
International Standard



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Single cold-reduced tinplate and single cold-reduced blackplate — Part 1: Electrolytic and hot-dipped tinplate sheet and blackplate sheet

Fer-blanc et fer noir laminés à froid par simple réduction — Partie 1: Feuilles de fer-blanc obtenues par électrolyse et par immersion à chaud et feuilles de fer noir

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1111/1 was developed by Technical Committee ISO/TC 17, *Steel*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Norway
Austria	India	Poland
Belgium	Iran	Romania
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Canada	Japan	Spain
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France	Mexico	United Kingdom
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No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation ISO/R 1111/1-1969, of which it constitutes a technical revision.

Single cold-reduced tinplate and single cold-reduced blackplate —

Part 1: Electrolytic and hot-dipped tinplate sheet and blackplate sheet

1 Scope and field of application

1.1 This part of ISO 1111 applies to single cold-reduced electrolytic and hot-dipped tinplate sheet in low carbon cold-reduced mild steel in nominal thicknesses from 0,15 mm up to and including 0,49 mm and to single cold-reduced blackplate sheet in low carbon mild steel in nominal thicknesses from 0,15 mm up to and including 0,49 mm.

1.2 This part of ISO 1111 does not apply to tinplate or blackplate in coils, or to double-reduced tinplate or blackplate, or to material described commercially as tinned sheets, steel sheets or electrolytic chromium/chromium oxide coated steel (TFS).

2 References

ISO/R 1024, *Rockwell superficial hardness test (N and T scales) for steel*.

ISO 1111/2, *Single cold-reduced tinplate and single cold-reduced blackplate — Part 2: Electrolytic tinplate coil and blackplate coil for subsequent cutting into sheet*.¹⁾

ISO 4977, *Double cold-reduced electrolytic tinplate*.²⁾

3 Definitions

For the purpose of this part of ISO 1111 the following definitions apply:

3.1 tinplate: Cold-reduced low carbon mild steel sheet coated on both surfaces with tin, applied either by dipping in molten tin or by electro-deposition. Tinplate produced by the hot-dipping process is called hot-dipped tinplate; that produced by electro-deposition is called electrolytic tinplate.

3.2 differentially coated tinplate: Electrolytic tinplate, one surface of which carries a heavier tin coating than the other.

3.3 blackplate: Cold-reduced low carbon mild steel sheet, not tinned, and normally not oiled or otherwise treated.

3.4 consignment: A quantity of tinplate or blackplate of the same dimensions and quality made available for despatch at the same time.

4 Conditions of manufacture and utilization

4.1 The methods of manufacture of tinplate and blackplate are the province of the producer.

4.2 The methods of using tinplate and blackplate are the province of the user.

4.3 The tin used for the coating of tinplate shall have a purity of not less than 99,75 %.

4.4 The chemical composition of the steel may be agreed upon between the producer and the purchaser provided that it is consistent with this part of ISO 1111. (See clause 15.)

4.5 At the time they are made available by the producer and under normal conditions of transport and storage, tinplate and blackplate are suitable for surface treatments such as established lacquering and printing operations. Appropriate grades and tempers are also suitable for shaping operations such as stamping, drawing, folding and bending, and assembly work such as joint forming, soldering (tinplate only) and welding. The purchaser's order requirements shall be consistent with the end use of the product.

4.6 Surface finishes

4.6.1 There are four recognized commercial finishes for electrolytic tinplate, namely bright, stone, matt and silver. The appearance is governed by

1) At present at the stage of draft. (Revision of ISO/R 1111/2-1976.)

2) At present at the stage of draft.

- 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;
- the mass of the coating applied;
- whether the tin layer is melted or unmelted.

- a) **Bright finish:** A surface provided by a flow-brightened tin coating on a smooth finish steel base.
- b) **Stone finish:** A surface provided by a flow-brightened tin coating on a steel base finish characterized by a directional pattern.
- c) **Matt finish:** A surface provided by an unmelted coating generally on a shot blast finish steel base (see 4.5).
- d) **Silver finish:** A surface provided by a flow-brightened tin coating on a highly roughened shot blast finish steel base (see 4.5).

4.6.2 Blackplate may be available in the same steel base surface finishes.

4.7 Surface treatments (Electrolytic tinplate only)

4.7.1 Passivation treatment

A chemical or electrochemical treatment applied to the surface of electrolytic tinplate to produce a surface of improved resistance to discolouration and superior lacquering and printing quality. The usual procedure is cathodic treatment in a solution of sodium dichromate (see 15.2.4).

4.7.2 Oiling

Normally the surface of electrolytic tinplate has applied to it a very thin coating of an oil which is suitable for food packaging (see 15.2.1).

NOTES

- 1 When ordering tinplate and blackplate it is recommended that the purpose of manufacture for which the tinplate or blackplate is intended should be stated. When he so requires, the purchaser should indicate to the producer the direction of rolling required.
- 2 It is recommended that, if required, the producer supplies to the purchaser such details of the steel-making process as may assist the purchaser in his efficient use of the material. It is further recommended that the purchaser be informed of any alterations in the method of manufacture which will significantly affect the properties of the purchased product. Similarly, it is recommended that the purchaser informs the producer of modifications in the fabrication methods which will significantly affect the way in which the purchased product is used.

5 Material grading

5.1 Electrolytic tinplate, standard grade

Standard grade electrolytic tinplate represents the normal production of lines employing the usual inspection and classifica-

tion procedures. In normal conditions of storage and use, standard grade electrolytic tinplate permits lacquering and printing over the entire surface.

NOTE — Electrolytic tinplate, second grade, is available in certain countries. It represents the best sheets rejected from the standard grade but may contain sheets exhibiting surface imperfections, tinning defects, and shape and other defects to a minor extent (but not pinholes or off-gauge material). Suitability for lacquering and printing over the entire surface is not guaranteed.

5.2 Hot-dipped tinplate

After coating, hot-dipped tinplate is inspected and graded as follows.

5.2.1 First grade or primes

Tinplate which at the time of despatch is free from defects readily visible to the unaided eye. In normal conditions of storage and use it is suitable for lacquering or printing over the entire surface of the sheet.

5.2.2 Second grade or seconds

Tinplate which at the time of despatch has visible imperfections of moderate magnitude or frequency. Lacquering or printing over the entire surface of the sheet is not guaranteed.

NOTE — The term "standard grade" is applied to hot-dipped tinplate which is inspected during processing and from which material not of first or second grade is rejected. The accepted material, however, is not segregated into first and second grades.

5.3 Blackplate

Blackplate is line inspected during processing. Material having visible imperfections of only moderate magnitude or frequency is included. Blackplate is liable to rust, but at the time it is made available by the producer the material is suitable for normal lacquering and printing over the entire surface.

NOTE — Second grade. In certain countries, blackplate rejected during line inspection because of surface imperfections or shape defects of limited extent is available as second grade. Suitability for lacquering or printing over the entire surface of the sheet is not guaranteed.

6 Tin coating masses

6.1 Expression of tin coating masses

Tin coating masses shall be expressed in grams per square metre (g/m^2).

6.2 Electrolytic tinplate, equally coated

6.2.1 A number of coating masses are specified as shown in table 1.

Table 1 — Coating masses for electrolytic tinplate, equally coated

Code ¹⁾	Nominal coating mass ¹⁾		Minimum average coating mass (see 6.5)
	g/m ²		g/m ²
	Per surface	Total both surfaces	Total both surfaces
E2,8/2,8	2,8	5,6	4,9
E5,6/5,6	5,6	11,2	10,5
E8,4/8,4	8,4	16,8	15,7
E11,2/11,2	11,2	22,4	20,2

1) The code figures are derived from the nominal coating mass on each surface of the tinplate.

6.3 Electrolytic tinplate, differentially coated

6.3.1 A number of coating masses are specified as shown in table 2.

Table 2 — Coating masses for electrolytic tinplate, differentially coated

Code ¹⁾	Nominal coating mass ¹⁾		Minimum average coating mass (see 6.5)	
	g/m ²		g/m ²	
	Heavily coated surface	Lightly coated surface	Heavily coated surface	Lightly coated surface
D5,6/2,8	5,6	2,8	4,75	2,25
D8,4/2,8	8,4	2,8	7,85	2,25
D8,4/5,6	8,4	5,6	7,85	4,75
D11,2/2,8	11,2	2,8	10,1	2,25
D11,2/5,6	11,2	5,6	10,1	4,75

1) The code figures are derived from the nominal coating mass on each surface of the tinplate.

6.4 Hot-dipped tinplate

Table 3 — Coating masses for hot-dipped tinplate

Code ¹⁾	Nominal coating mass ¹⁾	Minimum average coating mass (see 6.5)
	g/m ²	g/m ²
	Total both surfaces	Total both surfaces
H12/12	24,0	21,0
H14/14	28,0	24,6
H15/15	30,0	26,0
H17/17	33,6	28,0

1) The code figures are derived from the nominal coating mass on each surface of the tinplate. In hot-dipped tinplate it is not possible, as for electrolytic tinplate, intentionally to vary the distribution between the two surfaces and the total coating is assumed to be equally divided between the two surfaces.

6.5 The average value of the coating masses of the sample selected to represent a consignment in accordance with clause 9 and tested in accordance with clause 10 shall not be lower than the appropriate minimum average coating mass specified in tables 1, 2 or 3.

NOTES

1 The individual specimens of the sample may show tin coatings as low as, for example, 80 % of the minimum average coating mass for equally coated or differentially coated electrolytic tinplate and 60 % of the minimum average coating mass for hot-dipped tinplate. It is emphasised that isolated specimens have no representative value in relation to the consignment under consideration.

2 In practice the producer aims to apply the nominal coating mass, the minimum average coating mass values only occasionally being encountered.

6.6 Marking of differentially coated tinplate

In order to distinguish material having differential coatings, the sheet should be marked on one surface which, by agreement, can be either the lightly or the heavily coated surface. In all cases, both the surface to be marked and the surface which is to be piled uppermost should be clearly designated on the contract by the purchaser. Generally the marking should be made on the heavily coated surface in the form of dull straight continuous parallel lines about 1 mm wide (see annex A). If the marking is on the lightly coated surface then at least alternate lines should be interrupted, or geometrical patterns may be used.

7 Temper classifications

7.1 The term "temper", when applied to tinplate and blackplate, summarises a combination of interrelated mechanical properties and no single mechanical test can measure all the various factors which contribute to the fabrication characteristics of the material. However, the Rockwell 30T hardness test (HR 30T) is the best single test available and serves as a guide to the properties of the material. This test forms the basis for a system of temper classification as shown in table 4, which gives the hardness values at which the producer shall aim.

7.2 The purchaser shall specify the temper required by reference to the appropriate temper classification as set out in table 4.

Table 4 — Rockwell HR 30T hardness values normally associated with the temper classification of batch annealed and continuously annealed tinplate

Temper classification	Rockwell HR 30T hardness aim	
	Mean	Maximum deviation of sample average
T 50	52 max.	
T 52	52	+ 4 - 4
T 55	55	+ 4 - 3
T 57	57	+ 4 - 3
T 61	61	+ 4 - 4
T 65	65	+ 4 - 4
T 70	70	+ 3 - 4