



**International
Standard**

ISO 11949

**Cold-reduced tinmill products —
Electrolytic tinplate**

Aciers pour emballage laminés à froid — Fer blanc électrolytique

**Third edition
2026-04**

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 9, *Tinplate and blackplate*.

This third edition cancels and replaces the second edition (ISO 11949:2016), which has been technically revised.

The main changes are as follows:

- the maximum nominal thickness for double cold-reduce tinplate has been changed to 0,390 mm, instead of 0,360 mm (see [Clause 1](#));
- the chromium-free passivation has been specified in addition to the usual chromium passivation (see [6.2](#) and [7.4](#));
- former subclause 7.4, “Passivation and Oiling”, has been divided into two subclauses, i.e. passivation ([7.4](#)) and oiling ([7.5](#));
- the coating mass of 0,6 g/m² has been specified for the lowest coating mass, instead of 1,0 g/m² (see [Clause 8](#));
- an option to supply sheet numbers in bulk package other than multiples of 100 has been added ([17.2](#));
- the maximum weight of sheets in bulk package has been increased to up to 3 000 kg instead of 2 000 kg ([17.2](#));
- several steel grades have been added (see [Tables A.1, A.2](#) and [B.1](#));
- the lower yield strength, R_{eL} has been specified for CA ([9.3, 14.3.2, Annex B, Annex D](#)).

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Cold-reduced tinmill products — Electrolytic tinplate

1 Scope

This document specifies requirements for single and double cold-reduced low-carbon mild steel electrolytic tinplate in the form of sheets or coils.

Single cold-reduced tinplate is generally specified in nominal thicknesses that are multiples of 0,005 mm, from 0,150 mm up to and including 0,600 mm. Double cold-reduced tinplate is generally specified in nominal thicknesses that are multiples of 0,005 mm, from 0,100 mm up to and including 0,390 mm.

This document applies to coils and sheets cut from coils in nominal minimum rolling widths of 600 mm.¹⁾

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.

ISO 404, *Steel and steel products — General technical delivery requirements*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

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

ISO 10474, *Steel and steel products — Inspection documents*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1

blackplate

cold-reduced low-carbon mild steel, applied for manufacturing electrolytic tinplate

Note 1 to entry: See ISO 11951^[1].

3.2

electrolytic tinplate

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

3.3

differentially coated electrolytic tinplate

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

1) Nominal minimum rolling widths of 500 mm can be applied by agreement between the purchaser and the manufacturer.

3.4

single cold-reduced

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

3.5

double cold-reduced

description of product in which the blackplate has had a second major reduction after annealing

3.6

standard grade tinplate sheet

product in sheet form which is confirmed to be suitable, under normal conditions of storage, for established lacquering and printing over the entire sheet and is

- a) free from surface imperfections which render the material unsuitable for the intended use and
- b) free from damages which render the material unsuitable for the intended use

Note 1 to entry: The standard material is compliant with the requirements as specified in this document.

3.7

batch annealing

box annealing

BA

process in which the cold-reduced strip is annealed in coil form, within a protective atmosphere, for a predetermined time-temperature cycle

3.8

continuous annealing

CA

process in which cold-reduced coils are unwound and annealed in strip form within a protective atmosphere

3.9

finish

surface appearance of tinplate, determined by the surface roughness, R_a , of the steel base together with the conditioning of the tin coating which can be either flow-melted or unflow-melted

3.9.1

smooth finish

appearance of the blackplate resulting from the use of temper-mill work rolls that have been ground to a low roughness

Note 1 to entry: This finish is used for the production of bright finish tinplate.

3.9.2

bright finish

appearance of the surface on flow-melted tinplate using the smooth finish blackplate

3.9.3

fine stone finish

appearance of the surface 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 level of roughness than those used for stone finish

3.9.4

stone finish

appearance of the surface on flow-melted tinplate characterized by a directional pattern, resulting from the use of final-mill work rolls that have been ground to a higher level of roughness than those used for the smooth finish

3.9.5

silver finish

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

3.9.6

matt finish

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

3.10

chromium passivation

usual procedure which is a cathodic treatment in an acidic chromium solution resulting in a chromium layer on the tinplate

3.11

chromium-free passivation

procedure which is a treatment in non-chromium solution resulting in a chromium-free layer on the tinplate

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

longitudinal bow

line bow

residual curvature in the strip remaining along the direction of rolling

3.14

transverse bow

cross bow

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

3.15

centre fullness

centre buckle

full centre

intermittent vertical displacement or wave in the strip occurring other than at the edges

Note 1 to entry: See [Figure 8](#).

3.16

edge wave

intermittent vertical displacement occurring at the strip edge when the strip is laid on a flat surface

3.17

feather edge

transverse thickness profile

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

3.18

edge camber

deviation of edge of coil/sheet from a straight line forming its chord

3.19

rolling width

width of the rolled strip perpendicular to the direction of rolling

3.20

stillage platform

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

3.21

consignment

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

3.22

bulk package

bulk

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

3.23

line inspection

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

4 General technical delivery condition

In cases where the technical delivery condition is not specified in this document, then ISO 404 shall apply.

5 Classification

Steel grades for this document are generally classified as non-alloy quality steels.

6 Information to be supplied by the purchaser

6.1 Designation

For the purposes of this document, tinplate is designated in terms of a steel grade classification based either on the Rockwell HR30Tm hardness values or on the tensile properties. For the hardness requirements, the steel grade designations shall be in accordance with [Annex A](#); specifically, steel grade designations are given in [Table A.1](#) for single cold-reduced tinplate and in [Table A.2](#) for double cold-reduced tinplate. For the tensile properties requirements, the steel grade designations shall be in accordance with [Table B.1](#) of [Annex B](#).

Tinplate covered by this document shall be designated by the following characteristics in the given sequence:

- a) a reference to this document, i.e. ISO 11949;
- b) the steel grade designation in accordance with [Table A.1](#), [Table A.2](#) or [Table B.1](#);
- c) the type of annealing used by the manufacturer (see [7.2](#));
- d) the type of finish (see [7.3](#));
- e) the coating masses and their combinations, D or S (for differentially coated), together with numbers representing the nominal coating mass on top/bottom surface (see [Clause 12](#));
- f) the dimensions, in millimetres:
 - for coils, thickness × width;
 - for sheets, thickness × width × length.

By agreement, the symbol “× C” after width may be designated for coils.

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By agreement, the symbol “w” may be designated after the number for the width to indicate that the number is the dimension perpendicular to the direction of rolling.

EXAMPLES

Single cold-reduced tinplate sheet, in accordance with this document, steel grade T61, continuously annealing (CA), stone finish, equally coated with a coating mass of 2,8 g/m², with a thickness of 0,220 mm, a width of 800 mm and a length of 900 mm is designated:

ISO 11949-T61CA - stone - 2,8/2,8 - 0,220 × 800 × 900

Double cold-reduced tinplate coil, in accordance with this document, steel grade T75, continuously annealing (CA), stone finish, differentially coated with coating masses of 8,4 g/m² and 5,6 g/m², with marking on 5,6 g/m² side, with a thickness of 0,180 mm and a width of 750 mm is designated:

ISO 11949-T75CA - stone - 8,4/D5,6 - 0,180 × 750

Tinplate coil, in accordance with this document, steel grade TH415, continuously annealing (CA), stone finish (ST), differentially coated with a coating mass of 2,8 g/m² and 5,6 g/m², with marking on 5,6 g/m² side, with a thickness of 0,200 mm, a width of 750 mm is designated:

ISO 11949- TH415 CA - ST - 2,8/D5,6 - 0,200 × 750 × C

Tinplate sheet, in accordance with this document, steel grade TS520, batch annealing (BA), stone finish, differentially coated with coating masses of 5,6 g/m² and 8,4 g/m², with single line marked on 5,6 g/m² side, with a thickness of 0,140 mm, a dimension perpendicular to the direction of rolling of 844 mm and a length of 755 mm is designated:

ISO 11949- TS520 BA - stone - S5,6/8,4 - 0,140 × 844w × 755

6.2 Mandatory information

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

- a) the designation as given in [6.1](#);
- b) the quantity, expressed on an area or mass basis, e.g. 50 000 kg of sheets, 100 000 kg of coils;
- c) marking requirements for differentially coated tinplate (see [Clause 12](#));
- d) the minimum and the maximum coil weight, the minimum and the maximum coil outer diameter, the coil internal diameter, the core vertical or horizontal and the direction of winding (see [17.1](#));
- e) the maximum weight of bulk package;
- f) the type of passivation (see [7.4](#)), the type of chromium passivation or the type of chromium-free passivation (see [Annex H](#));
- g) other inspection documents than that specified by the manufacturer (see [Clause 16](#));
- h) end use;
- i) any further special requirements.

NOTE Information on appropriate steel grade is suitable for shaping operations, such as stamping, drawing, folding, beading and bending, and assembly work such as joint forming, soldering and welding. The end use is important when the steel grade is selected.

6.3 Options

In addition to the information in [6.2](#), the purchaser may wish to provide additional information to the manufacturer to ensure that the order requirements are consistent with the end use of the product.

The purchaser shall inform the manufacturer of any modifications to the purchaser's 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 is generally stated. It is 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, for example for built-up can bodies, the direction of rolling is usually stated. When double cold-reduced tinplate is used for built-up can bodies, the direction of rolling is around the circumference of the can so as to minimize the hazard of flange cracking.

7 Manufacturing features

7.1 Manufacture

Continuously cast, fully-killed steel is applied except when otherwise specified. The examples of the steel types of tinplate are shown in [Annex C](#).

The steel type of tinplate shall be designed to secure food safety when tinplate is used for food application. The purchasers should be aware of existing national regulations which may impose limitations on some elements.

The purity of tin used to produce the coating shall be not less than 99,85 % (mass fraction).

The manufacturing method of tinplate is left to the discretion of the manufacturer and is not specified in this document.

7.2 Annealing

Annealing of tinplate shall be either batch annealing (BA) or continuous annealing(CA) and shall be specified by the purchaser at the time of enquiry and order.

7.3 Finish

Tinplate is usually available in the finishes as indicated in [Table 1](#). The type of finish is designated either by the tinplate finish or the code shown in [Table 1](#).

Table 1 — Typical finishes for tinplate

Tinplate finish	Code ^a	Blackplate		Flow-melted
		Finish	Surface roughness ^{bc} R _a μm	
Bright	BT	Smooth	≤0,35	Yes
Fine stone	FS	Fine stone	0,25 – 0,45	Yes
Stone	ST	Stone	0,35 – 0,60	Yes
Silver	AM	Matt	≥0,90	Yes
Matt	MM	Matt		No
^a By agreement between the purchaser and the manufacturer, another code system may be applied. ^b Values of surface roughness in this table are not mandatory. The values are given for reference in order to classify the finishes. ^c The measurement of surface roughness is in accordance with ISO 21920-3 ^[2] .				

NOTE The appearance is governed by the following:

- a) the surface characteristics of the blackplate principally result from controlled preparation of the work rolls used during the final stages of temper rolling;
- b) the mass of the coating applied;