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## Cold-reduced tinmill products — Blackplate

*Aciers pour emballage laminés à froid — Fer noir*

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# Contents

	Page
Foreword.....	v
Introduction.....	vi
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 General technical delivery condition.....</b>	<b>3</b>
<b>5 Classification.....</b>	<b>3</b>
<b>6 Information to be supplied by the purchaser.....</b>	<b>3</b>
6.1 Designation.....	3
6.2 Mandatory information.....	4
6.3 Options.....	5
<b>7 Manufacturing features.....</b>	<b>5</b>
7.1 Manufacture.....	5
7.2 Annealing.....	5
7.3 Finish.....	5
7.4 Oiling.....	6
7.5 Imperfections.....	6
<b>8 Mechanical properties.....</b>	<b>6</b>
8.1 General.....	6
8.2 Hardness requirement.....	6
8.3 Tensile property requirement.....	6
<b>9 Tolerances on dimensions and shape.....</b>	<b>7</b>
9.1 General.....	7
9.2 Thickness and feather edge.....	7
9.2.1 Coil thickness.....	7
9.2.2 Feather edge.....	7
9.3 Coil width.....	7
9.4 Coil length.....	7
9.5 Edge camber of trimmed coils.....	7
9.6 Flatness.....	8
9.6.1 Edge wave.....	8
9.6.2 Longitudinal and transverse bow.....	8
9.6.3 Centre fullness.....	8
<b>10 Joint within a coil.....</b>	<b>8</b>
10.1 General.....	8
10.2 Number of joint.....	8
10.3 Location of joint.....	9
10.4 Dimension of joint.....	9
10.4.1 Thickness.....	9
10.4.2 Overlap.....	9
<b>11 Sampling.....</b>	<b>9</b>
<b>12 Test method.....</b>	<b>10</b>
12.1 Hardness test.....	10
12.1.1 Test piece.....	10
12.1.2 Test method.....	10
12.2 Tensile test.....	11
12.2.1 Test piece.....	11
12.2.2 Test method.....	11
12.3 Flatness test.....	11

12.3.1	General	11
12.3.2	Edge wave	11
12.3.3	Longitudinal or transverse bow	11
12.3.4	Centre fullness	12
<b>13</b>	<b>Retests</b>	<b>13</b>
<b>14</b>	<b>Inspection document</b>	<b>14</b>
<b>15</b>	<b>Dispatch and packaging</b>	<b>14</b>
15.1	Coil orientation	14
15.2	Labelling	14
<b>Annex A</b>	<b>(normative) Hardness requirements for blackplate</b>	<b>15</b>
<b>Annex B</b>	<b>(normative) Tensile property requirements for blackplate</b>	<b>16</b>
<b>Annex C</b>	<b>(informative) Steel types</b>	<b>18</b>
<b>Annex D</b>	<b>(informative) Springback test for routine determination of proof strength for blackplate</b>	<b>19</b>
<b>Annex E</b>	<b>(normative) Rockwell HR15Tm values and their HR30Tm equivalents</b>	<b>20</b>
<b>Bibliography</b>		<b>21</b>

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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 documents 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 17, *Steel*, Subcommittee SC 9, *Tinplate and blackplate*.

This second edition ~~is a technical revision of the first edition (ISO 11951:1995)~~ <sup>ISO 11951:2016</sup> ~~replaces the first edition (ISO 11951:1995)~~ <sup>75a7ddb37026/iso-11951-2016</sup>, which has been technically revised.

## Introduction

Selling of packaging steels is today a worldwide business. Therefore, revision of this International Standard was expected earlier since the last edition dated from 1995. Because of the long period between revisions, harmonization became difficult. In some regions, the properties of the packaging steels are determined by the hardness test whereas in other regions, a decade ago, the hardness test was replaced by the tensile test. Since the latest available techniques should be reflected in this International Standard, the possibility of using the tensile test as the reference test for determining the mechanical properties should be considered during the next revision of this International Standard.

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# Cold-reduced tinmill products — Blackplate

## 1 Scope

This International Standard specifies requirements for single and double cold-reduced blackplate in the form of coils which are intended for manufacturing electrolytic tinplate or electrolytic chromium/chromium oxide-coated steel (ECCS) in accordance with ISO 11949 or ISO 11950.

Single cold-reduced blackplate 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 blackplate is generally specified in nominal thicknesses that are multiples of 0,005 mm, from 0,100 mm up to and including 0,360 mm.

This International Standard applies to coils in nominal minimum rolling widths of 600 mm<sup>1)</sup> with either trimmed or untrimmed edges.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

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

ISO 6892-1:—<sup>2)</sup>, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

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

ISO 11949, *Cold-reduced tinmill products — Electrolytic tinplate*

ISO 11950, *Cold-reduced tinmill products — Electrolytic chromium/chromium oxide-coated steel*

## 3 Terms and definitions

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

### 3.1

#### **blackplate**

cold-reduced low-carbon mild steel, normally oiled, for the production of electrolytic tinplate or ECCS in accordance with ISO 11949 or ISO 11950

### 3.2

#### **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

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

2) To be published (Revision of ISO 6892-1:2009)

3.3

**double cold-reduced**

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

3.4

**batch annealed**

**box annealed**

**BA**

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

3.5

**continuously annealed**

**CA**

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

3.6

**finish**

appearance of the surface of blackplate resulting from controlled preparation of the work rolls used for the final stages of rolling

3.6.1

**smooth finish**

finish 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 or bright finish ECCS.

3.6.2

**stone finish**

finish 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

3.6.3

**matt finish**

finish 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

3.7

**coil**

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

3.8

**longitudinal bow**

**line bow**

residual curvature in the strip remaining along the direction of rolling

3.9

**transverse bow**

**cross bow**

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

3.10

**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 6](#).



**3.11****edge wave**

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

Note 1 to entry: This parameter is only applicable to material supplied with trimmed edges.

**3.12****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

Note 1 to entry: This parameter is only applicable to material supplied with trimmed edges.

**3.13****edge camber**

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

**3.14****burr**

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

**3.15****rolling width**

width of the rolled strip perpendicular to the direction of rolling

**3.16****consignment**

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

**3.17****pallet**

base platform on which a coil is placed to facilitate ready transportation

**3.18****anvil effect**

effect that a hard anvil can produce on the numerical hardness value obtained when a hardness test is performed on very thin material supported on such an anvil

**4 General technical delivery condition**

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

**5 Classification**

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

**6 Information to be supplied by the purchaser****6.1 Designation**

For the purposes of this International Standard, blackplate 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 are given in [Table A.1](#) for single cold-reduced blackplate and in [Table A.2](#) for double cold-reduced blackplate. For the tensile properties requirements, the steel grade designations are given in [Table B.1](#).

## ISO 11951:2016(E)

Blackplate covered by this International Standard shall be designated by the following characteristics in the given sequence:

- a) a reference to this International Standard, i.e. ISO 11951;
- 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 dimensions of the thickness and width, in millimetres;
- f) whether mill-edge or trimmed.

### EXAMPLE

Single cold-reduced blackplate coil, in accordance with this International Standard, steel grade T61, continuously annealed (CA), stone finish, with a thickness of 0,220 mm and a width of 800 mm after trimmed, shall be designated.

#### **ISO 11951 - T61 CA - stone - 0,220 × 800 trimmed**

Double cold-reduced blackplate coil, in accordance with this International Standard, steel grade T75, continuously annealed (CA), stone finish, with a thickness of 0,180 mm and a mill-edge width of 750 mm, shall be designated.

#### **ISO 11951 - T75 CA - stone - 0,180 × 750 mill-edge**

Blackplate coil, in accordance with this International Standard, steel grade TH415, continuously annealed (CA), stone finish (ST), with a thickness of 0,200 mm and a mill-edge width of 750 mm, shall be designated.

#### **ISO 11951 - TH415 CA - ST - 0,200 × 750 mill-edge**

Blackplate coil, in accordance with this International Standard, steel grade TS520, batch annealed (BA), stone finish, with a thickness of 0,140 mm and a width of 844 mm after trimmed, shall be designated:

#### **ISO 11951 - TS520 BA - stone - 0,140 × 844 trimmed**

## 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 a mass basis, e.g. 50 tons of sheets, 100 tons of coils;
- c) 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 [15.1](#));
- d) whether or not the coil shall be supplied with the edges trimmed;
- e) whether or not the coil shall be coated with a suitable oil.
- f) other inspection document than that specified by the manufacturer (see [Clause 14](#));

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

### 6.3 Options

When ordering, the purchaser shall supply all the necessary information concerning the following:

- a) the production facilities which he/she anticipates will be appropriate to the ordered blackplate;
- b) the intended end use.

## 7 Manufacturing features

### 7.1 Manufacture

Continuously cast, fully-killed steel shall be applied, except when otherwise specified. The examples of the steel types of blackplate are shown in Annex C.

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

The methods of manufacture of blackplate are the province of the manufacturer and are not specified in this International Standard.

NOTE It is recommended that the manufacturer supplies to the purchaser such details of the manufacturing process so as to assist the purchaser in his/her efficient use of the blackplate.

### 7.2 Annealing

Annealing of blackplate 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

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

**Table 1 — Typical finishes for blackplate**

Finish	Code <sup>a</sup>	Surface roughness <sup>b, c</sup>
		<i>Ra</i> µm
Smooth	BT	≤0,35
Fine stone	FS	0,25 – 0,45
Stone	ST	0,35 – 0,60
Matt	MM	≥0,90

NOTE Double cold-reduced blackplate is usually supplied with a stone finish.

<sup>a</sup> By agreement between the purchaser and the manufacturer, another code system may be applied.

<sup>b</sup> Values of surface roughness in this table are not mandatory. The values are given for reference in order to classify the finishes.

<sup>c</sup> The measurement of surface roughness is in accordance with ISO 4288.