturing (EDT), electron beam texturing (EBDT) or another similar method, together with a flow-melted tin coating

3.11.5**matt finish**

finish resulting from the use of temper mill work rolls with surface textured by shot blast, electro discharge texturing (EDT), electron beam texturing (EBDT) or another similar method, together with an unflow-melted tin coating

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3.12**coil**

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

3.13**bow**

residual curvature in sheet or coil such that the distance between the edges is less than the appropriate sheet or coil dimension

3.13.1**longitudinal bow**

line bow

residual curvature in the strip remaining along the direction of rolling

3.13.2**transverse bow**

cross bow

mode of curvature in the sheet such that the distances between its edges parallel to the rolling direction is less than the sheet width

prEN 10202:2021 (E)**3.14****centre fullness**

full centre

centre buckle

intermittent vertical displacement occurring other than at the edge of the sheet or coil when the material is laid on a flat horizontal surface

3.15**short pitch camber**

deviation of the coil from a straight line forming its chord

3.16**edge wave**

intermittent vertical displacement occurring at the edge of a sheet or a sample from a coil when laid on a flat horizontal surface

3.17**feather edge**

transverse thickness profile

variation in thickness, characterized by a reduction of thickness close to the edges, at right angles to the rolling direction

3.18**burr**

metal displaced beyond the plane of the surface of the strip by shearing action

3.19**rolling width**

width of the strip perpendicular to the rolling direction

3.20**consignment**

quantity of material of the same specification made available for dispatch at the same time

3.21**bulk package**

packaging unit comprising a stillage platform, the sheets and packaging material

3.22**stillage platform**

platform on which sheets are stacked to facilitate packing and ready transportation

3.24**line inspection**

final inspection of the finished product performed by instruments and/or by visual examination at normal production line speeds

3.25**SITA**

area of 100 m² of material taken from a total surface area of 200 m²

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4 Classification and designation

4.1 Classification

The classification of the relevant steel grades is according to EN 10020. Steel grades for this document are generally classified as non-alloy quality steels, but in some cases low-alloy quality steels may be encountered.

4.2 Designation

For the steel grades covered by this document, the steel names as given in the relevant tables are allocated in accordance with EN 10027-1. TS grades are batch annealed grades and TH grades are continuous annealed grades. The steel numbers as given in the relevant tables are allocated in accordance with EN 10027-2. See ordering examples below (see 5.3).

5 Information to be supplied by the purchaser

5.1 Mandatory information

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

- a) quantity expressed as an area (square metres or SITA's) or mass (tons);
- b) description of the material (coil or sheet) and type of metallic coating (typically tin or chromium);
- c) dimensions in millimetres: **(standards.iteh.ai)**
 - for coil: thickness X width; [oSIST prEN 10202:2021](https://standards.iteh.ai/catalog/standards/sist/1f348792-8046-47b8-820f-21)
 - for sheets: thickness X rolling width X cutting length; <https://standards.iteh.ai/catalog/standards/sist/1f348792-8046-47b8-820f-21>
- d) number of this document (prEN 10202:2021);
- e) steel name or steel number (see Table 5);
- f) type of annealing;
- g) finish (see Table 1);
- h) in the case of tinplate, the coating masses and their combinations, E (for equally coated) or D (for differentially coated) described in Clause 11 (standard marking); in the case of chromium coated steel specify ECCS or ECCS-RC;
 - i) in the case of tinplate, the passivation (see 6.4);
 - j) type of oiling;
- k) intended use of the material e.g. stamping, drawing, beading, bending and assembly work such as joint forming, soldering and welding, surface coating (metallic and organic coating);
- l) dispatch and packaging conditions (see Clause 14), e.g. inner diameter of coils, coils core vertical or horizontal and the coil winding direction if core vertical, maximum and minimum mass and/or outside diameter of coils;

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- m) maximum weight of bulk package for sheets, direction of runners if is different from 14.2;
- n) if required standard designation for a test report 2.2 or an inspection certificate 3.1 or 3.2 in accordance with EN 10204.

5.2 Options

In addition to the information in 5.1 the purchaser shall provide further information to the supplier to ensure that the order requirements are consistent with the end use of the product.

It is generally recommended that supplier and purchaser agree on the best product specifications to fit the targeted use and other requirements. Eventually, the purchaser is responsible for the product designation in the order (see 5.3).

The purchaser shall inform the supplier of any modifications to its manufacturing process that will significantly affect the way in which the tinmill products are used.

It should be noted that double cold reduced tinmill products are relatively less ductile than single cold reduced products and have very distinct directional properties, so for some uses, e.g. for three-piece can bodies, the direction of rolling should be stated.

When double cold reduced products are used for three-piece can bodies, it is recommended to have the can weld perpendicular to the strip rolling direction so as to minimize the hazard of flange cracking.

5.3 Ordering examples

EXAMPLE 1 **10 t of tinplate in sheet**, in accordance with this document of steel grade TS275, batch annealed, stone finish, equally coated with a coating mass of 2,8 g/m², passivation 311, with a thickness of 0,22 mm, a rolling width of 800 mm and cut length of 900 mm is designated:

10 t tinplate sheet EN 10202-TS275-BA-ST-E2,8/2,8-311-0,22 × 800 × 900

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EXAMPLE 2 **10 t of tinplate in coil** in accordance with this document, of steel grade TH620, continuously annealed, stone finish, differentially coated with coating masses of 8,4 g/m² and 5,6 g/m², and marking on side 8,4 g/m² positioned on the outside of coil, passivation Titanium/Zirconium 555 with a thickness of 0,18 mm and a rolling width of 750 mm is designated:

10 t tinplate coil EN 10202-TH620-CA-ST-D8,4/5,6-555-0,18 × 750

EXAMPLE 3 **10 t of chromium coated steel (ECCS or ECCS-RC) in coil** in accordance with this document, of steel grade TH550, continuously annealed, fine stone finish, with a thickness of 0,185 mm and a rolling width of 750 mm is designated:

10 t ECCS coil EN 10202-TH550-CA-FS-ECCS-0,185 × 750

10 t ECCS-RC coil EN 10202-TH550-CA-FS-ECCS-RC -0,185 × 750

NOTE These ordering examples do not cover all the specifications of the products; further mandatory information is requested; see 5.1.

6 Manufacturing features**6.1 Steelmaking process**

The steelmaking process is under the responsibility of the manufacturer with the exception that the steel is continuously cast. All steels shall be fully killed.

The purchaser should be informed of any change made to the method of manufacture if the manufacturer suspects that the change may affect the ordered end use of the product.

If the product is ordered for food contact, the product should be manufactured in accordance with food safety regulations. The steel shall be manufactured according to EN 10334.

If the product is not ordered for food contact, a different steelmaking process may be agreed between manufacturer and purchaser.

The purchaser shall inform the manufacturer about all relevant regulations which may influence the manufacturing of the product.

Each product shall be traceable to the cast.

6.2 Annealing

Annealing for tinmill products shall be either batch annealing or continuous annealing and shall be specified by the purchaser at the time of enquiry and order (see 5.1 f)).

NOTE The forming properties of tinmill products will differ depending on the type of annealing employed.

6.3 Finish

Tinplate is usually available in the finishes as indicated in Table 1. The type of finish is designated by the product finish or the code shown in Table 1.

Table 1 — Recognized finishes

Product finish	Code	Steel base	Flow-melted (tinplate only)	Nominal surface roughness of the steel base µm Ra
Bright (tinplate only)	BR	Smooth	Yes	≤ 0,35
Fine stone	FS	Fine stone	Yes	0,25 - 0,45
Stone	ST	Stone	Yes	0,35 - 0,60
Silver (tinplate only)	SG	Shot blast or alternative	Yes	≥ 0,90
Matt	MM	Shot blast or alternative	No	Various

NOTE 1 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 applied coating; and
- c) whether the tin layer is flow-melted or unflow-melted.

NOTE 2 Special surface finishes are available by agreement at the time of ordering for example: tin unmelted or other surface roughnesses.

NOTE 3 For shot blast, alternative roll preparation is possible, for example: EDT, EBDT or another similar method.